



PROCEEDINGS

ONE HUNDRED AND  
TWENTY FIRST  
ANNUAL MEETING

OF THE

UNITED STATES ANIMAL  
HEALTH ASSOCIATION



TOWN AND COUNTRY HOTEL  
SAN DIEGO, CALIFORNIA  
OCTOBER 12 – 18, 2017

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UNITED STATES ANIMAL HEALTH ASSOCIATION**

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*Special Thanks to all Committee Chairs and Presenters for contributions  
to these proceedings.*

# ABOUT USAHA

## USAHA VISION

The United States Animal Health Association (USAHA) is the leading forum for animal health issues in the United States, promoting active participation from industry, academia, and government. USAHA provides a national venue for stakeholders to identify the most effective methods to protect and improve animal health and welfare and public health.

## USAHA MISSION

The United States Animal Health Association develops and promotes sound animal health solutions for the public good.

# ABOUT USAHA

## USAHA MEMBERSHIP

### State Official Agency Members (50)

Alabama	Indiana	Nebraska	South Carolina
Alaska	Iowa	Nevada	South Dakota
Arizona	Kansas	New Hampshire	Tennessee
Arkansas	Kentucky	New Jersey	Texas
California	Louisiana	New Mexico	Utah
Colorado	Maine	New York	Vermont
Connecticut	Maryland	North Carolina	Virginia
Delaware	Massachusetts	North Dakota	Washington
Florida	Michigan	Ohio	West Virginia
Georgia	Minnesota	Oklahoma	Wisconsin
Hawaii	Mississippi	Oregon	Wyoming
Idaho	Missouri	Pennsylvania	
Illinois	Montana	Rhode Island	

### Federal Official Agency Members (10)

USDA, APHIS, Veterinary Services	USDHS, Science and Technology Directorate
USDA, Agriculture Research Service	USDI, US Fish and Wildlife Service
USDA, National Institute of Food and Agriculture	USDI, National Park Service
USDA, APHIS, Wildlife Services	USDI, USGS, National Wildlife Health Center
USDHHS, Centers for Disease Control and Prevention	USDOE, Lawrence Livermore National Laboratory

### Territory and Sovereign Agency Members (2)

North Mariana Island  
Navajo Nation

### International Animal Health Agencies (4)

Australia  
Canada  
Mexico  
New Zealand

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Alpaca Owners Association  
American Association of Avian Pathologists  
American Association of Bovine Veterinarians  
American Association of Equine Practitioners  
American Association of Small Ruminant Practitioners  
American Association of Swine Veterinarians  
American Association of Veterinary Laboratory Diagnosticians  
American Association of Wildlife Veterinarians  
American Association of Zoo Veterinarians  
American Cervid Alliance  
American Dairy Goat Association  
American Association of Equine Practitioners  
American Farm Bureau Federation  
American Goat Federation  
American Horse Council  
American Sheep Industry Association  
American Veterinary Medical Association  
Association of American Veterinary Medical Colleges  
Association of Fish & Wildlife Agencies  
Battelle Memorial Institute  
Exotic Wildlife Association  
Livestock Exporters Association, USA  
Livestock Marketing Association  
National Association of State Public Health Veterinarians  
National Bison Association  
National Cattlemen's Beef Association  
National Chicken Council  
National Dairy Herd Information Association, Inc.  
National Institute for Animal Agriculture  
National Milk Producers Federation  
National Pork Board  
National Pork Producers Council  
National Renderers Association  
National Turkey Federation  
North American Deer Farmers Association  
North American Elk Breeders Association  
Professional Rodeo Cowboys Association  
US Poultry & Egg Association

### District Delegates

Northeast: G. Hohenhaus; B. Thompson  
North Central: L. Neuder, P. Brennan  
South: L. O. Lollis; E. Jensen  
West: T. Hanosh; H.M. Richards

**Individual Members: 703**

**Life Members: 134**

**Student Members: 162**

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## I. 2017 Officers and Directors

### A. Officers



#### **2016-2017 Executive Committee**

Front row (from left): David Schmitt, IA, Immediate Past President; Boyd Parr, SC, President; Barbara Determan, IA, President-Elect.  
Back row (from left): Kristin Haas, VT, First Vice President; Marty Zaluski, MT, Second Vice President; Paul McGraw, WI, Third Vice President; Annette Jones, CA, Treasurer.

## B. USAHA Board of Directors, 2017

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Tom	Burkgren	American Assn of Swine Vets
Jim	Kistler	American Assn of Vet Laboratory Diagnosticians
Peregrine	Wolff	American Assn of Wildlife Vets
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David	Foley	American Assn of Equine Practitioners
Cindy	Wolf	American Assn of Small Ruminant Practitioners
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Dale	Moore	American Farm Bureau Federation
Anita	Teel Dahnke	American Goat Federation
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Cliff	Williamson	American Horse Council
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Jaspinder	Komal	Canadian Food Inspection Agency
Casey	Barton Behravesh	Centers for Disease Control and Prevention
Boyd	Parr	Clemson Univ Livestock Poultry Health
Keith	Roehr	Colorado Dept of Agriculture



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Margaret	Wild	National Park Service
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Cyril	Gay	USDA-ARS
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Paul	McGraw	Wisconsin Dept of Agriculture
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Jim	Logan	Wyoming Livestock Board

## C. 2017 USAHA Committees

- COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
- USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS
- COMMITTEE ON ANIMAL WELFARE
- USAHA/AAVLD COMMITTEE ON AQUACULTURE
- COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
- COMMITTEE ON CATTLE AND BISON
  - SUBCOMMITTEE ON BRUCELLOSIS
  - SUBCOMMITTEE ON BVDV
  - SUBCOMMITTEE ON JOHNE'S DISEASE
  - SUBCOMMITTEE ON TRICHOMONIASIS
  - SUBCOMMITTEE ON TUBERCULOSIS
- USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
- COMMITTEE ON EQUINE
- USAHA/AAVLD COMMITTEE ON FOOD AND FEED SAFETY
- COMMITTEE ON FOREIGN AND EMERGING DISEASES
- COMMITTEE ON GOVERNMENT RELATIONS
- COMMITTEE ON INTERSTATE AND INTERNATIONAL COMMERCE
  - SUBCOMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE
  - SUBCOMMITTEE ON LIVESTOCK IDENTIFICATION
- USAHA/AAVLD COMMITTEE ON NATIONAL ANIMAL HEALTH LABORATORY
- COMMITTEE ON NOMINATIONS AND RESOLUTIONS
- COMMITTEE ON PARASITIC AND VECTOR BORNE DISEASES
- COMMITTEE ON PROGRAM
- COMMITTEE ON ONE HEALTH
  - SUBCOMMITTEE ON PHARMACEUTICAL ISSUES
  - SUBCOMMITTEE ON RABIES
  - SUBCOMMITTEE ON SALMONELLA
- COMMITTEE ON SHEEP, GOATS AND CAMELIDS
  - SUBCOMMITTEE ON SCRAPIE

## I. C. USAHA COMMITTEES

- COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES
- COMMITTEE ON SWINE
- COMMITTEE ON WILDLIFE AND CAPTIVE WILDLIFE

Rosters of each committee as of the 2017 Annual Meeting are included within each report.

A current listing for committee rosters can be found on the USAHA website, listed under each committee page respectively.

## **II. 2017 Annual Meeting Proceedings**

- A. USAHA/AAVLD President's Reception and Dinner
- B. USAHA/AAVLD Plenary Session
- C. USAHA Scientific Posters, Papers and Abstracts
- D. USAHA Membership Meetings
- E. Committee Reports
- F. Other Reports

## **II. A. USAHA/AAVLD President's Reception and Dinner**

### **INVOCATION**

Kristin Haas

### **MEMORIAL SERVICE**

Barbara Determan

Colleagues, let us take a moment this evening to humbly pause in our busy lives to remember those that have served with us over the years, but will not be with us this evening because of their passing. Let us keep in mind that life is fragile, but also enjoy the memories, contributions and fellowship that we share that are no longer with us. We wish for strength to their families and friends, and that we carry forward their dedication in the work we do here.

Please take a moment and reflect on these individuals as I read their names:

Jack Armstrong, Nevada, USAHA Member

Claude Barton, Tennessee, USAHA Member

Joe Finley, Texas, USAHA Member

Bob Sanders, Texas, USAHA Member

Gail Scherba, Illinois, AAVLD Member

Charles Thoen, Iowa, USAHA Member

Let us humbly pause for silent prayer in remembrance of these deceased members. Amen.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### WELCOME TO CALIFORNIA

Annette Jones



Dr. Annette Jones, State Veterinarian of California, introduced a brief video featuring photos from across the U.S., compiled by members of the National Assembly. The montage was a reminder to everyone that we're all individuals working together to achieve common goals, and the importance of our relationships.



II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

**PRESIDENT'S DINNER SPONSOR'S RECOGNITION**

Special Thanks to our 2017 President's Dinner Supporters



Jill Greene, Thermo Fisher Scientific



Steve Parker, Merial

**USAHA PRESIDENT'S ADDRESS**

Boyd Parr



*Dr. Boyd Parr, with his wife, Cheryl*

This is my chance to make a few remarks as President of USAHA and I want to bring you greetings on behalf of U.S. Animal Health Association and welcome you to San Diego. Of course, I can't top the beautiful job that Annette Jones did making us all feel so good with all those slides from across the country. Thank you, Annette, for all that effort - we really appreciate it.

I am welcoming you to the 121<sup>st</sup> U.S. Animal Health Association Annual Meeting. This is also the 60<sup>th</sup> Annual Meeting for AAVLD and Pat Halbur, who you will hear from next, has been serving as their President. I wanted to stop and say thank you to Pat for what a privilege it has been to work alongside you. He certainly made my job easier – everyone should have a "Parallel President" as capable and helpful as Pat. Thank you again.

Since 1897, USAHA has been the Nation's Animal Health Forum. We have a vision statement, the most recent version from 2014, that I am going to read to you to help give context to rest of my remarks:

"U.S. Animal Health Association is the leading forum for animal health issues in the U.S, promoting active participation from industry, academia and government. USAHA provides a national venue for stake holders to identify the most effective methods to protect and improve animal health and welfare, and public health."

121 years – that's a long time. I want to tell you U.S. Animal Health certainly has a strong history and heritage and it's the foundation for everything we do. In my year as President, I have been the beneficiary of the work done in those 121 years. The tremendous respect that we see going to

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

Washington, DC for our Governmental Relations committee. You see it in the halls of Congress and across the federal government. You see it when Ben and I were invited to meet with the Director General of O.I.E in D.C. That respect that all of you have helped earn is evident.

The members of this organization are the source of its strength. This was demonstrated to me vividly when I had the opportunity this year to make all four regional meetings. I was greeted with hospitality by all groups and I came away very impressed with the vitality of the organization and its diversity. Each of the regions adhering to the mission and catering what they were doing to the needs of their particular district. So, thanks to each one of you that welcomed me there and I wanted all of you to hear that to appreciate what it is all of you have helped create.

In 2014, there was a new strategic plan that involved the entire organization creating it, involved the work of a lot of previous Presidents and Executive Committees. It certainly involved this year the work of a very hard working and conscientious Executive Committee, I can't have asked for a better group of people to have been working with this year, they certainly have made me look better than I might have looked otherwise. That work that has been going on all those years from 2014 on just happened to culminate this year in several significant areas. Before I highlight these changes, I want to point out and I am confident in saying that the changes we made under the strategic plan were changes that we made out of strength and not weakness, looking forward for the organization.

The first thing that is obvious to most of you is that the Board approved a new logo last year, we modernized it and made it scalable and it was rolled out during the year. We also contracted to have the website redesigned with many new features, one of the most important being that the site is now mobile friendly. Hopefully you have had a chance to use that. Then we worked with our committees and all of you who have been here very long know that the committees are the heart of this organization. Two big things that we have embarked on – the first I think is very important – we set up for the first time a process to review and evaluate each committee, subcommittee and working group at least once every three years. Then we looked at our structure, drawing input from member surveys and the strategic plan, and reorganized and realigned the committees for flexibility and efficiency. I want to stop and thank all the committee chairs who have been so tremendously supportive as we have worked through this process and as we use this new schedule for this first time. They have made my job a lot easier – a lot of them have accepted new assignments and other changes in the things that they had to do, so thank you all for that.

I has been very much a privilege to be the President in a year, as I joked with some folks earlier, in which we touched all the “third rails” of this organization. So far, we have come out unscathed. With the foundation like we have, I feel really good about the future we have going forward.

As I close, I want to thank a few people for helping me serve you this past year. Let me start with our Executive Director, Ben Richey. I don't know

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

if I would have accepted the nomination if we didn't have Ben to do what he does for USAHA and he certainly has lived up to every expectation. Thank you, Ben. And his able assistant, Kelly Janicek – Kelly has been with us ten years this year – thank you Kelly. She knows my voice when I call – thank you so much for what you do. I want to thank my fellow members in the Southern District for giving me this opportunity, it has certainly been a good one, to serve as their representative for SAHA on the Executive Committee. I also want to tip my hat to a previous President of USAHA from the Southern District, Dave Marshall, also a Clemson grad and fan like me, who applied the arm twisting and talked me into accepting this opportunity. I am grateful to Dave that he did.

I also have to thank the people I work with at Clemson University, the administration who has been supportive in allowing me to do this. Also thank you especially to my colleagues and staff at Clemson Livestock Poultry Health, many of them are here tonight, they have borne some of the brunt of me being gone, picking up a lot of extra duties, and being very helpful to me in getting this done. They may even be planning a party when I become "Past President", but I'm not sure.

In case you think I have forgotten, I'm saving the best for last, my wife, Cheryl, my partner. Without her support and backing, I don't know if I would get anything accomplished. She certainly, by all means, deserves the most thanks for helping me get through all this.

Thank you for the opportunity to serve. It has certainly been a highlight of my career as a veterinarian.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### AAVLD PRESIDENT

Pat Halbur



*About Dr. Halbur:* Patrick G. Halbur, DVM, PhD, became the interim dean of the College of Veterinary Medicine at Iowa State University (ISU) on July 1, 2017. He has been a professor, administrator and researcher at Iowa State since 1990. Among his many roles at Iowa State, Dr. Halbur has served as the chair of the Department of Veterinary Diagnostic and Production Animal Medicine, executive director of the Veterinary Diagnostic Laboratory and interim associate dean for public services and outreach for the College of Veterinary Medicine.

Inducted in 2017 into the National Academy of Inventors, Dr. Halbur and his collaborators have advanced understanding of the pathogenesis, developed new diagnostic technologies, and developed new vaccines for prevention and control of several emerging animal diseases leading to improved animal health, public health and food security. He holds 14 U.S. patents that have been licensed to several companies and was the recipient of the Iowa State University Award for Achievement in Intellectual Property in 2015.

Dr. Halbur continues to serve as Executive Director of the ISU Veterinary Diagnostic Laboratory (ISU VDL). The ISU VDL processes over 85,000 case submissions and conducts approximately 1.25 million diagnostic tests annually, a caseload that has doubled in the last five years. The ISU VDL is the only one of its kind in Iowa, and one of only 11 fully accredited Tier 1 laboratories in the U.S. National Animal Health Laboratory Network. While Dr. Halbur was chair of the Department of Veterinary Diagnostic and Production Animal Medicine, the ISU CVM grew to be first amongst veterinary teaching hospital in food animal patient count. The college receives more USDA funding than any other veterinary college in the nation.

Dr. Halbur is the recipient of several awards including the Howard Dunne Memorial Award from the American Association of Swine Veterinarians, the Iowa State University Award for Departmental Leadership and in 2014 was

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

named to the "Masters of the Pork Industry" by the National Hog Farmer magazine.

The author of over 200 manuscripts in peer-reviewed journals, Dr. Halbur is currently serving as the president of the American Association of Veterinary Laboratory Diagnosticians (AAVLD). He is a past president of the Iowa Veterinary Medical Association and is a member of several veterinary associations.

Dr. Halbur received his DVM, MS and PhD degrees from Iowa State University. After graduating with a DVM from Iowa State, he was a private veterinary practitioner in a mixed animal practice in Williamsburg, Iowa.

II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

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## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### **APHIS Administrator's Award**

Kevin Shea  
APHIS Administrator



*Awardee Bruce Akey (l), with Kevin Shea and Jack Shere*

Bruce L. Akey, DVM, MS, director for the Texas A&M Veterinary Medical Diagnostic Laboratory (TVMDL) was presented with the 2017 APHIS Administrator's Award.

Each year APHIS presents the Administrator's Award during the joint meeting of the United States Animal Health Association (USAHA) and American Association of Veterinary Laboratory Diagnosticians (AAVLD). The award is presented to a USAHA or AAVLD member whose contributions have had a significant and enduring impact on animal health in the U.S.

Dr. Akey was recognized by USDA for his leadership in a number of key areas. His service in regulatory medicine as a state animal health official, as well as his many years as a diagnostic laboratory director in three different states, has given him a unique perspective and understanding of both the regulatory and laboratory challenges involved in protecting animal health, public health and the food supply. His interest and expertise in information technology and informatics has contributed to implementation of innovative and improved technologies, systems and practices in animal disease surveillance and the information and analytic systems that support those efforts. He has been instrumental in disease detection and eradication response efforts involving avian influenza, Johne's disease, and chronic wasting disease. His knowledge of veterinary diagnostic methods and technologies led to his selection as co-chair the National Animal Health Laboratory Network's (NAHLN) Methods Technical Working Group and the



## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

NAHLN Coordinating Council. Dr. Akey has co-chaired multiple AAVLD and joint USAHA/AAVLD committees over the years, including the AAVLD Government Relations Committee since its inception 17 years ago. He is a Past President of the AAVLD and a 2004 recipient of the E. P. Pope Memorial Award from the organization.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### **AAVLD Distinguished Service Award**



*Matti Kiupel*

The Distinguished Service Award honors those members who have generously volunteered their time, energy, and professionalism to substantially enrich and advance AAVLD and diagnostic medicine.

Dr. Matti Kiupel, East Lansing, Michigan, was honored for volunteering time, energy, and professionalism to substantially enrich and advance the AAVLD and the field of veterinary diagnostic medicine. Dr. Kiupel received his veterinary degree from Freie Universitat Berlin in Germany in 1996 and earned his doctorate in veterinary pathology from Purdue University in 2001. He serves as a professor in the Department of Pathobiology and Diagnostic Investigation and the Veterinary Diagnostic Laboratory at the Michigan State University College of Veterinary Medicine. Dr. Kiupel is a diplomate of the American College of Veterinary Pathologists and has chaired the AAVLD Pathology Committee for eight years.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### **AAVLD E.P. Pope Award**



*Lanny Pace*

The American Association of Veterinary Laboratory Diagnosticians' (AAVLD) E. P. Pope Award is the highest honor given by the association in recognition of an individual who has made noteworthy and significant contributions to advance the recognition of the specialty of veterinary diagnostic laboratory medicine.

Dr. Lanny Pace was recognized for noteworthy contributions to the AAVLD and to the field of veterinary diagnostic medicine. Dr. Pace received his DVM degree from Mississippi State University in 1982 and his doctorate in veterinary pathology from Louisiana State University in 1986. A diplomate of the American College of Veterinary Pathologists, he is executive director of the Mississippi Veterinary Research and Diagnostic Laboratory System in Pearl. Dr. Pace has served on the executive board of the AAVLD and is a member of the AAVLD Accreditation Committee.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### **USAHA Federal Partnership Award**



*Boyd Parr with Jon Zack*

In 2011, USAHA established an award to recognize our federal partners who may work closely with USAHA members on a regular basis. The USAHA Federal Partnership Award is designated for the recognition of a federal employee that has demonstrated commendable service to the betterment of animal health in the United States. Candidates can be employed at any level of an Official Federal Agency Member of USAHA. The candidate should exemplify partnership with states and industry stakeholders through leadership, expertise and/or other accomplishments. The recipient need not be a member of USAHA, but have a positive impact on animal health related to the work of USAHA.

Dr. Jon Zack currently manages the National Preparedness and Incident Coordination Center (NPIC) for the USDA Animal and Plant Health Inspection Service, Surveillance, Preparedness and Response Services. He is responsible for developing strategies and policies for effective incident management and coordinating incident response. He has dedicated his career at APHIS to the betterment of animal health in the U.S. He works tirelessly to communicate and interact with state animal health officials and industry and is open to comments and suggestions for improvement. It is this approach that exemplifies the intent of this award.

Dr. Zack is a 1997 graduate of the University of Minnesota College of Veterinary Medicine. He was a large animal and equine practitioner for five years before joining Veterinary Services in 2002. Prior to obtaining his current position in 2007, he served as a District Veterinary Medical Officer and an Area Veterinarian in Charge.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

One of Dr. Zack's notable accomplishments includes in leading the development of the Foreign Animal Disease Preparedness and Response Plan (FAD PReP) from the beginning. His vision for FAD PReP was to have a suite of documents, at various levels, that would support the U.S. response to a disease outbreak—a vision that he succeeded in fulfilling. The FAD PReP documents establish commonly accepted and understood response goals and guidelines and are based on lessons learned in past outbreaks. With the complexity of a disease outbreak, Dr. Zack clearly understands the importance of keeping response resources up to date and applicable to the rapidly changing livestock production systems in the U.S. and the changing animal health situation.

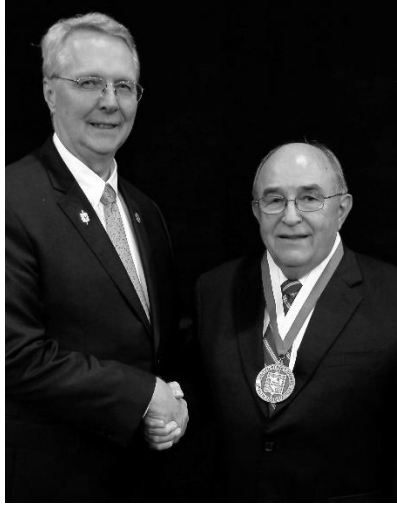
It was Dr. Zack's vision to transform the response to disease outbreaks that led to the development of the Secure Food Supply (SFS) plans. The goals of these plans are to avoid interruptions in animal/animal product movement to processing from farms with no evidence of infection, to provide a continuous supply of safe and wholesome food to consumers and to maintain business continuity for producers, transporters and food processors. These plans had been developed prior to the highly pathogenic avian influenza (HPAI) outbreak in 2015 and were implemented during the recent HPAI outbreaks. These plans were credited as a valuable tool in facilitating movement during the outbreak, and controlling loss.

Dr. Zack also manages a staff that oversees critical programs such as Emergency Management Response System (EMRS), traceability and the National Veterinary Accreditation Program (NVAP). Most importantly, Dr. Zack was the Deputy National Incident Commander during the largest HPAI outbreak in U.S. history during 2014—2015, and served in this position again in 2016, and in 2017, for mixed HPAI/LPAI incidents. Several states commended his leadership during these costly and challenging outbreaks.

Dr. Zack has been a part of numerous other initiatives with APHIS-VS, and his partnership with industry and the states in these efforts makes him deserved of this award tonight.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### USAHA Medal of Distinction Award



*Boyd Parr with Bobby Acord*

The USAHA Medal of Distinction is awarded annually to recognize one or more distinguished USAHA members who have demonstrated outstanding leadership, provided exemplary service, and have made significant contributions to the advancement of the Association.

Mr. Bobby Acord has built a career around public service. A graduate in animal science from West Virginia in 1966, he enlisted with the U.S. Army and served as a meat inspector in Europe, which translated to a long career with USDA. Over a span of twenty years, Mr. Acord held several key senior level positions in APHIS, including Director of the Legislative Affairs Staff and Deputy Administrator for Wildlife Services. Notably, Acord was credited with a successful overhaul of the modern Wildlife Services program, under which he added functions of managing and controlling wildlife diseases and their impact on domestic animals and the public at large. Acord was also responsible for revitalizing the wildlife research program ensuring that decisions and programs were well founded in science and ensured that Congress and other parties better understood the devastating effects on U.S. agriculture animal populations caused by various wildlife diseases.

In all his actions, Acord was a master at fostering good lines of communication and close coordination among all parties including state agricultural agencies, other federal agencies, and especially the affected industries.

Acord took on the role of APHIS Administrator in 2001. As Administrator, he led a diverse portfolio of programs including animal and plant health, wildlife disease control and damage prevention, animal welfare, regulation of

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

agricultural biotechnology, and sanitary and phytosanitary issues related to trade. During his tenure as APHIS Administrator, he put a senior leadership team in place that worked in close coordination with USAHA members and constituent organizations to quickly and effectively eliminate several major disease outbreaks including Exotic Newcastle Disease (END), Avian Influenza (AI), and bovine spongiform encephalopathy (BSE), among others. Ultimately, the success of these operations was largely due to Acord's leadership as he put the best teams in place while also working with Congress and the Administration to obtain adequate funding and ensure that necessary resources were available. Collectively, these disease responses set a new standard for good communication and close collaboration among state and federal agencies and affected industries. Acord proved that regulatory agencies are most effective when they work collaboratively with regulated industries. We still enjoy and benefit today from those relationships that were forged during Acord's tenure as the APHIS Administrator. Specifically, as it relates to USAHA, Acord has always been a strong proponent of APHIS employees' involvement in the organization, from active participation in the various USAHA committees to attending the annual meeting. Even during lean budget years, Acord always ensured strong APHIS representation at the USAHA annual meeting.

Following the events of 9/11, Acord worked on behalf of all parties invested in the animal and plant health of our country to keep APHIS and its mission within USDA. With the creation of the Department of Homeland Security (DHS), there was a concerted effort to incorporate all of APHIS into the new department. Working tirelessly and largely behind the scenes with key Congressional staff, many members of USAHA and other organizations such as the National Association of State Departments of Agriculture (NASDA), Acord was successful in keeping APHIS intact and within the USDA.

Mr. Acord now owns Acord Consulting, LLC, which focuses on issues related to animal and plant health. His practice includes assistance with sanitary and phytosanitary issues management and their impact on trade, and clients include several household names.

During his 50-year career, Bobby Acord truly has been involved in all aspects of animal health while effectively employing a diversity of skills from communications to his political savvy. He has always insisted on the utilization of sound science, from program design and implementation to trade negotiations.

Acord is recognized as a valued mentor to many current leaders in animal agriculture today, and an example for many more. To quote from his nomination, "Acord's unquestionable moral integrity, high personal standards, work ethic, and solid core values have served him well while also setting a stellar example to those around him."

We are honored to recognize him tonight for the USAHA Medal of Distinction. Congratulations, Bobby Acord.

## II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

### **National Assembly Award**



*Scott Marshall with Kent Fowler*

The National Assembly Award is given to an active regulatory official or an industry representative for outstanding service in animal health regulatory programs.

Dr. Kent Fowler, California Department of Food and Agriculture Animal Health branch chief, was recognized for his work in preparation for potential future outbreaks of foot-and-mouth disease; for his support and acceptance of an official treatment for Piroplasmiasis in horses, including efforts to establish a communications infrastructure for equine diseases; and for working closely with public health and animal health officials on bovine tuberculosis issues.



## **II. B. USAHA/AAVLD Plenary Session**

**State of the Industry: Animal Agriculture** –  
Barbara Determan and Steve Hooser, Co-chairs

**Welcome and Introduction** – Max Armstrong

**Ag, Economics, and Impacts of Animal Health:  
Livestock State Perspective** – Mr. Mike Naig, Deputy  
Secretary of Agriculture - Iowa

**Global Relevance – OIE and Foreign Animal Diseases**  
– Dr. Elizabeth Parker, Institute for Infectious Animal  
Diseases

**FMD Now and the Future** – Panel

- Dr. Pam Hullinger, California Animal Health Food Safety System
- Dr. Bret Marsh, Indiana State Veterinarian
- Dr. Jack Shere, Deputy Administrator, USDA-APHIS-VS
- Dr. Liz Wagstrom, National Pork Producers Council

## II. B. USAHA/AAVLD PLENARY SESSION

### **WELCOME AND INTRODUCTION**

Max Armstrong  
Moderator

Max Armstrong, The Voice of American Agriculture, anchors the Penton Agriculture broadcast group that includes television, radio, enhanced Web content, custom video, and custom programming.

Millions of farmers, ranchers and consumers have viewed Max's TV programs and heard his radio broadcasts during his more than 30 years of industry experience. He is one of the most widely recognized and highly regarded agricultural journalists in America.

You can hear him on radio stations throughout the country with weekday broadcasts of his agricultural perspectives on "Farm Progress America" programs and his wit, wisdom and observations in "Max Armstrong's Midwest Digest" segments; and weekly co-hosting the "Saturday Morning Show" on the legendary radio powerhouse, WGN radio.

He is co-founder and co-host of "This Week in AgriBusiness," broadcast on the popular RFD-TV satellite and cable channel that is carried on more than 120 additional local television stations throughout the nation's best agricultural areas. Max and Orion Samuelson host this highly regarded weekly agricultural business and news program 52 times each year.

In pursuit of the news of agriculture, Max has originated broadcasts from every U.S. state and more than 30 nations. His work has earned dozens of honors from agriculture groups, trade associations and professional organizations.

From his boyhood of growing up on a farm near Owensville, Indiana, to his years in Chicago radio and television, Max's background and experience have developed to give him the perspectives and industry access to produce his insightful broadcasts. He maintains close ties with agriculture and proudly displays his boyhood 1953 Farmall Super H tractor at parades, fairs and festivals.

**AG, ECONOMICS, AND IMPACTS OF ANIMAL HEALTH: LIVESTOCK  
STATE PERSPECTIVE**

Mike Naig  
Iowa Department of Agriculture

Mike Naig grew up on a farm near Cylinder, Iowa in the Northwest corner of the state. He is a graduate of Buena Vista University in Storm Lake with degrees in biology and political science. Naig is married to his wife Jamie and together they have three boys.

Naig has spent his entire career working in agriculture, having served in public policy roles for state and national agribusiness trade associations as well as in private industry.

As Deputy Secretary of Agriculture, Naig assists in management responsibilities for the Department, focused on the areas of Policy, Budget and Personnel. He also supports the Department's efforts to be accessible for Iowans by traveling regularly to represent Secretary Northey at meetings and events across the state.

**GLOBAL RELEVANCE – OIE AND FOREIGN ANIMAL DISEASES**

Elizabeth Parker  
Institute for Infectious Animal Diseases  
Texas A&M University

Dr. Elizabeth Parker serves as Chief Veterinarian, Institute for Infectious Animal Diseases and subject matter expert, Texas A&M AgriLife Research College Station, Texas

Elizabeth Parker grew up on a farm in Abilene, Texas. She graduated from Texas A&M University in College Station, Texas and received two Bachelors of Science (Biomedical Science in 1987 and Veterinary Science in 1990) and a Doctorate of Veterinary Medicine in 1993, with an emphasis on equine medicine. She was in private veterinary practice in Texas doing mixed, small animal and small animal emergency work from 1993 through 1999.

Elizabeth worked on agriculture policy for the United States Congress, House of Representatives, Committee on Agriculture in Washington, DC from 1999 to 2006, first as the 1999-2000 American Veterinary Medical Association's Congressional Science Fellow for Ranking Member Charlie Stenholm (R-TX); and subsequently as Majority Professional Staff for then-Chairman Larry Combest (R-TX), followed by Chairman Bob Goodlatte (R-VA). While on the Committee, Elizabeth worked on fruit and vegetable issues, viticulture, marketing orders and promotion programs, livestock issues, animal and plant health, pesticides, biotechnology, homeland security, food safety, research and honey issues, among others. Legislation of interest she has worked on are The Agriculture Risk Protection Act of 2000 (crop insurance), The Farm Security and Rural Investment Act of 2002 (farm bill), the National Veterinary Medical Services Act of 2003 and the Specialty Crop Competitiveness Act of 2004.

In 2006 Elizabeth was based in Rome, Italy as an International Consultant, Avian Influenza and Planning Operations Officer for the Food and Agricultural Organization of the United Nations (FAO) where she worked on highly pathogenic avian influenza strategy, policy and resource mobilization.

From 2007-2011, Elizabeth returned to Washington, DC where she served as the National Cattlemen's Beef Association's first Chief Veterinarian, leading the association's domestic and international efforts related to animal health, animal welfare and food safety and security, especially those debated within the government agencies, in Congress and in the international arena.

Most recently, Elizabeth served as an Animal Health Officer, Programming Unit, Infectious Diseases Group within FAO's Animal Health Service (AGAH) from December 2011–July 2014, where she focused on overall strategy, coordination, quality assurance and resource mobilization for AGAH and the Emergency Center for Transboundary Animal Diseases (ECTAD) related to zoonotic and transboundary animal diseases, among others.

Currently Elizabeth is the Chief Veterinarian for the Institute for Infectious Animal Diseases (IIAD), utilizing her extensive national and international

## II. B. USAHA/AAVLD PLENARY SESSION

experience to develop collaborations between IIAD and animal health stakeholders, including private business, agriculture associations and veterinary practitioners, as well as federal and international governments. In addition to her work with IIAD, Elizabeth holds a joint appointment with the Office of the Director, Texas A&M AgriLife Research, serving as a subject matter expert related to livestock and animal health.

### **External Reference Links**

- OIE Annual Report 2016: Healthy animals for a better life: <https://www.youtube.com/user/OIEVideo?feature=mhee>
- 85<sup>th</sup> OIE General Session May 2017: <https://www.youtube.com/watch?v=CijPxUJ7Yes>

**FMD NOW AND THE FUTURE  
PANEL DISCUSSION**

**Pamela J. Hullinger**

California Animal Health and Food Safety Laboratory System  
School of Veterinary Medicine, UC Davis

Dr. Pam Hullinger was appointed Director of the California Animal Health and Food Safety (CAHFS) Laboratory System in November 2016.

Prior to joining CAHFS, Dr. Hullinger served as Director of the University of California, Davis Veterinary Medical Teaching Hospital's Large Animal Clinic. Prior to 2015, she worked as the Chief Veterinary Officer leading the Agricultural Security Program at Lawrence Livermore National Laboratory and as a Clinical Diagnostic Epidemiologist in the Department of Medicine and Epidemiology, School of Veterinary Medicine, University of California, Davis. During that time (2006-2016) she worked on projects funded by the United States Department of Agriculture's Veterinary Services and Department of Homeland Security focused on foot-and-mouth disease countermeasures (diagnostic test development and FMD vaccination contingency planning), response planning (Secure Food Supply) and policy development. From 1996-2006, Dr. Hullinger served as a Veterinary Medical Officer for the California Department of Food and Agriculture (working in both the California 2002-03 Exotic Newcastle Disease outbreak and the 2001 U.K. FMD outbreak). Prior to that, she was a veterinarian in a large animal practice in Sonoma County (California).

Dr. Hullinger completed her undergraduate studies at the University of California, Davis along with her Doctor of Veterinary Medicine and Masters of Preventive Veterinary Medicine degrees. She is a Diplomate of the American College of Veterinary Preventive Medicine.

**Bret D. Marsh**

Indiana State Board of Animal Health

Dr. Marsh serves as the Indiana State Veterinarian. He is responsible for all statewide animal health programs, as well as providing inspection services for the meat, poultry and dairy products industries. He is also an advisor to the Indiana State Board of Veterinary Medical Examiners. Dr. Marsh previously served as the Special Detail to the U.S. Secretary of Agriculture's Homeland Security Staff. In that role, he represented the views of the country's state veterinarians on issues affecting the nation's ability to preserve and protect its agricultural assets. Dr. Marsh was Treasurer to the American Veterinary Medical Association (AVMA) for six years and served in the AVMA House of Delegates for nearly a decade. Dr. Marsh is a past President of the Indiana Veterinary Medical Association and the United States Animal Health Association. He has received the Distinguished Alumnus Award from both the Purdue College of Veterinary Medicine and the Purdue College of Agriculture.

## II. B. USAHA/AAVLD PLENARY SESSION

He received his BS degree in Animal Sciences, and his DVM from Purdue University.

### **Jack Shere**

Deputy Administrator, Veterinary Services (VS), Chief Veterinary Officer

Dr. Jack Shere was appointed Deputy Administrator in March 2016 and leads the program's many employees in protecting and improving the health, quality, and marketability of U.S. agricultural animals, animal products, and veterinary biologics. He also oversees VS' national and international reference laboratory network.

Dr. Shere joined VS in 1990 as a field veterinary medical officer in Nebraska and Wisconsin and has held many leadership positions since then, including Associate Western Regional Director from 2002 to 2005 and Eastern Regional Director from 2005 to 2013. More recently, Dr. Shere served as VS' Associate Deputy Administrator since 2013.

Dr. Shere has extensive experience with animal disease outbreaks, including salmonella enteritidis, foot-and-mouth disease in England, low pathogenic avian influenza, Exotic Newcastle Disease (END), and highly pathogenic avian influenza. During the extensive 2002-2003 END outbreak in California, Texas, New Mexico, and Utah, Dr. Shere served as the Joint Area Commander and Incident Commander, leading a massive federal and state eradication effort for nine months until the disease was eradicated from the United States.

Dr. Shere received a Bachelor of Science in Biology and Chemistry in 1981, a Doctor of Veterinary Medicine in 1987, and a Master of Science in Education with a minor in Counseling in 1988 – all from Iowa State University. He received PhD's in Poultry Science and Microbiology in 2001 from the University of Wisconsin. He also practiced veterinary clinical medicine for three years in Georgia.

### **Liz Wagstrom**

National Pork Producers Council

Dr. Elizabeth (Liz) Wagstrom holds Doctor of Veterinary Medicine and Masters of Preventive Medicine degrees from Iowa State University. During her career, she has worked at the intersection of animal health and public health, including as a practicing veterinarian, an epidemiologist and public health veterinarian, an industry organization staff member and in academia. In those roles, she has interacted with a wide range of stakeholders and consistently worked to find common ground and mutual goals.

Dr. Wagstrom currently serves as the Chief Veterinarian for the National Pork Producers Council (NPPC). The National Pork Producers Council conducts public policy outreach on behalf of its 43 affiliated state association members. She leads NPPC's Science and Technology efforts, including an active effort on responsible antibiotic use and antibiotic use data collection and reporting. In her previous role with the National Pork Board she was the staff responsible for the development of the industry's Take Care® - Use Antibiotics

## II. B. USAHA/AAVLD PLENARY SESSION

Responsibly program. That program has been incorporated into the larger Pork Quality Assurance® Plus certification, which includes an on-farm assessment and audit component.

She serves as an ad hoc member on committees for the National Pork Board (NPB) and the American Association of Swine Veterinarians (AASV). She was recently elected to her second term on the American Veterinary Medicine Association's (AVMA) Council on Public Health and Regulatory Medicine. She serves as a liaison from that Council to the Food Safety Advisory Committee and the Animal Agriculture Liaison Committee. Dr. Wagstrom was a member of the United States delegation to the first Codex Alimentarius Task Force on Antimicrobial Resistance. She recently participated in the Physical Working Group meeting to develop documents outlining the scope of a second Task Force. If that work is approved by the Codex Alimentarius Commission (CAC), she expects to participate in the work of the second Task Force.

Prior to joining the National Pork Producers Council, Dr. Wagstrom was an Associate Professor at the University of Minnesota's Center for Animal Health and Food Safety. She also served as director of their Veterinary Public Practice Residency Program. Dr. Wagstrom served six years on the USDA Secretary's Advisory Committee on Animal Health, serving as both vice-chairman and chairman. That committee has a diverse membership but under her leadership developed consensus recommendations on a wide range of topics including the USDA efforts on antimicrobial resistance. Dr. Wagstrom has served one term as a liaison member of the Presidential Advisory Council on Combatting Antibiotic-Resistant Bacteria. She served on the Vaccine Incentives Working Group of Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB).



## **II. C. Joint Scientific Session Papers, Abstracts, and Posters**

## II. C. Joint Scientific Session Papers, Abstracts, and Posters

### 1. Papers and Abstracts

**A highly sensitive and specific multispecies cELISA based on the 3ABC nonstructural polyprotein for the diagnosis of foot-and-mouth disease** - *Ethan Adams, Chungwon Joseph Chung, Alfonso Clavijo, Barbara J. Kamicker, David J. Brake, Carey Bandaranayaka-Mudiyanselage, Scott Beeson, Scott Adams, Siddra Hines*

**Antimicrobial activity of bovine NK-lysin-derived peptides on bovine respiratory pathogen *Histophilus somni*** - *Rohana P. Dassanayake, Shollie Falkenberg, Robert E. Briggs, Fred M. Tatum, Randy E. Sacco*

**Assessing the performance of diagnostic tests in detecting low pathogenic avian influenza viruses in pooled swab samples** - *Amos Ssematimba, Sasidhar Malladi, Peter Bonney, Cristian Flores, Jeannette Munoz, David A. Halvorson, Carol Cardona*

**Development and optimization PCR assays for rapid identification and authentication of mammalian cell lines commonly used in veterinary virology laboratories** - *Amaresh Das*

**Effects of biological materials and collection media on PCR detection of *Tritrichomonas foetus*** - *Kris A. Clothier, Bret R. McNabb, Jeff Ondrak*

**Forty eight hour incubation of field mimic *Tritrichomonas foetus* positive TF Transit Tubes shows improved real-time PCR threshold cycle values compared to non-incubated and PBS samples** - *Brandon Kennedy Font, Stephen Chamberlain, Suzanna Leckman, Tiffany Brigner*

**Improved detection of bovine viral diarrhea virus in bovine lymphoid cell lines using PrimeFlow RNA assay** - *Shollie Falkenberg, Rohana P. Dassanayake, Simone Silveira, John D. Neill, Julia Francis Ridpath*

**Intra-laboratory blinded method test evaluation of an HPLC fluorescent method for quantitation of aflatoxin B1 and M1 in animal urine** - *Xiangwei Du*

**Modeling suitable areas for avian influenza in California with MaxEnt and Random forest** - *Jaber Belkhiria, Robert Hijmans, Walter Boyce, Beate Crossley, Beatriz Martínez-López*

**Modelling the impact of climate factors on the dynamics of carcass condemnation in cattle slaughter plants in Northern and Southern California from 2005-2015** - *Sara Amirpour Haredasht, Dale A. Moore, Noelia Silva-del-Río, Anita Edmondson, Beatriz Martínez-López*

## II. C. JOINT SCIENTIFIC SESSION

**Performance of a synthetic OPS antigen-based DIVA assay for the diagnosis of *Brucella abortus* in cattle** - *Andrew Johnson, John McGiven, Sampath Srikanth, Siddra Hines*

**Performance of an automated whole-house poultry vaccination system** - *Joseph L. Purswell, Scott L. Branton*

**Performance of antibody ELISAs for TGEV/PRCV differential diagnosis** - *Ronaldo Magtoto, Dave Baum, Jianqiang Zhang, Qi Chen, Ji Ju, Korakrit Poonsuk, Pablo E. Pineyro, Jeff Zimmerman, Luis Gabriel Gimenez-Lirola*

**Smart-Epidemiology - Big data analytical platforms for the near real-time risk assessment, surveillance and modeling of infectious diseases: practical examples and illustration of benefits for the swine industry** - *Beatriz Martínez-López, Dale Polson, Erin Lowe, Sara Amirpour Haredasht, Kyuyoung Lee, Derald Holtkamp, Zachary Whedbee, Bret Crim, Rodger Main*

**Thyroid activity and survival in Maine moose** - *Anne Lichtenwalner, Ann Bryant, Lee E. Kantar, Matthew R. O'Neal*

**Using a novel real-time PCR assay to investigate the epidemiology of brucellosis in the Yellowstone National Park bison herd** - *Noah Hull, Suelee Robbe-Austerman, Jacob Berg, Sierra Amundson, Ashley Smith, Callie Klinghagen, William Laegreid Christine Quance, Brant Schumaker,*

**Using the pig trade networks and the geographical distance among farms to model the spatio-temporal dynamics of porcine reproductive and respiratory syndrome status at farm level** - *Sara Amirpour Haredasht, Dale Polson, Rodger Main, Kyuyoung Lee, Derald Holtkamp, Erin Lowe, Beatriz Martínez-López*

**Validation of a commercial rLPS-based antibody ELISA for *Brucella ovis* and *Brucella canis*** - *Andrew Johnson, John McGiven, Sampath Srikanth, Siddra Hines*

**When the doctor consults Dr. Google: an information literacy exercise for fourth year veterinary students** - *Danielle Darracq Nelson, Suzanne Fricke*

**A HIGHLY SENSITIVE AND SPECIFIC MULTISPECIES CELISA BASED ON THE 3ABC NONSTRUCTURAL POLYPROTEIN FOR THE DIAGNOSIS OF FOOT-AND-MOUTH DISEASE**

Ethan Adams<sup>1</sup>, Chungwon Joseph Chung<sup>2</sup>, Alfonso Clavijo<sup>4</sup>, Barbara J. Kamicker<sup>3</sup>, David J. Brake<sup>3</sup>, Carey Bandaranayaka-Mudiyanselage<sup>1</sup>, Scott Beeson<sup>1</sup>, Scott Adams<sup>1</sup>, Siddra Hines<sup>1</sup>

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Foot-and-mouth disease (FMD) is extremely contagious, affecting domestic livestock such as cattle, pigs, sheep, and goats. Control of FMD is one of the leading priorities for countries worldwide. An effective diagnostic test must be broadly reactive across all seven viral serotypes and multiple host species, and able to differentiate between infected and vaccinated animals (DIVA capable). A competitive ELISA (cELISA) has been developed and validated through collaboration between the Institute for Infectious Animal Diseases, Plum Island Animal Disease Center: USDA ARS, USDA APHIS, DHS, and Leidos, and VMRD, Inc. The cELISA detects serum antibodies via inhibition of specific monoclonal antibody binding to an epitope within the FMDV 3ABC non-structural polyprotein (NSP). This enables the assay to be DIVA capable, as 3ABC is only induced in the presence of replicating virus. The cELISA format enhances specificity (Sp) while offering flexibility for multispecies use. Thus far, this assay has been validated for use in cattle, pigs, and sheep, and the USDA has approved pre-licensing serials manufactured by VMRD, Inc. Final licensure is expected in mid-2017. Serum samples of known infection status were evaluated from 503 FMD negative cattle of U.S. origin (FMD-free), 121 cattle experimentally infected with FMDV isolates representing all 7 serotypes, 117 naturally infected cattle from Cameroon and South Africa, and 52 vaccinated cattle later challenged with live FMDV. A subset of these samples (n=386) was also run in a current commercial FMDV NSP ELISA for comparison. Porcine samples (n=272, 207 negative and 65 positive) were also tested in both assays along with 214 ovine samples, of which 151 were classified negative and 63 positive. An optimal cutoff of 40% inhibition was determined based on receiver operator characteristic curves. Reactivity to all seven serotypes in experimental infections was demonstrated as well as to five serotypes in naturally infected cattle. DIVA capability was confirmed by negative test results in vaccinated, unchallenged cattle that seroconverted after challenge. In unvaccinated, experimentally infected cattle, the cELISA identified seroconversion in all animals by 7-15 days post infection. The subset of 386 bovine samples showed a sensitivity (Se) of 99.6% and Sp of 99.3% in comparison to 96.7% and 97.9%, respectively, for the other assay. The complete bovine sample set generated similar values of 99.6% Se and 99.1%

## II. C. JOINT SCIENTIFIC SESSION

Sp. Both the VMRD cELISA and the comparator assay had 100% Sp for porcine samples, however the cELISA had a Se of 96.9% versus 76.9% for the other assay. Finally, the VMRD cELISA had a Se of 76.1% and Sp of 98.6% for ovine samples, with the assay used for comparison demonstrating Se of 68.2% and Sp of 100%. The broad reactivity, DIVA capability, and high performance shown for multiple species demonstrate the value of this cELISA as a critical tool for FMDV control efforts.

**ANTIMICROBIAL ACTIVITY OF BOVINE NK-LYSIN-DERIVED PEPTIDES  
ON BOVINE RESPIRATORY PATHOGEN *HISTOPHILUS SOMNI***

Rohana P. Dassanayake, Shollie Falkenberg, Robert E. Briggs, Fred M.  
Tatum, Randy E. Sacco  
ARS/NADC, USDA, Ames, IA

Bovine NK-lysins, which are functionally and structurally similar to human granulysin and porcine NK-lysin, are predominantly found in the granules of cytotoxic T-lymphocytes and NK-cells. Although antimicrobial activity of bovine NK-lysin has been assessed for several bacterial pathogens, not all the important bacterial pathogens that are involved in the bovine respiratory disease complex have been studied. Therefore, the objective of the present study was to evaluate the antimicrobial activity of bovine NK-lysin-derived peptides on bovine respiratory pathogen *Histophilus somni*. Four, 30-mer peptides corresponding to the functional region of NK-lysin helices 2 and 3 were synthesized and assessed for antibacterial activity on four bovine pneumonic *H. somni* isolates. Although there were some differences in the efficiency of bactericidal activity among the NK-lysin peptides at lower concentrations (2 - 5  $\mu$ M), all four peptides effectively killed most *H. somni* isolates at higher concentrations (10 - 30  $\mu$ M) as determined by a bacterial killing assay. Confocal microscopic and flow cytometric analysis of Live/Dead BacLight stained *H. somni* (which were preincubated with NK-lysin peptides) were consistent with the killing assay findings and suggest NK-lysin peptides are bactericidal for *H. somni*. Among the four peptides, NK2A-derived peptide consistently showed the highest antimicrobial activity against all four *H. somni* isolates. Electron microscopic examination of *H. somni* following incubation with NK-lysin revealed extensive cell membrane damage, protrusions of outer membranes, and cytoplasmic content leakage. Taken together, the findings from this study clearly demonstrate the antimicrobial activity of all four bovine NK-lysin-derived peptides against bovine *H. somni* isolates.

**ASSESSING THE PERFORMANCE OF DIAGNOSTIC TESTS IN  
DETECTING LOW PATHOGENIC AVIAN INFLUENZA VIRUSES IN  
POOLED SWAB SAMPLES**

Amos Ssematimba<sup>1</sup>, Sasidhar Malladi<sup>1</sup>, Peter Bonney<sup>1</sup>, Cristian Flores<sup>2</sup>,  
Jeannette Munoz<sup>2</sup>, David A. Halvorson<sup>1</sup>, Carol Cardona<sup>1</sup>

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Low pathogenic avian influenza (LPAI) viruses are important precursors to their more devastating highly pathogenic counterparts and such mutations have been reported in some of major outbreaks worldwide. Routine sampling and testing of birds is a vital component of the surveillance protocols implemented to ensure their early detection in poultry flocks. There are several aspects of sampling protocols that influence detection chances. These may include the status of the birds sampled (healthy, sick or dead), sampling methodology, sample storage and transportation and pooled sample composition. In this study, two experiments were performed involving inoculation of broiler chickens with the low pathogenicity chicken/Pennsylvania/04 H5N2 or H7N2 virus subtype and taking regular swab samples for subsequent testing using and molecular diagnostic real-time Reverse Transcription Polymerase Chain Reaction (rRT-PCR) and two antigen capture tests. The first experiment, aimed assessing the effect of sample composition on virus detection rate, involved testing pooled samples obtained by mixing the individual swabs to create pooled samples containing either 4, 5 or 10 negatives swabs mixed with one positive swab. The second experiment was aimed at calculating the sensitivities of two antigen capture tests and involved testing the individual single swabs using the two tests with rRT-PCR test as the reference test. In the analysis, rRT-PCR cycle threshold (CT) values are summarized and the proportions detected by antigen capture are obtained and compared between the two antigen capture tests using onesided fisher's exact test. Generally, the mean CT value for the H7 samples were slightly lower than that for the H5 samples, the detection rates were found to be significantly higher in the combined pools of 5 and 6 swabs compared to the pools of 11 and FluDetect test was found to detect slightly more positive samples than VetScan for both virus subtypes and at the different CT ranges assessed. For both tests, the highest percentage of positives detected was for H7 samples with  $CT \leq 30$  giving "sensitivities" of 68% and 49% for FluDetect and VetScan respectively. Much as pooling a bigger number of swab samples increases the chances of having a positive swab included in the sample to be tested, this study's outcomes indicate that this practice may actually reduce the chances of detecting the virus since it resulted into lowering the virus titer of the pooled sample. Hence there is a need to optimize sample pooling for effective surveillance.

**DEVELOPMENT AND OPTIMIZATION PCR ASSAYS FOR RAPID IDENTIFICATION AND AUTHENTICATION OF MAMMALIAN CELL LINES COMMONLY USED IN VETERINARY VIROLOGY LABORATORIES**

*Amaresh Das*

Foreign Animal Disease Diagnostic Laboratory, Plum Island Animal Disease Center, Greenport, NY

Continuous mammalian cell lines are routinely used in virus research with applications ranging from virus isolation to production of biologicals. The integrity of the cell lines can be compromised either by spontaneous natural mutations or by cross-contamination with other cell lines. Therefore, it's important to routinely examine the authenticity of cell lines in use. Here we report the development and optimization of new conventional and real time (TaqMan™) cell line specific PCR assays for identification of four most commonly used mammalian kidney cell lines from swine, monkey, hamster and bovine. The primers and probe sequences were designed from the highly conserved mitochondrial genes and analyzed *in silico* by primer BLAST in the NCBI database to ensure their specificity. The assays were optimized using Dream Taq PCR Mastermix (Thermo Fisher Scientific) for conventional PCR and Path-ID qPCR Mastermix for real time PCR (qPCR). Newly developed PCR assays were highly specific for the target cell lines and had no cross-reactivity against other cell lines including sheep (kidney), dog (kidney), cat (kidney), rat (liver), rabbit (kidney), Guinea pig (lung), lamb (kidney-primary) and human (HeLa). The assay specificity was further confirmed by nucleotide sequencing of the PCR products. The sequence analyses revealed 100% identity with the corresponding nucleotide sequences of the respective cell lines in the NCBI database by BLAST. A multiplex qPCR assay was developed for simultaneous detection of up to three cell lines in a single assay (swine/monkey/hamster and swine/monkey/bovine). The multiplex assays exhibited no loss of sensitivity compared to the corresponding singleplex assays. Due to its higher sensitivity (10-1000 fold), qPCR was able to detect traces of contamination of other cell lines that was not detectable by conventional PCR. The newly developed PCR assays can be very useful for routine examination of the identity of the cell lines.



**EFFECTS OF BIOLOGICAL MATERIALS AND COLLECTION MEDIA ON PCR DETECTION OF TRITRICHOMONAS FOETUS**

Kris A. Clothier<sup>1</sup>, Bret R. McNabb<sup>3</sup>, Jeff Ondrak<sup>2</sup>

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In spite of regulatory programs present in many states and countries to address *Tritrichomonas foetus* infection, this pathogen continues to represent a major economic problem to the cattle industry. Due to its insidious nature and lack of clinical signs in infected adult cattle, *T. foetus* can go unrecognized in a herd for many years. The advent of molecular detection has dramatically increased the sensitivity and specificity of *T. foetus* diagnosis over previously used culture methods. Sample condition is also a major contributing factor to accurate detection. The purpose of this study was to evaluate the effects of exposure to a variety of biological materials on the PCR detection of *T. foetus*. A standard inoculum of one of three strains of *T. foetus* were used to inoculate 0.9% saline (n=45), lactated Ringers solution (LRS; n=45), or InPouch® (Biomed Diagnostics) media (IP; n=45.) Samples were then spiked with either freshly collected semen, urine, or blood to mimic conditions which may be present during field sample collection. At the laboratory, saline and LRS were inoculated into modified Diamond's media and incubated at 37 °C for 48 hours; IP samples were incubated at the same temperature for 24 hours. Aliquots were collected and tested in triplicate by PCR. In IP media, urine had the most detrimental effect on detection of *T. foetus* with higher cycles to threshold (Ct) values identified in urine spiked samples over blood, semen, and control groups across all strains evaluated. Ct values were not significantly different in samples containing blood or semen than in control samples. *T. foetus* detection was less affected in samples inoculated into modified Diamond's media, with no differences in Ct values between treatment groups; however, samples submitted in LRS had lower mean Ct values than samples submitted in saline. Overall, media containing urine had fewer samples identified as "positive" and more samples classified as "inconclusive" using laboratory cut-offs than those containing blood or semen. Sample integrity can impact identification of this pathogen and the present study shows that minimizing urine contamination can improve PCR detection of *T. foetus* in preputial samples.

**FORTY EIGHT HOUR INCUBATION OF FIELD MIMIC *TRITRICHOMONAS FOETUS* POSITIVE TF TRANSIT TUBES SHOWS IMPROVED REAL-TIME PCR THRESHOLD CYCLE VALUES COMPARED TO NON-INCUBATED AND PBS SAMPLES**

Brandon Kennedy Font<sup>1</sup>, Stephen Chamberlain<sup>1</sup>, Suzanna Leckman<sup>2</sup>,  
Tiffany Brigner<sup>2</sup>

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*In vitro* culture of the protozoan *Tritrichomonas foetus* is the traditional method of diagnosing bovine trichomoniasis in order to meet regulatory requirements and to control for the reproductive and monetary losses absorbed by the cattle industry due to this sexually transmitted disease. In more recent decades, real-time PCR assays have continued to work in tandem with traditional culture/transport systems (e.g., InPouch™ TF system) and also with the TF Transit Tube sample transportation for ‘PCR use only’ system to increase the overall sensitivity and specificity of *T. foetus* detection. Current discussions in the veterinary parasitology literature revolve around the optimization and application of best practices regarding *T. foetus* bovine sample collection, transport, storage temperatures, *in vitro* culture dynamics and real-time PCR analysis. Here we performed a simple two lab experiment on a set of 30 field mimic samples spiked with 100 *T. foetus* cells and 250 µl of bull smegma. Field mimic culture/transport systems included InPouch TF, TF Transit Tubes and PBS tube samples. After 24 h ambient transportation times, these systems were exposed to two temperature treatments for 48 h. Ambient vs. 35 ± 2°C samples were analyzed via real-time PCR to observe for any threshold cycle variations due to incubation temperatures or culture/transport systems. Our findings suggest that bovine sample collection in PBS or lactated Ringer’s is not optimal for *T. foetus* real-time PCR. While additional investigation is ongoing to examine (1) optimal *T. foetus* recovery as a function of incubation time, (2) effects of gaseous micro-environments for both pure and mixed microbial *T. foetus* cultures, and (3) potential limited *T. foetus* recovery caused by contaminating bacterial blooms, our data show that real-time PCR sensitivity of *T. foetus* was enhanced after 48 h incubation in both the InPouch TF and TF Transit Tube systems.

**IMPROVED DETECTION OF BOVINE VIRAL DIARRHEA VIRUS IN BOVINE LYMPHOID CELL LINES USING PRIMEFLOW RNA ASSAY**

Shollie Falkenberg<sup>1</sup>, Rohana P. Dassanayake<sup>1</sup>, Simone Silveira<sup>2</sup>, John D. Neill<sup>1</sup>, Julia Francis Ridpath<sup>1</sup>

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Bovine viral diarrhoea virus (BVDV) infections, whether as acute, persistent or contributing to co-infections, result in significant losses for dairy and beef producers. While BVDV can be identified by real-time PCR and ELISA, consistent detection and quantification of viral infection at the single cell level is extremely difficult. Detection at the single lymphoid cell level is important due to the nature of the immunomodulation that accompanies BVDV infection. A novel assay based on PrimeFlow RNA technology was adapted for *in-situ* detection of BVDV at the single-cell level. The model used to develop and test this technique included three BL-3 cell lines with three different infection statuses, one was not infected with BVDV, one was infected with BVDV and one was dual infected with BVDV and bovine leukosis virus (BLV). Using RNA probes specific for the BVDV-2a Npro-Erns region, BVDV RNA was detected from both contaminated BL-3 cell lines by flow cytometry and fluorescent microscopy using the novel assay. This is the first report on *in-situ* detection of BVDV at the single-cell level.

**INTRA-LABORATORY BLINDED METHOD TEST EVALUATION OF AN HPLC FLUORESCENT METHOD FOR QUANTITATION OF AFLATOXIN B1 AND M1 IN ANIMAL URINE**

Xiangwei Du  
VDL, Iowa State University, Ames, IA

Aflatoxin B1 (AFB1) is a mycotoxin commonly found in a wide variety of seed and grains used as ingredients in manufacturing animal feeds. A common cause of pet food recalls, AFB1 is the most potent aflatoxin. It is both hepatotoxic and immunosuppressive. Animals metabolize AFB1 to AFM1 and excrete both the parent and the metabolite in milk and urine. Urine is an ideal antemortem diagnostic specimen for aflatoxin exposure because it is noninvasive. Iowa State University VDL has developed a quantitative method for measurement of AFB1 and AFM1 in animal urine by high performance liquid chromatography (HPLC) with fluorescence detection. The method has high recovery (> 81%) and high sensitivity, with a method lower limit of quantitation (LLOQ) of 0.3 ng/mL for AFB1 and 0.5 ng/mL for AFM1. To evaluate the method, a blinded method test (BMT) organized by the FDA Vet-LIRN (Veterinary Laboratory Investigation and Response Network) was performed. The blinded study consisted of canine urine spiked at low (0.9 ppb for AFB1 and AFM1), medium (4.5 ppb for AFB1 and 5.0 ppb AFM1), and high (11.0 ppb for AFB1 and 9.0 AFM1) levels. Eight replicates were used at the low level, while six replicates were used at the medium and high levels. In addition, two "mystery" samples of canine urine spiked with aflatoxins in the ranges of 0.6 ppb - 13.0 ppb for AFB1; and 0.7 ppb - 13.0 ppb for AFM1 were included. Only one replicate was used for "mystery" samples. Due to unscheduled deviations, results of this BMT were unsatisfactory. A major challenge encountered was insufficient volumes of dilution solvent, buffer, and derivatization reagents which ran out during the middle of run. Saved sample extracts were reanalyzed in an unblinded manner. Using results from this second run, we calculated recovery and precision (relative standard deviation). For AFB1, the recovery ranged from 71.6 to 88.7%, while the RSD ranged from 8.79 to 21.6% at three levels. For AFM1, the recovery ranged from 65.9 to 87.5%, while the RSD ranged from 11.3 to 14.1% for the three spiked levels. The recovery was excellent for both aflatoxins and was within AOAC and FDA guidelines (50-120%). A repeat intra-laboratory BMT organized by the FDA Vet-LIRN is in progress. This study was funded by FDA grant number 1U18FD005006-04.

**MODELING SUITABLE AREAS FOR AVIAN INFLUENZA IN CALIFORNIA  
WITH MAXENT AND RANDOM FOREST**

Jaber Belkhiria<sup>1</sup>, Robert Hijmans<sup>2</sup>, Walter Boyce<sup>3</sup>, Beate Crossley<sup>4</sup>, Beatriz Martínez-López<sup>1</sup>

<sup>1</sup>Medicine & Epidemiology, University of California, Davis, School of Veterinary Medicine, Davis, CA; <sup>2</sup>Environment Science and Policy, University of California, Davis, Davis, CA; <sup>3</sup>Pathology, Microbiology and Immunology, University of California, Davis, School of Veterinary Medicine, Davis, CA; <sup>4</sup>California Animal Health and Food Safety Laboratory, University of California, Davis, School of Veterinary Medicine, Davis, CA

The unique peculiarities of the state of California such as the coexistence of different types of poultry operations (i.e., organic vs commercial, backyard flocks, live bird markets, etc.), as well as of many areas where wild and domestic birds co-occur, makes it a perfect place for the potential emergence of Highly Pathogenic Avian Influenza outbreaks. The 2014-2015 outbreaks of HPAI in California and other US states highlight the urgent need to develop and implement solutions to protect the poultry industry against this devastating disease. Disease distribution models were used to generate high spatial resolution map of the suitability for Avian influenza and potential emergence of HPAI outbreaks. Two algorithms, Random Forest and MaxEnt, were utilized. Both models were trained with Presence-Background and Presence-Absence data and several environmental predictors specific to disease epidemiology in the state. Overall, both models performed well (AUCc > 0.7 for data testing) particularly the models trained with Presence-Background data (AUCc >0.85). The resulting high resolution maps identified suitable areas across the state, particularly in coast and the valley. Environmental predictors that contributed to the prediction of AI suitability in most models were land cover, distance to coast, and broiler farm density. Suitability maps predicted 6 of the 8 counties where HPAI was detected during the 2014-2015 HPAI outbreak. This study provides further insights into the spatial epidemiology of AI in California, and may be useful to guide risk-based surveillance and outreach efforts and increase producers' awareness to implement more cost-effective interventions.

**MODELING THE IMPACT OF CLIMATE FACTORS ON THE DYNAMICS OF CARCASS CONDEMNATION IN CATTLE SLAUGHTER PLANTS IN NORTHERN AND SOUTHERN CALIFORNIA FROM 2005-2015**

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California ranks fourth in cattle harvested within the US with 1,181,631 head slaughtered in 2015. From all reported carcasses condemned from 2005-2015 in US slaughter plants, 21% occurred in California. Carcass condemnations are associated with farm management practices but also with environmental and climatic factors. A better characterization of temporal and spatial characteristics of condemnation reasons and factors contributing to their incidence in California will help to better prevent them and improve industry profitability. In this study we aimed to show the ability of our approach to quantify the seasonal components of the carcass condemnation numbers in Southern and Northern of California. We used a multiple-input, single-output (MISO) model to understand the impact of climatic factors on carcass condemnation numbers in Southern and Northern California. First we used cross-correlation coefficient (CCF) analysis between each of the 35 reasons for carcass condemned case in each region and climate data such as Southern Oscillation Index, Palmer Z-index, modified Palmer drought severity index, cooling degree days, el Niño, standard precipitation index and Pacific decadal oscillation to select input variables with the strongest linear relationship with the number of carcass condemnations. Then, selected inputs were used to model the temporal dynamics of the carcass condemnation using a MISO model. The selected condemned cases for the MISO model based on the CCF analysis were malignant lymphoma, septicemia, emaciation and pericarditis. Across the 10 year-period, temporal dynamics of these condemnation cases in Southern and Northern California were well-captured by phenomena such as El Niño, Standard Precipitation Index and Pacific Decadal Oscillation with coefficients of determination (R<sup>2</sup>) ranging from 0.51 to 0.72. The decreasing precipitation of the last year (i.e. time delay of 11-12 month) will increase the septicemic condemned carcasses a year after and hydrological drought of a last year can increase the emaciated cases in north California a year after. The decrease in the precipitation of two seasons and a year before will increase the malignant lymphoma condemned carcasses in north and south of California, respectively. Pericarditis condemned carcasses in south of California will increase by hydrological drought of the last season. We found an association between climatic factors and four of the most incident condemnation cases in

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California: septicemia, pericarditis, malignant lymphoma and emaciation. This data-based modelling approach can be used in real-time to inform syndromic and risk-based surveillance programs. It may also help us better understand and forecast the impact that climatic change may have on cattle condemnations. This study aims to increase awareness of producers and policy makers of management practices and policies to mitigate the number of condemnations while improving cattle welfare and industry profitability.

**PERFORMANCE OF A SYNTHETIC OPS ANTIGEN-BASED DIVA ASSAY FOR THE DIAGNOSIS OF *BRUCELLA ABORTUS* IN CATTLE**

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*Brucella abortus* is one of the causative agents of brucellosis, a zoonotic disease found worldwide in cattle, sheep, goats and swine that results in billions of dollars in economic loss, particularly in endemic areas. Control and eradication of brucellosis can be accomplished through diagnosis and vaccination. The US is considered *Brucella* free and currently uses the *B. abortus* strain RB51 vaccine as a mainstay of their *B. abortus* control program. For diagnosis of *B. abortus*, the sLPS antigen ELISA is one of the OIE recommended tests. This assay is very sensitive but has a significant number of false positive serum reactors (FPSR), which may result from the shared homology between the sLPS antigen and *Yersinia enterocolitica* O:9 antigens. Synthetic antigens derived from the OPS of *Brucella* have shown considerable promise in decreasing the number of false positives. A previously published study using a synthetic antigen-based ELISA demonstrated 100% specificity with 125 *Brucella abortus* culture negative samples and 100% sensitivity with 45 culture positive samples. Samples classified as FPSR on the sLPS ELISA (n=125) were also tested. The synthetic antigen ELISA correctly identified 32 of these as negative, resulting in a 25% improvement in specificity with this sample type. The new VMRD *Brucella abortus* sAg antibody assay designed with this synthetic antigen technology was evaluated using 256 negative samples derived from multiple US cattle herds to determine a specificity of 100%. The assay was then tested on 31 defined samples obtained from the National Veterinary Services Laboratory (NVSL) of the United States Department of Agriculture, including 10 positive check set samples as well as 21 positive control sera representing various states of infection. This included 4 samples from naturally infected animals and 1 from an experimentally infected animal, 8 samples for which the source of infection was unknown, and 8 samples from animals vaccinated with a product other than strain RB51. The VMRD assay correctly identified 26 out of 31 positive samples with a sensitivity of 84%. Based on the same sample sets, the reference cELISA and FPA assays showed a relative sensitivity of 77.4%. The assay appears to not detect antibodies in RB51 vaccinated animals but does detect antibodies in animals vaccinated with *B. abortus* strain 19, performing similar to the cELISA in this respect. We conclude that the VMRD *Brucella abortus* sAg antibody assay is more sensitive than the FPA or the cELISA assay (84% vs 77%) while showing 100% specificity in a large sample of non-infected animals. Ongoing testing is currently underway for additional species and on samples from endemic areas to better evaluate the performance of this assay in real world situations.



**PERFORMANCE OF AN AUTOMATED WHOLE-HOUSE POULTRY  
VACCINATION SYSTEM**

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Recent experience with large-scale disease events has highlighted the need for improved response to minimize their impacts to animal agriculture. Response to these events relies on veterinary care to limit mortality and morbidity, containment to limit the spread of the disease, and vaccination to provide resistance to infection. Current vaccine administration methods for loose housed poultry such as drinking water administration or portable spray units produce variable results with limited efficacy. The objective of this study was to characterize the performance of a novel whole-house spray system for loose housed poultry to improve vaccination program efficacy and to reduce administration time, labor, and human-to-bird contact. The vaccination system was tested in commercial pullet houses stocked with approximately 10,000 White Leghorn layer pullets. A total of five flocks were vaccinated for Newcastle Disease Virus (NDV) and Infectious Bronchitis Virus (IBV) over a two year period. Three flocks were vaccinated with a prototype system, with a secondary house was vaccinated via man-portable backpack sprayer as a control treatment. The fourth and fifth flocks were vaccinated with a commercial version of the automated spray system. Results show that the prototype automated spray system had a mean seroconversion rate of 69% compared to 41% for the man-portable backpack sprayer for IBV during the first three flocks. Results for NDV seroconversion were 69% and 22% for the automated and backpack sprayers during the first three flocks, respectively. Performance of the commercial system was similar to the prototype system, with seroconversions ranging from 60 to 100%.

## PERFORMANCE OF ANTIBODY ELISAS FOR TGEV/PRCV DIFFERENTIAL DIAGNOSIS

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Porcine respiratory coronavirus (PRCV) is a natural mutant of transmissible gastroenteritis virus (TGEV) lacking 224 amino acids in the N-terminal portion of the spike (S) glycoprotein. Serum antibodies provide evidence of TGEV or PRCV infection and/or herd immunity. However, antibodies against PRCV can cross-react and crossneutralize TGEV. Blocking enzyme-linked immunosorbent assays (ELISAs) for differentiation of PRCV and TGEV based on monoclonal antibodies (mAbs) targeting the N-terminal region (300 amino acids) of the S glycoprotein have been described and are currently commercially available. The aim of this study was to evaluate the diagnostic performance of several commercial ELISA kits for the detection and differentiation of TGEV and PRCV antibodies in serum from experimentally inoculated animals. Forty-eight, 7-week-old conventional pigs from a farm with no history of porcine coronavirus infections were randomized into four inoculation groups: TGEV Miller, TGEV Purdue, PRCV, and a mock infected control group (12 pigs per group; 2 pigs per pen; 6 pens per group). Pig serum samples (n = 528) were collected at DPI -7, 0, 3, 7, 10, 14, 17, 21, 28, 35, and 42 for antibody (Ab) testing. Three different commercial TGEV/PRCV differential blocking ELISA kits were evaluated: (i) Swinecheck® TGEV/PRCV Recombinant (Biovet, Canada); (ii) Svanovir® TGEV/PRCV-Ab (Svanova, Sweden); (iii) INgezim Corona Diferencial (Ingenasa, Spain). Antibody response was detected between 7-10 DPI, regardless of the inoculation group or ELISA kit evaluated. Thereafter, the positive rate within each group increased overtime. In the absence of antibodies against other crossrelated porcine coronaviruses, the three commercial ELISA kits evaluated had a 99-100% diagnostic specificity. However, a pig-specific two-way serologic cross-reactivity was detected between PRCV and TGEV between 7 and 21 DPI, regardless of the ELISA kit evaluated. The percentage of PRCV false positive results was higher in the TGEV Purdue group compared to the TGEV Miller infected group. Under the experimental conditions of this study, two-way serologic cross-reactivity between PRCV and TGEV was observed during early infection. This may vary depending on the homology distance of strains present, the commercial test used, and differences at the pig level. This cross-reactivity at early stages post-infection could be resolved in part through the combined use of serologic and PCR-based assays. Nevertheless, our findings support the concept that the accuracy of commercial ELISAs for differentiating PRCV and TGEV at the individual pig level is low, and therefore should be used on a population basis.

**SMART-EPIDEMIOLOGY - BIG DATA ANALYTICAL PLATFORMS FOR THE NEAR REAL-TIME RISK ASSESSMENT, SURVEILLANCE AND MODELING OF INFECTIOUS DISEASES: PRACTICAL EXAMPLES AND ILLUSTRATION OF BENEFITS FOR THE SWINE INDUSTRY**

Beatriz Martínez-López<sup>1</sup>, Dale Polson<sup>2</sup>, Erin Lowe<sup>2</sup>, Sara Amirpour Haredasht<sup>1</sup>, Kyuyoung Lee<sup>1</sup>, Derald Holtkamp<sup>3</sup>, Zachary Whedbee<sup>1</sup>, Bret Crim<sup>3</sup>, Rodger Main<sup>3</sup>

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Platforms for near real-time risk assessment, spatio-temporal visualization and molecular epidemiology that are operational and easily accessible to producers, veterinarians and diagnostic laboratories are key to support the cost-effective prevention and control of infectious diseases. This is particularly true in the swine industry in the US where the size and complexity of the operations as well as the type and frequency of movements facilitates pathogen transmissions and make challenging the early detection of pathogens and effective intervention. The introduction into and rapid spread of porcine epidemic diarrhea virus (PEDV) across the Western hemisphere, with estimated losses of 3 million pigs in 2013 alone, reflects the urgent need to implement risk-based, more cost-effective surveillance programs in order to better manage the transmission and circulation of these and other diseases in swine industry. We have been working to develop an information management platform using the Disease BioPortal which includes automation of diagnostic data interpretation and transfer for near real-time risk assessment and surveillance for supporting risk-based, more cost-effective programs for infectious diseases globally. Specifically here, we illustrate the capabilities of the Disease BioPortal platform using examples of some of the most economically important swine diseases in the US: PRRS, swine influenza and mycoplasma. The most recent version of the Disease BioPortal incorporates Big Data analytical capabilities as well as automation of diagnostic data transfer, extended analytical and user-friendly visualization tools adapted to the swine industry. This platform allows users to integrate and analyze swine information at different levels (genomic to phenomic and beyond). As a result, producers and veterinarians can use the Disease BioPortal platform to conduct outbreak investigations; generate site, flow, system, area and network level health reports; as well as test hypotheses about the potential direct (e.g., animal movements) or indirect (e.g., airborne spread) transmission of diseases between swine operations with advanced analytical methods such as social network analysis, trend analysis and multi-dimensional space-time-genomic capabilities. One of the distinct capabilities of this web-based system is the near real-time integration of different data streams that traditionally have been

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presented separately and were not available until long after the outbreak, thus were unable to be used to support timely risk assessment and risk-based surveillance strategies. We believe that these types of platforms represent the future of more cost-effective decision support and more effective prevention and control of infectious diseases globally.

## THYROID ACTIVITY AND SURVIVAL IN MAINE MOOSE

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Maine moose numbers are estimated to remain high, but losses of young moose occur yearly, and usually are associated with heavy parasite burdens. Nutritional deficits may contribute to these losses, and multiyear evaluations have shown some mineral deficits, notably selenium, as well as poor body condition in moose mortalities. Between 2014 and 2017, the Maine Department of Inland Fisheries and Wildlife captured and radio-collared adult and calf moose using a helicopter team. A pool of approximately 100 animals has been maintained, with necropsies conducted on any animals that die during the study, and replacement animals collared during the late winter, when deep snow conditions allow humane capture of the animals. At capture, all animals were vigorous and were visually assessed as being generally healthy. Hematologic parameters were recorded, tick counts were conducted, and hair and fecal samples collected. Animals were also sampled after death, monitored via radio tracking. Tissues and blood were collected at field necropsy. 36 moose have died from the initial year of the study, 25 from the second year, 49 from the third year, and 11 from the fourth (current) year. The majority of yearly mortalities are calves. In mortalities analyzed to date, histology showed both thyroid glands in 38 of 46 moose to be inactive (2014-2017); of 11 moose necropsied so far in 2017, 2 had apparently normally active thyroid glands (score 1), 3 had moderately inactive glands (score 2), and 6 had very severely affected the thyroid glands, with numerous follicles empty of colloid (score 3). Only 1 mortality occurred in the fall (score 2), and the remaining 45 died between January and May, with no apparent effect of month on thyroid score. However, the lack of mortality in the summer and fall limits conclusions regarding seasonality of thyroid activity in these moose mortalities. In White Tailed Deer, serum thyroid hormone levels fluctuate with season and nutritional level. For moose at capture, and for those radio-collared moose from which blood could be collected after death (n=33), blood was also submitted for mineral analysis; liver was submitted in moose mortalities. Samples were analyzed at Michigan State University for cobalt, copper, iron, manganese, molybdenum, selenium and zinc. When compared with values established for cattle, very low selenium (mean serum SE 9.1  $\pm$  3.3 ng/ml vs bovine normal mean of 70-100 ng/ml; mean tissue SE 0.05  $\pm$  0.01 PPM versus a bovine mean of 0.2 PPM) along with marginal copper, cobalt and molybdenum, were noted. Selenium acts as a vital antioxidant, and is known to be deficient in Maine soils. Lack of selenium has been implicated in bovine hypothyroidism. Nutritional status in combination with parasite stressors, such as high concentrations of winter ticks and lungworms, may contribute to the relatively high mortality of Maine moose calves.

**USING A NOVEL REAL-TIME PCR ASSAY TO INVESTIGATE THE EPIDEMIOLOGY OF BRUCELLOSIS IN THE YELLOWSTONE NATIONAL PARK BISON HERD**

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Previous descriptive and analytical epidemiologic analyses of bovine brucellosis (*Brucella abortus*) in the Greater Yellowstone Area defined disease status based on ante-mortem testing (serology) and/or the current “gold-standard” of bacteriologic culture. These findings need to be reassessed in light of novel diagnostics with higher sensitivity than the “gold-standard.” Previously, we presented on a novel real-time PCR validation for *B. abortus*, including the differentiation of vaccine strains. Our novel assay had two to three times the sensitivity of culture while maintaining perfect specificity. In the winter of 2016-17, we collected samples from 159 Yellowstone National Park bison (*Bison bison*) at slaughterhouses in Montana. We also collected demographic information: sex (male or female), body condition score (1, 1+, 2, 2+, 3, 3+, 4, 4+ or 5), pregnancy status (bred or not bred), and age (adult, yearling, or calf). Our sample included 126 females (79.2%), of which 66 (52.4%) were pregnant. The sample was predominantly adults (106 of 159; 66.7%). Serology (fluorescence polarization assay; FPA) was run on all animals: 71 animals (44.7%) were classified as seropositive ( $\square mP > 20$ ); 12 (7.5%) were suspect ( $\square mP 10-20$ ); and 76 (47.8%) were negative ( $\square mP < 10$ ). A stepwise multivariate regression model was run with the outcome of FPA status (positive, suspect, or negative) with all demographic covariates listed above. The best fit model included age and body condition score; however, our R<sup>2</sup> value was low (0.1661). Real-time PCR identified 107/159 (67.3%) as positive. Of these 107, 36 (33.6%) were FPA negative, 61 (57%) were FPA positive, and 10 (9.4%) were FPA suspect. Interestingly, of the 36 that were FPA negative, 25 were in juvenile animals (calves). Cohen’s kappa coefficient was calculated on adult animals based on FPA status (positive and negative only) and PCR status, kappa = 0.524 indicating moderate agreement between the two assays. Tooth aging, currently in progress, will allow us to evaluate demographic factors associated with discordant results. We hypothesize that classifying disease status based on PCR test result (positive or negative) will better inform the model. Comparisons will be presented for serology vs. culture, and PCR vs. culture. Additionally, data on ante-mortem samples will be presented.

**USING THE PIG TRADE NETWORKS AND THE GEOGRAPHICAL DISTANCE AMONG FARMS TO MODEL THE SPATIO-TEMPORAL DYNAMICS OF PORCINE REPRODUCTIVE & RESPIRATORY SYNDROME STATUS AT FARM LEVEL**

Sara Amirpour Haredasht<sup>1</sup>, Dale Polson<sup>2</sup>, Rodger Main<sup>3</sup>, Kyuyoung Lee<sup>1</sup>, Derald Holtkamp<sup>3</sup>, Erin Lowe<sup>2</sup>, Beatriz Martínez-López<sup>1</sup>

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Porcine reproductive and respiratory syndrome virus (PRRSV) is a RNA virus of the family Arteriviridae that causes reproductive failure in breeding stock and respiratory disease in piglets. In the US, it has been estimated that the annual economic impact of PRRSV for the pig industry is US\$664 million. A better understanding of PRRSV transmission dynamics is key for the successful PRRSV control and elimination in endemic settings. In this research we used a two-step parameter-driven (PD) Bayesian approach to model the spatio-temporal dynamics of PRRSV and predict the future PRRSV status at farm level. We used data from >500 production sites from 2012-2015 regarding the PRRSV status, the pig trade network and the geographical location and distance among farms (i.e., distance was used as a proxy of airborne transmission). We evaluated the role of geographical distance and/or pig trade in PRRSV status by using five PD models with different weights matrices: (i) geographical distance weight, defined as the inverse distance between each pair of farms in kilometers, (ii) pig trade weight, defined as the absolute number of pig movements between each pair of farms, (iii) the product between the distance weight and the standardized relative pig trade weight, (iv) the product between the standardized distance weight and the standardized relative pig trade weight, and (v) the product of the distance weight and the pig trade weight. The model that included the pig trade weight matrix provided the best fit with an area under the ROC curve (AUC) of 0.88 and an accuracy of 85% (105/124). Our results emphasize the importance of pig trade in PRRSV transmission in the endemic setting under study. The modeling approach of this study may be easily adapted to other production systems to characterize the PRRSV transmission dynamics under diverse epidemiological settings. This method will be incorporated into Disease BioPortal (<http://bioportal.ucdavis.edu>) and made available to producers and industry stakeholders so they can use it in a user-friendly way to help prioritize interventions and support timely decision-making.

**VALIDATION OF A COMMERCIAL RLPS-BASED ANTIBODY ELISA FOR  
*BRUCELLA OVIS* AND *BRUCELLA CANIS***

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Accurate and consistent serologic diagnosis of *Brucella ovis* and *Brucella canis* have historically challenging for the sheep and dog industries, respectively, affecting animal sales and complicating disease management. Currently for *B. ovis*, diagnosis is performed using ELISA kit components obtained from the USDA-NVSL. These are not assembled into a standardized kit, therefore discrepant results can occur due to variation in individual lab procedures such as plate coating. The assay also has an “indeterminate” range which is problematic for screening purposes, particularly in young ram lambs sold for breeding. Diagnosis of *B. canis* can be even more complicated, and its potentially zoonotic nature generates added concern. False positives are a reported problem with most available testing modalities. As such, current USDA recommendations advocate for a consensus result of up to three different diagnostic tests to confirm a positive result, as no single test is a confirmatory gold standard. To address these issues and provide a consistent commercial product for diagnosis of both diseases, VMRD Inc. developed an indirect antibody ELISA based on the rough LPS bacterial constituent common to both *B. ovis* and *B. canis*. This project sought to improve specificity and resolution, minimize variation in results between labs, and address the problematic “indeterminate” sample classification. An improved purification method was employed to extract rLPS for plate coating, and species-specific secondary antibodies were utilized for detection. The assay was tested on 482 sheep serum samples, including 30 samples classified as “indeterminate” on the current NVSL ELISA. At a cutoff of 0.3 OD, the assay had a specificity and sensitivity of 100% in comparison to the NVSL ELISA (excluding indeterminate samples). Without a confirmatory gold standard for comparison, it is impossible to reliably classify these indeterminate samples as positive or negative. However, most animals with this status evaluated over time and by multiple methods are found to be truly negative. If these samples are considered negative and the cutoff is increased to 0.5 OD, sensitivity and specificity are both 99.6% with good resolution between sample populations. Canine serum samples (n=136) were also evaluated, with samples classified by immunofluorescence assay. At a cutoff of 0.2 OD, sensitivity was 90.8% and specificity was 100% for *B. canis*. Additional testing will be performed to verify sample classification into positive and negative cohorts. Overall, an improved, standardized commercial ELISA for *B. ovis* will facilitate appropriate and precise management of sheep flocks to prevent unnecessary economic loss. This is also true for *B. canis*, for which regulations in some states require testing of breeding animals and prohibit sale of puppies born to positive dams. Availability of an accurate and rapid screening method for both diseases would be of great benefit to these respective industries.



## **WHEN THE DOCTOR CONSULTS DR. GOOGLE: AN INFORMATION LITERACY EXERCISE FOR FOURTH YEAR VETERINARY STUDENTS**

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Veterinarians play an important role in public health, and face increasing oversight from regulatory agencies. This focuses greater attention on the decentralized nature of information resources for veterinarians. Described herein is an innovative case-based learning exercise co-developed by a diagnostic pathologist and DVM-librarian focused on quality information seeking for animal and human health regulatory and reporting decisions. The small-group session takes place in the final year diagnostic block at Washington State University's College of Veterinary Medicine. Individual students each lead their rotation mates through a pre-selected regulatory scenario discussion. These scenarios are designed to challenge students to efficiently research governmental websites, interpret regulations, and discover valuable information resources in order to make critical decisions. Scenarios address the following essential questions: Who do you contact when faced with a public health concern and/or a reportable condition, and what agencies handle regulatory testing and reporting at the local, state, federal and international levels? How do you confirm a reportable diagnosis - what samples are submitted to what laboratory and by whom, and how might those results be achieved in the most timely fashion? What is the timeline for reporting? For suspected conditions? For definitively diagnosed conditions? Which government agencies regulate food for animals, food for people, dietary supplements, drugs, biologicals, and pesticides? What is the field veterinarian's role with respect to treating and diagnosing disease in recently and illegally imported animals? Where can you find quality consumer information to communicate with animal caregivers from a variety of backgrounds? What strategies can you use to navigate government, organizational and laboratory websites, legal code and literature databases to find the most current and accurate information? Students research how to handle these scenarios, and present their recommendations including web references for group discussion. In the process, students indirectly cover the concepts of information currency, bias, authority, gaps, organization, and permanency. Students also develop basic practical game plans and contact lists for common public health concerns requiring rapid diagnosis such as rabies, regulatory testing such as raw milk dairies, and confusing reporting scenarios such as dietary supplements versus feeds. Altogether, participants discover how critical thinking in both the creation and use of online information resources impacts animal and human health.

## II. C. USAHA/AAVLD Joint Scientific Session Abstracts and Posters

### 2. Posters

Adaptation of the porcine epidemic diarrhea virus (PEDV) fluorescent focus neutralization (FFN) assay to a high-throughput format using imaging cytometry - *Luciana V. Sarmiento, Juan C. Mora, Rodger Main, Dave Baum, Jeff Zimmerman, Luis Gabriel Gimenez-Lirola*

Adaptation of the porcine epidemic diarrhea virus (PEDV) indirect immunofluorescent antibody (IFA) assay to a high-throughput format using imaging cytometry - *Juan C. Mora, Luciana V. Sarmiento, Rodger Main, Dave Baum, Jeff Zimmerman, Luis Gabriel Gimenez-Lirola*

Assessment of vulnerability in commercial poultry farms in Egypt for control of avian influenza - *Asmaa Nady Mohamed*

Blinded Method Test (BMT) - Lessons learned - *Andriy Tkachenko, Jake Guag, Sarah Nemser, Jennifer Jones, Olgica Ceric, Renate Reimschuessel*

Comparison of conventional tube and gel-based agglutination tests for feline AB system blood typing - *Eva Spada, Roberta Perego, Luciana Baggiani, Daniela Proverbio*

Comparison of three cross-matching methods to detect canine DEA 7 blood incompatibility - *Eva Spada, Roberta Perego, Luis Miguel Viñals Flórez, Maria del Rosario Perlado Chamizo, Luciana Baggiani, Dall'Ara Paola, Daniela Proverbio*

Comparison of three different conventional polymerase chain reaction (PCR) methods to detect and genotype *Gallibacterium anatis* isolates - *Jessica Hockaday, Alejandro Banda, Jay Kay Thornthorn, Lifang Yan, Candy Zhang, Martha Pulido-Landinez*

Development of a dry room temperature-stable real-time RT-PCR assay for the specific detection of porcine hemagglutinating encephalomyelitis virus (PHEV) - *Rolf Rauh, Pablo E. Pineyro, Wm M. Nelson, Jeff Zimmerman, Luis Gabriel Gimenez-Lirola*

Development of a real-time biosecurity score based on self-assessment of management accountable for increased risk of LPAI and HPAI introduction and spread in poultry farms in USA - *Sharmin Chowdhury Alda Pires, Jaber Belkhiria, Beatriz Martínez-López*

## II. C. JOINT SCIENTIFIC SESSION

Development of pen-side screening and surveillance tools - *Valorie Theresa Ryan, Joseph Carrano, Logan Haller, Richard Winegar*

Drug Residue Avoidance - *Alyssa Toillion*

*Salmonella enterica* detection methods - *Lydia Margaret Hall Kenitra Hammac,*

Serologic cross-reactivity between PEDV and other porcine enteric coronaviruses - *Luis Gabriel Gimenez-Lirola, Jianqiang Zhang, Jose Antonio Carrillo Avila, Qi Chen, Ronaldo Magtoto, Korakrit Poonsuk, Dave Baum, Pablo E. Pineyro, Jeff Zimmerman*

Spatio-temporal patterns and phylogenetic analysis of Equine Influenza Virus (EIV) from 2011 to 2016 in the U.S. - *Kyuyoung Lee, Nicola Pusterla, Samantha M. Barnum, Beatriz Martínez-López*

Survey of MG/MS infection in backyard avian species using real time PCR - *Lanqing Li*

Swine serosurveillance in Hawaii - *Jenee Odani, Halina Zaleski, Naomi Ogasawara, Brittany Castle, Fabio Vannucci2, Travis Heskett*

The eastern coyote: Missing link? - *Grace Chavis, Ann Bryant, Cory E. Mosby, Anne Lichtenwalner*

**ADAPTATION OF THE PORCINE EPIDEMIC DIARRHEA VIRUS (PEDV)  
FLUORESCENT FOCUS NEUTRALIZATION (FFN) ASSAY TO A HIGH-  
THROUGHPUT FORMAT USING IMAGING CYTOMETRY**

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Since its first report in the US (April 2013), PEDV has spread aggressively throughout farms affecting 36 states. Last year alone (2016), 1092 confirmed cases were reported ([www.aphis.usda.gov/animal-health/secd](http://www.aphis.usda.gov/animal-health/secd)) to the USDA. Because of its highly contagious nature and its consequential economic losses, efforts have been made to develop diagnostic tests able to accurately diagnose and/or monitor PEDV in commercial swine farms, e.g., ELISA, RTPCR, and immunofluorescence (IFA) assays. Currently, the tests described to detect PEDV neutralizing antibodies in pigs are the serum-virus neutralization (SVN) and fluorescent focus neutralization (FFN) assays. Although both provide high specificity, they are time-consuming and labor intensive. Most importantly, these assays are inherently variable due to the subjective nature in which antibody titers are determined. In the present study, we describe the adaptation of FFN to a high-throughput virus reduction neutralization test using imaging cytometry (SpectraMax i3x and SoftMax Pro 6.5). Results based on testing of samples of precisely-known PEDV status showed three clear advantages over traditional FFN assays: 1) fluorescence reading of a 96-well plate is fast (3-4 minutes); 2) the use of imaging cytometry eliminates the eye strain associated with reading plates under a microscope; 3) reliance on data generated through imaging cytometry eliminates human operator-dependent variation in plate readings and makes determination of virus neutralization titers more consistent and repeatable. We believe this approach can be broadly applicable to a variety of antibody detection assays.

**ADAPTATION OF THE PORCINE EPIDEMIC DIARRHEA VIRUS (PEDV) INDIRECT IMMUNOFLUORESCENT ANTIBODY (IFA) ASSAY TO A HIGH-THROUGHPUT FORMAT USING IMAGING CYTOMETRY**

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Porcine epidemic diarrhea virus (PEDV) is responsible for significant economic losses in the swine industry due an elevated morbidity and mortality in neonatal pigs. For this reason, the diagnosis of the disease in the herds is of highly importance, in order to prevent and/or control the spread of the virus among pigs. Nowadays, there are several techniques to diagnosis PED, such as, RT-PCR, ELISA, FFN, and Immunofluorescence antibody (IFA) assay. IFA identifies the presence of antibodies bound to specific antibodies using a fluorescent dye. Although this test is useful for screening samples for PEDV antibody, the technique is labor intensive because it requires technicians to individually read and interpret each reaction on slides or plates using an inverted UV light microscope. The reliance on individual technician also introduces subjectivity into the test and raises repeatability/ reproducibility issues when comparing results produced by different technicians and laboratories. In addition, because the samples are run in two-fold dilutions, the results are semi-quantitative rather than exact estimates. The objective of this study was to convert a PEDV IFA standard procedure into a high-throughput format based on a SpectraMax MiniMax 300 imaging cytometer (Molecular Devices, Sunnydale, CA) which is able to measure fluorescence intensity yet with imaging and analyzing cells capabilities. For this purpose, 96-well black plates with clear flat bottom (cell bind surface) were seeded with  $5 \times 10^4$  Vero 81 (ATCC® CCL-81TM) cells per well, incubated for 48 h (37 °C with 5% CO<sub>2</sub>), and subsequently infected with PEDV (Colorado strain P4; 0.2 MOI) and incubated for an additional 24 h. Then, plates were fixed with 80% acetone for 10 minutes, air dried for a minimum of 20 min, and stored at -20°C until use. IFA was made on sera collected from pigs of precisely known PEDV status, and read with the SpectraMax MiniMax 300 imaging cytometer. Results showed that the use of the imaging cytometer has the advantage of reducing the time for plate reading to < 3 min, improving the repeatability/ reproducibility of the test, and the precision of the antibody response estimates, resulting in an improvement over the classic IFA approach.

**ASSESSMENT OF VULNERABILITY IN COMMERCIAL POULTRY FARMS  
IN EGYPT FOR CONTROL OF AVIAN INFLUENZA**

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Avian Influenza (AI) is a transboundary animal disease with a huge socio-economic effect on poultry sector. Egypt witnessed the first outbreak of AI due to HPAIV H5N1 clade 2.2 in February 2006 with estimated loss 1 billion US\$. The source of the outbreak is migratory birds (late 2005). Highly fissured poultry-human interface leads to spill-over infections into humans (pandemic risks). Serious and frequent outbreaks in poultry on-going despite massive intervention by cull/control and vaccination campaigns. Vaccine escape mutants emerged and started to circulate. The research results showed the possibilities of mutation of the Low Pathogenic Avian Influenza virus (LPAIV) into Highly Pathogenic Avian Influenza Virus (HPAIV) under unfavorable production practices in Egypt. The aim of this study was to conduct a qualitative risk assessment for the possibilities of the re-occurrence of AI outbreak in Egypt. A cross-sectional analytical study was conducted through interviews using structured questionnaire during July 2015 to March 2016. Eighty six questionnaires were distributed to poultry producers with respondent's rate of 35.6%. All the data collected were analyzed using the software programme SPSS version 22. Results revealed that 50% of producers had higher level of education and this can ease their understanding and adoption of the study recommendations. Knowledge, Attitude and Practice (KAP) of producers towards prevention and control of AI disease scored 86.4%, 80.8% and 25.0 % for good level, respectively. These levels are not enough to protect poultry sector from the disease occurrence and spreading. Risk factors associated with poultry farms, 11.5% of farms did not use all in all out system of production, and 30.6% of farms did not experience any biosecurity measures and 73.8% did not hygienically dispose dead birds particularly during disease outbreak. Moreover, no program for pest control in 87.0% of targeted farms. 100% of the producers were not satisfied with the rate and time of compensation. The study highlighted the necessity to restructure the farm distribution, needs to establish a system to enforce the veterinary rules and legislation, urgent needs for effective extension services, availability for diagnostic facilities and training institutes.

**BLINDED METHOD TEST (BMT) - LESSONS LEARNED**

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The Food and Drug Administration's (FDA) Center for Veterinary Medicine (CVM), Veterinary Laboratory Investigation and Response Network (Vet-LIRN), comprises 38 veterinary diagnostic laboratories across North America. Vet-LIRN has funded several projects to test for food related toxicants or pathogens in animal diagnostic samples. To evaluate performance of chemistry methods, Vet-LIRN Program Office (VPO) conducts Blinded Method Tests (BMTs) with the method originating laboratory followed by a multi-laboratory BMT. In both Single and Multi-laboratory BMTs, test samples are prepared by VPO and analyzed by participants in a blinded manner. Single-laboratory BMTs have been identified as an essential prerequisite exercise prior to multi-laboratory exercises as they ensure the method works well and may bring to light important aspects to include when transferring the method to other laboratories. Using FDA guidelines for methods validation, VPO can, within a relatively short time period, determine major characteristics of method performance with a high degree of confidence. BMTs were successfully applied for both quantitative and qualitative methods based on different instrument platforms confirming the great flexibility and adaptability of the BMT approach. Key BMT features include: (i) preparation of the test samples, (ii) capturing and processing data and (iii) application of project management tools.

**COMPARISON OF CONVENTIONAL TUBE AND GEL-BASED  
AGGLUTINATION TESTS FOR FELINE AB SYSTEM BLOOD TYPING**

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Gel technology is widely used in human medicine for blood typing. It carries many advantages over routine tube testing, such as: standardization, stability, smaller sample volume, easy to perform and read, and rapidity. The aim of this study is to evaluate the gel column technique in feline blood typing. The blood type of one hundred and thirty-six blood samples anticoagulated with EDTA or CPDA from feline blood donors, feline blood recipients, health patients and stored units of whole blood was determined using tube agglutination (TUBE) with plasma from type B cats as anti-A reagent, *Triticum vulgare* lectin as anti-B reagent and PBS for control. Samples positive for type B and AB were back typed with type A RBCs to confirm whether the samples were B (strong agglutination) or AB (absence of agglutination). Samples were blood typed in duplicate using the same anti-A and anti-B reagents in a neutral gel (GEL) column technique (ID-Card NaCl enzyme test and cold agglutinins, DiaMed). Briefly, 25  $\mu$ L of type B plasma and 25  $\mu$ L of *Triticum vulgare* lectin were mixed with 50  $\mu$ L of a 0.8% RBC suspension (made by suspending 10  $\mu$ L of the RBC pellet in 1 mL of low ionic strength solution) in the reaction chamber of a gel column identified as A and B respectively. For all samples, a negative control column containing the RBC suspension of interest and PBS was included. The gel columns were incubated for 15 min at room temperature and then centrifuged in a special gel column card centrifuge (ID-Centrifuge 24 S, DiaMed) at 80 g for 10 min. Finally, the gel column cards were visually checked to identify positive samples via agglutination reactions. Results were considered valid if the control column was negative. Sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) and Cohen's kappa coefficient (K) for GEL were calculated, considering TUBE as the gold standard technique. Of 136 samples typed with TUBE, 95 (69.8%) were type A, 22 (16.2%) type B and 19 (14.0%) type AB. All B and AB samples were confirmed by back typing. With GEL 112 samples (82.3%) gave concordant results with TUBE, and 24 samples showed a mixed-field agglutination pattern (presence of a layer of RBCs simultaneously either at the top and at the bottom of the gel in A or in B gel column). If a mixed-field pattern was interpreted as a negative result 135/136 (99.3%) samples showed concordant results and Se, Sp, PPV and NPV (95%CI) were respectively 100% (96.1-100), 100% (91.4-100), 100%, 100% for type A, 95.4% (77.1-99.8), 100% (96.8-100), 100% and 99.1% (94.3-99.8) for type B, 100% (82.3-100), 99.1% (95.3-99.9), 95.0% (72.9-99.2) and 100% for type AB. Strength of agreement was very good (K= 0.98, 95%CI 0.95-1.00). The GEL column technique, using the same anti-A and anti-B reagents as in TUBE test is a sensitive and specific method for blood typing feline samples. Mixed-field pattern should be considered as negative results.



## COMPARISON OF THREE CROSS-MATCHING METHODS TO DETECT CANINE DEA 7 BLOOD INCOMPATIBILITY

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The prevalence of naturally occurring antibodies to dog erythrocyte 7 antigen (DEA 7) in DEA 7-negative dogs has been reported to be up to 50%. The potential risk of delayed transfusion reaction due to these antibodies makes it prudent to consider cross-matching before transfusion, especially when DEA 7 status of the donor dog is unknown. This prospective study compares diagnostic performances of neutral gel column (GEL), standard tube (TUBE) and a point-of-care immunochromatographic strip kit cross matches to identify DEA 7 blood incompatibilities due to the presence of naturally occurring anti-DEA 7 antibodies in canine blood. Firstly, 42 canine sodium citrate whole blood samples were typed for DEA 7 (by agglutination on gel technique). Of these 2/42 samples were DEA 7-positive (agglutination strength 2+), and 40/42 samples were DEA 7-negative (agglutination strength  $\leq 1+$ ). Secondly, the 40 DEA 7-negative samples were centrifuged and plasma samples were cross-matched against two samples of DEA 7-positive and three DEA 7-negative RBCs using the GEL technique. Samples that showed  $>1+$  agglutination strength with DEA 7-positive RBCs samples but not with DEA 7-negative RBCs samples were classified as containing naturally occurring anti-DEA 7 antibodies. Samples that showed no agglutination with DEA 7-positive RBCs were classified as containing no anti-DEA 7 antibodies. Thirdly, the 40 DEA 7-negative plasma samples were cross-matched in double blind fashion with the two DEA-7 positive RBCs samples using TUBE and immunochromatographic kit and results were compared with those of the agglutination on GEL, considered the gold standard technique. A positive/incompatible cross match was identified when agglutination, hemolysis, or both reactions were present with TUBE technique or when a red band, other than the control one, was identified on the immunochromatographic strip. To determine relationship between results obtained with various methods, 2 x 2 tables were used. Cohen's kappa coefficient (K) was calculated with 95% confidence interval (95%CI) between results of GEL and other methods. With GEL agglutination 21/40 plasma samples showed positive cross-matching and 19/40 showed negative crossmatching. The same results were obtained by TUBE cross match, whilst only 1/40 sample showed positive cross matching with immunochromatography. There was a statistically significant relationship

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between results of GEL and TUBE methods ( $P < 0.000$ ), but not between GEL and immunochromatography results ( $P = 1,000$ ). Agreement quantified by kappa showed perfect ( $K = 1,000$ , 95% CI 1,000 to 1,000) agreement for comparison of TUBE to GEL, but agreement equivalent to chance ( $K = 0,0453$ ; 95% CI -0.0427 to 0.133) was seen between GEL and immunochromatography. GEL column and TUBE crossmatch tests are useful methods to evaluate DEA 7 blood compatibility, whereas the immunochromatography was not able to identify DEA 7 incompatibilities due to anti-DEA 7 naturally occurring antibodies.

**COMPARISON OF THREE DIFFERENT CONVENTIONAL POLYMERASE  
CHAIN REACTION (PCR) METHODS TO DETECT AND GENOTYPE  
*GALLIBACTERIUM ANATIS* ISOLATES**

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*Gallibacterium anatis* is a naturally occurring commensal bacterial of the upper respiratory system in poultry that may induce upper respiratory signs, decreased egg production, salpingitis, and airsacculitis, this bacterium can produce important health and productive problems in broiler breeder and commercial layer flocks. During the isolation procedures, other bacteria such as *Pasteurella* sp. may show similar phenotypic features, therefore the evaluation of molecular methods for the efficient detection and genotyping of *G. anatis* is necessary. *G. anatis* isolates from 2016 and 2017 were included in this study. During the isolation all of them exhibited hemolysis, positive oxidase and negative indole reaction among other biochemical features determined by the Sensititre system. DNA from these isolates was extracted, one conventional PCR method was used to amplify the 16s rRNA gene, and two other PCR methods were directed to the conserved parts of the 16S-23S rRNA gene. The three different methods efficiently amplified the targeted regions of all *G. anatis* isolates, and the amplicon exhibited the expected sizes. However, the nucleotide sequence and phylogenetic analyses of these isolates using these three methods showed differences in the clustering of the isolates. The usefulness of these three methods to genotype and classify the different *G. anatis* isolates will be discussed.

**DEVELOPMENT OF A DRY ROOM TEMPERATURE-STABLE REAL-TIME RT-PCR ASSAY FOR THE SPECIFIC DETECTION OF PORCINE HEMAGGLUTINATING ENCEPHALOMYELITIS VIRUS (PHEV)**

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Porcine hemagglutinating encephalomyelitis virus (PHEV) is a member of the family Coronaviridae. This positive sense ssRNA virus has a crown-like appearance and a large, non-segmented genome. Structural proteins include hemagglutinin-esterase (HE), envelope protein (E), spike glycoprotein (S), membrane protein (M), and nucleocapsid (N). Clinical presentation in suckling pigs is short and include displaying neurological disorders (muscle tremors, paddling, and paralysis), vomiting, and wasting, with mortality rates of 100% in naïve farms of piglets less than three weeks of age. However, PHEV infection in adult animals is subclinical, being a potential threat to a high health gilt herds. There are not previous information describing kinetic of PHEV shedding (i.e., duration and pattern of viral shedding, specimen more suitable for testing) in the field nor under experimental conditions. Moreover, there has been a growing research interest in PHEV as infection and rates and disease severity have increased in some countries. Therefore, the implementation of PCR-based methods will help to identify and subsequently isolate animals who are actively shedding the virus. The objective of this study was to develop a dry room temperaturestable real-time RT-PCR assay for the specific detection of PHEV, to describe and compare the patterns of PHEV shedding in pen-based feces and oral fluid specimens collected from PHEV experimentally inoculated 7-week-old pigs (12 pigs, 6 pens, 2 pigs per pen) over the course of the infection. PHEV was consistently detected in oral fluid specimens within the first 28 days post-inoculation (DPI) compared fecal specimens where the shedding was just detected within the first 10 DPI. Preliminary results indicated that oral fluids are a suitable specimen for routine PHEV diagnosis and surveillance. This is consistent with the fact that oral fluids have become the preferred sample type used in monitoring for pig diseases. Further studies are being carried out to optimize an easiest and fastest extraction protocol that can be used for blood, feces and oral fluids specimens at the same time. The ultimate goal of this collaborative project between Iowa State University Veterinary Diagnostic Laboratory (ISU-VDL) and Tetracore Inc. is to develop and optimize a standardized PHEV rRT-PCR kit of easy implementation in all U.S. VDLs.

**DEVELOPMENT OF A REAL-TIME BIOSECURITY SCORE BASED ON  
SELF-ASSESSMENT OF MANAGEMENT ACCOUNTABLE FOR  
INCREASED RISK OF LPAI AND HPAI INTRODUCTION AND SPREAD IN  
POULTRY FARMS IN USA**

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The numerous (>220) outbreaks in more than 20 US states during 2014-2015 epidemic of highly pathogenic avian influenza (HPAI), primary H5N8, that affected commercial turkey, poultry operations and backyard flocks highlights the urgent need to develop and implement solutions to protect US poultry industry against this devastating disease. These recent outbreaks have highlighted the need to integrate the environmental, climatic and anthropogenic factors (e.g. biosecurity and management practices) that are associated with an increased risk for HPAI outbreaks in poultry operations (POs). All those aspects combined with extension tools that increase the awareness, provide recommendations and education of producers would lead to the implementation of appropriate biosecurity and management practices on farms located in high-risk areas, which is key to prevent and mitigate the devastating consequences of HPAI outbreaks. The overall goal of this study was to gather information about the biosecurity practices in diverse poultry production systems as well as to develop an online biosecurity scoring system that provides real-time biosecurity scores and recommendations to improve biosecurity on poultry farms. A systematic literature review was conducted to inform the development of a semi-structured questionnaire. Options/ answers under each question were divided into 4 categories: high risk, medium risk, low risk and preventive factors and scored according to literature review and expert opinions. An overall biosecurity score was then calculated by summing up individual scores for the options/answers for different questions. On completion of the online survey, a farmer gets this real-time biosecurity score and a customized (based on their responses) list of recommendations to improve the overall score when necessary. Completion of this study provides the farmers a better understanding about their farm biosecurity practices and their potential risk for HPAI exposure. Moreover, the overall, combined, analysis of the biosecurity scores and management practices for each of the poultry production systems will provide valuable information on the strengths and vulnerabilities of poultry industry regarding HPAI exposure to better inform risk mitigation strategies. Results of this survey and the list of customized recommendations would foster the awareness among the farmers and facilitate the improvement of biosecurity practices to more cost-effectively prevent and control future HPAI outbreaks in the US poultry industry.

**DEVELOPMENT OF PEN-SIDE SCREENING AND SURVEILLANCE TOOLS**

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MRIGlobal, in collaboration with Kansas State University and with support from the Animal Research Services (ARS), and the Plum Island Animal Disease Center (PIADC), are developing a rapid, sensitive, portable, multiplex veterinary syndromic disease identification system. The workflow system will allow rapid multiplexed pen-side detection, providing advancing situational awareness during outbreaks and provide rapid tools to distinguish between diseases of every day importance in the swine and cattle industries. The developed system will provide end users the opportunity to demonstrate freedom from disease after an outbreak. The system will contain separate sample preparation and analysis/detection components. Sample preparation methods are in development for swine oral fluid, whole blood, vesicular fluid, serum and feces. Multiplex recombinase polymerase amplification (RPA) assays provide pen-side results in less than 15 minutes. Including sample preparation, the total turnaround time will be less than 1 hour for target detection. Four syndromic multiplexed assay panels are in development. The first panel includes USDA-regulated swine vesicular diseases (Seneca Valley A virus (SVV), Swine Vesicular Disease virus (SVDV), and Foot and Mouth Disease virus (FMDV)). Singleplex SVV detection was demonstrated by spiking live SVV into swine serum and oral fluid and extracted using the GeneReach taco™ mini. Sample extraction of 8 samples was completed in less than 30 minutes. RPA detection of 50 PFU of SVV in serum and oral fluid was achieved in less than 8 minutes. Multiplex assay development is underway to combine the SVV assay with FMDV and SVDV assays. Three other assay panels target diseases of concern to commercial industry (swine respiratory, swine diarrheal, and a cattle diarrheal) and have been developed with input from the USDA, The National Pork Board, The National Cattleman's Association and the National Milk Producers Federation. A multiplexed respiratory RPA panel has been developed which includes Porcine Reproductive and Respiratory Syndrome virus (PRRS), Swine Influenza A and *Mycoplasma hyopneumoniae*. In a multiplexed format detection of 31 target copies of Swine Influenza and 63 target copies each of PRRS and *Mycoplasma hyopneumoniae* was achieved in less than ten minutes. The goal of this proof of concept project is to develop a field deployable multiplexed workflow system to support animal health management and monitoring programs to improve industry preparedness, disease response, and heighten U.S. biosecurity and biocontainment capabilities. The work is funded by the U.S. Department of Homeland Security Science and Technology Directorate (Contract No. DOI D15PC00281).

## II. C. JOINT SCIENTIFIC SESSION

### **DRUG RESIDUE AVOIDANCE**

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Antibiotics are used in food-producing animals to treat, prevent and control diseases caused by harmful bacteria. Any animal that receives antibiotic therapy cannot, by law, be sent to slaughter until the drug has been reduced to a specified level and deemed safe for human consumption. Drug concentrations above this level are illegal and known as violative residues. It is the responsibility of the producer to ensure the health, safety and well-being of their animals while remaining in compliance with state and federal laws. Following labels and abiding by withdrawal times are crucial parts in protecting our food supply chain. Diseases can have a devastating impact on animal productivity and production. Animal health affects food safety and food safety affects public health. Consumers have expressed concern regarding the health impact of drug residues in their food. These concerns include the potential for a transfer of antibiotic resistance and allergic or hypersensitivity reactions. All drugs should be used according to label directions and in a judicious manner. Drug residue avoidance begins by working with your veterinarian to put into place best management practices or “BMPs” and standard operating procedures or “SOPs” for your farm or operation. Following the formation of these BMPs and SOPs, all employees and stakeholders must be regularly trained and adherence verified. Reading and following product label directions, maintaining good records and adopting a quality assurance program that encompasses a wide array of topics from drug storage, administration techniques and humane animal handling practices, all contribute to maintaining the safest food supply chain in the world. The Kansas Department of Agriculture received a grant through the Food and Drug Administration (FDA) with the goal to educate and promote the prevention of illegal drug residue in animal derived foods produced in Kansas through educational training and outreach. The purpose of this project was to create and disseminate educational materials to limit the occurrence of drug residues. This was accomplished through three strategies; brochures, PowerPoint slide sets and online training modules. These materials were created in a species-specific packaging to effectively communicate to the various different industries. The five species covered in this project were beef, dairy, swine, poultry and small ruminants. Upon completion, these materials will be made available on the Kansas Department of Agriculture’s website.

**SALMONELLA ENTERICA DETECTION METHODS**

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*Salmonella enterica* is a well-known pathogen which can contaminate Large Animal Veterinary Teaching Hospitals. A previously published study concluded that the use of electrostatic wipes instead of sponges for sampling the hospitals environment may be a more effective method for routine surveillance testing. Although more effective, the study used a unique and longer bacterial culture method for detection. This study aimed to compare bacterial culture methods against previously published procedures to establish rapid and sensitive detection of *Salmonella enterica* contamination. The study design used laboratory based triplicate comparison of 5 different culture methods for the detection of low levels (10<sup>3</sup>; 10<sup>2</sup>; 10<sup>1</sup>; & 10<sup>0</sup> colony forming units per mL) of *Salmonella enterica* utilizing Blood Agar, Buffered Peptone Water (BPW), Tetrathionate Broth with Iodine (Tet), Rappaport-Vassiliadis R10 Broth (RVR-10), Variable Day Incubation (24hr or 48hr per culture media), and XLT4-agar plates (XLT-4) in a 6 day trial. Preliminary results found that the use of RVR-10 is not necessary for effective detection, although the full 6 day culture incubation is still needed for low level *Salmonella* detection. Next steps may include coupling Veterinary Hospital based samples to confirm that RVR-10 is unnecessary when electrostatic wipes are used for sampling.



**SEROLOGIC CROSS-REACTIVITY BETWEEN PEDV AND OTHER  
PORCINE ENTERIC CORONAVIRUSES**

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The development of porcine epidemic diarrhea virus (PEDV) antibody-based assays is important for detecting infected animals, confirming previous virus exposure, and monitoring sow herd immunity. However, the potential cross-reactivity among porcine coronaviruses, including PEDV, transmissible gastroenteritis virus (TGEV), porcine respiratory coronavirus (PRCV), and porcine deltacoronavirus (PDCoV), is a major concern for the development of pathogen-specific assays. In this study, 72, 7-week-old pigs were randomized to six groups; each group consisted of 12 pigs in one room, with 6 pens per room and 2 pigs per pen. Each group of pigs was experimentally inoculated with a different porcine coronavirus (PEDV non-S INDEL, TGEV Miller, TGEV Purdue, PRCV, PDCoV, and uninoculated control group). Serum samples (n = 792) were collected from all groups on day post-infection (DPI) -7, 0, 3, 7, 10, 14, 17, 21, 28, 35, and 42. Virus shedding within groups and absence of cross-contamination between groups was confirmed by rRT-PCR through the observation period (DPI -7 to 42). The antibody response to recombinant polypeptides derived from PEDV structural proteins, i.e., spike (S) nucleocapsid (N), membrane (M), and envelope (E), and to the intact PEDV virion was evaluated using a multiplex fluorescent microbeadbased immunoassay (FMIA) and a whole-virus (WV) ELISA. The final aim of this study was to identify highly sensitive and specific PEDV antigen targets for the antibody-based differential diagnosis of coronavirus-related enteric disease. Antibody assay cut-offs were selected to provide 100% diagnostic specificity for each target (S1 non S-INDEL, S1 S-INDEL, N, M, E, and WV). The earliest IgG antibody response was detected at days 7–10 post-infection, mainly directed against S1 polypeptides. With the exception of non-reactive protein E, we observed similar antibody ontogeny and pattern of seroconversion for S1 (non-S INDEL, S INDEL), N, M, and WV antigens. Recombinant S1 provided the best diagnostic sensitivity, regardless of PEDV strain, with no cross-reactivity detected against TGEV, PRCV, or PDCoV pig antisera. The WV particles showed some cross-reactivity against TGEV Miller and TGEV Purdue antisera, while N protein presented some cross-reactivity against TGEV Miller. The M protein was highly cross-reactive against TGEV and PRCV antisera. This study demonstrated that variations in the antibody response against different PEDV structural proteins may have important implications in the diagnosis of PEDV infection. We also successfully identified targets of interest (e.g., S1) for the diagnosis of PEDV, providing a truly molecular immunological view of antigenic distribution and a complete antibody cross-reactivity profile between PEDV and other porcine enteric coronaviruses.

**SPATIO-TEMPORAL PATTERNS AND PHYLOGENETIC ANALYSIS OF EQUINE INFLUENZA VIRUS (EIV) FROM 2011 TO 2016 IN THE U.S.**

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Equine influenza virus (EIV) is considered one of the leading causes of infectious respiratory diseases of equids in the US. Since 1956, two distinct subtypes of EIV (H7N7, H3N8) have diverged to the American lineage and further diverging into the Kentucky, South American and Florida sub-lineages. Nowadays, the Florida sublineage is predominant and has evolved into two antigenically different clades: clade 1 viruses endemic in horses from North America and clades 1 and 2 circulating in Europe. The hemagglutinin (HA), one of the surface glycoproteins of EIV, is the primary target of the protective immune response and associated with evasion of antibody neutralization. Therefore, the HA gene is the focus of EIV surveillance and ensure that the vaccines contain epidemiologically relevant strains. In this study, we describe the spatio-temporal distribution and phylogeny of H3N8 EIV isolates collected from outbreaks across the USA from 2011 to 2016. Specifically, we evaluated a high degree of evolutionary changes in HA gene and gauged suboptimal cross-protection level against antiquated vaccine strains. Seventy EIV qPCR positive cases out of the 190 cases were selected for sequencing of the HA1 gene and determining their genetic relationship. The conventional PCR was carried out to sequence HA1 gene in three segments using the three primers: 5' piece, middle piece and the 3' piece. The basic phylogenetic tree isolated EIV was combined with 193 reference EIV HA1 complete sequences isolated from January 1960 to January 2017 all around the world by the maximum likelihood method using PhyML v3.0. A Bayesian molecular clock and a coalescence-based method implemented in BEAST were used to measure the molecular clock and estimate the time of the most recent common ancestor (tMRCA) using a Bayesian Evolutionary Analysis Sampling Trees (BEAST) v1.8.4 software. The ancestor location and viral migration were evaluated to the spatio-temporal diffusion by grouping EIV isolates using the discrete phylogeographic asymmetric model in BEAST. Phylogenetic analysis showed different H3N8 monophyletic clades, linked to strains of different non-US origins and suggesting that EIV outbreaks were caused by different independent introductions, likely linked to international movement of horses, and further spread at regional level. Results of this study supports the importance to continuously update the vaccine strains to achieve adequate population immunity and to improve the epidemiological surveillance and tracing of horse movements to prevent its spread globally and regionally.

**SURVEY OF MG/MS INFECTION IN BACKYARD AVIAN SPECIES USING  
REAL TIME PCR**

Lanqing Li  
TBS State Diagnostic Laboratory, Auburn, AL

*Mycoplasma gallisepticum* (MG) and *M. synoviae* (MS) alone or by co-infection can cause respiratory disease in chickens and some other avian species. 1,337 swabs were randomly collected from 1337 backyard birds and pooled into 294 samples. Each pool consisted of 1-5 swabs with the same species; the avian species including chicken, quail, duck, goose, guinea, peafowl, pheasant, and turkey. The original purpose of these samples were designed for the USDA program, AI/NDV surveillances. The DNA was extracted from 294 pooled samples and tested for MG and MS using real time PCR. Based on the PCR results, 176 samples were positive for either single infections alone or for co-infections, 84 (28.6%) MG positive, 158 (53.7) MS positive, and 66 (22.4%) samples with MG/MS coinfection. The positive species consisted of chicken, duck, guinea, peafowl, pheasant, and turkey. In this survey, all birds did have obvious clinical signs. This data indicated that MG/MS are very common in backyard birds; and is more prevalent in backyard birds than in commercial poultry. This data also indicate that backyard birds may play a significant role in the prevalence and disease control of MG/MS.

## SWINE SEROSURVEILLANCE IN HAWAII

Jenee Odani<sup>1</sup>, Halina Zaleski<sup>1</sup>, Naomi Ogasawara<sup>1</sup>, Brittany Castle<sup>1</sup>, Fabio Vannucci<sup>2</sup>, Travis Heskett<sup>3</sup>

<sup>1</sup>Human Nutrition, Food, and Animal Sciences, University of Hawaii at Manoa, Honolulu, HI; <sup>2</sup>Veterinary Diagnostic Laboratory, University of Minnesota, St. Paul, MN; <sup>3</sup>Animal Industry Division, Hawaii Department of Agriculture, Aiea, HI

*Historical Background* Swine play an important cultural and economic role in Hawaii, and despite Hawaii's relative isolation from the mainland USA and other countries, many swine pathogens have been introduced into the domestic herd. Porcine Respiratory and Reproductive Syndrome virus (PRRSV) has been present in Hawaii since 1992, and both the European and the North American strains have been detected. Porcine Circovirus type 2 (PCV2) was first detected in Hawaii in 2008, and subsequent surveillance in 2009 showed that it had already spread widely throughout the state. A variant strain of Porcine Epidemic Diarrhea virus (PEDV) caused disease in a single Oahu farm in 2014, and investigations revealed other infected farms that did not exhibit clinical signs. Senecavirus A (SVA) was first detected in imported hogs on Oahu in 2013, and sporadically thereafter (2015, 2016, and 2017) in recently imported animals.

*Current Study* The State of Hawaii comprises a chain of eight major islands separated by sea, enabling interisland variability in disease introduction and maintenance. Therefore, swine herds on the four main swine producing islands (Kauai, Oahu, Maui, and the Big Island) were included in this study, and serum samples were tested for PEDV, SVA, PRRSV, and PCV2 by the University of Minnesota's Veterinary Diagnostic Laboratory. Results from this ongoing project suggest that there are geographic differences in pathogen occurrence and provide meaningful information that local swine producers, veterinarians, consultants, and regulatory agencies can use in their decision-making process. Current data and maps will be presented.

**THE EASTERN COYOTE: MISSING LINK?**

Grace Chavis<sup>1</sup>, Ann Bryant<sup>1</sup>, Cory E. Mosby<sup>2</sup>, Anne Lichtenwalner<sup>1</sup>  
<sup>1</sup>School of Food and Agriculture, University of Maine, Orono, ME; <sup>2</sup>Maine Dept. of Inland Fisheries and Wildlife, Bangor, ME

Sylvatic (genotype 8; G8) *Echinococcus granulosus* (EG) was identified during 2012 in the form of lung cysts in Maine moose, which can act as an intermediate host for this cestode parasite. The definitive host, in which the adult cestode reproduces, has been reported to be the wolf (*Canis lupus*). Since wolves are not thought to be present in Maine, a more likely definitive host is the Eastern Coyote (*Canis latrans* x *Canis lycaon*), due to its relatively large size compared to western coyotes (*Canis latrans*), diverse diet, and the fact that it has been reported to predate upon large game (i.e. deer, moose). Alternatively, domestic dogs might be implicated in the spread of EG in Maine moose. The goal of this study, conducted in collaboration with investigators at the University of Saskatchewan, was to assess whether the Eastern Coyote in Maine is a definitive host of the sylvatic form of EG. With the assistance of Maine IFW, enteric tracts of coyotes (n= 28) trapped or hunted in Maine's Northern Wildlife Management Districts (WMD) were collected by legally permitted hunters and trappers. Tracts were frozen for 14 days at -80 degrees C to inactivate tapeworm ova. Thawed tracts were sectioned, immersed in water, and the mucosa was scraped. The water was then filtered with 850  $\mu$ m, followed by 212  $\mu$ m pore size sieves. Parasitic worms in the filtrate were morphologically identified, imaged, and fixed in ethanol. A variety of cestodes and trematodes were found in most intestinal tracts. Based on morphologic characteristics, EG were detected in coyotes collected in three of the six Maine WMD studied. Based on morphology of the adult cestodes collected, it appears that the coyote is a definitive host for the sylvatic strain of *E. granulosus* G8 in Maine moose. DNA from adult cestodes collected in this study will be sequenced by PCR for the mitochondrial CO1 gene to confirm that EG is found in Maine coyotes.

## **II. D. USAHA Membership Meetings**

## II. D. USAHA MEMBERSHIP MEETINGS

### **USAHA MEMBERSHIP LUNCHEON AND MEETING MONDAY, OCTOBER 16, 2017 Boyd Parr, Presiding**

The First Membership Meeting was called to order by Dr. Boyd Parr. Special thanks was given to Boehringer Ingelheim and presenter Dr. Albrecht Kissel, for their support of the luncheon.

#### **Treasurer's Report Annette Jones, Treasurer**

The United States Animal Health Association (USAHA) continues to operate on a sound financial basis. The annual audit conducted by Clifton, Larson, Allen LLP, quarterly sampling audits conducted by the USAHA Treasurer, and the review of the 2017 Statement of Financial Position by the USAHA Committee on Audit found all accounting practices and financial statements to accurately reflect the financial positions of USAHA and that all financial affairs of the Association are in order.

#### *June 30, 2017 Reserve:*

The Association's net worth on June 30, 2017 was \$1,228,163, of which \$1,106,837 is held in various securities that reflect the Association's risk policy. Specifically, USAHA continues the policy of maintaining two years' expenses in reserve held in secure investments like CD's and invests the excess in securities with potentially higher anticipated returns. The intent continues to be to use any excess reserve or interest income to enhance member services.

#### *2016-17 Revenue-Expense:*

USAHA finished the 2016-17 fiscal year with a \$6,882 net income. Considering that the USAHA management team controls a \$460,000 budget, they did another excellent job of managing those revenues and costs throughout the year. Looking forward, however, projected cost increases cannot be absorbed without minimal adjustments to dues and registration fees, and as suggested in prior year Board of Director meetings, most consider it preferable to make small fee adjustments to avoid projected deficits rather than run deficits and then make large, less frequent fee adjustments.

## II. D. USAHA MEMBERSHIP MEETINGS

### **State of the Association**

Boyd Parr

I am pleased today as part of my duties to provide you an overview of some highlights of USAHA over the past year and a general state of the association. Before I do so, I am pleased to report our overall attendance at this year's meeting is quite strong, with participants surpassing 1,200, which may exceed our preceding years' numbers.

Our 2015-2020 Strategic Plan has been a primary focus for the Executive Committee over the past year. There has been significant progress in all five areas since we last met in Greensboro. Notably:

- The new logo was adopted by the Board last fall – and rolled out early this year. As an aside, I wanted to share that in this process, we've made available a link to order USAHA apparel if you are so inclined, with a link available on the website.
- A complete redesign of our Website was accomplished with a new look and also increased functionality for mobile devices.
- Committee realignment and reorganization was a major component of our work this past year. You will notice the associated schedule changes at the meeting this year, and also welcome your feedback on its progress.
- Committee evaluation guidelines were established and published to give a structured, objective approach to aligning USAHA committees with issues at hand. We will begin reviewing all committees over a three-year rotation moving forward, the first portion to be in place by the 2018 meeting.

USAHA co-hosted two forums partnering with NIAA and with USDA as the major sponsor over the past year. We are very pleased with the discussion and outcomes of these efforts.

- Equine Forum in January in Denver: Advancing ID, Technology and Electronic Health Records
  - Strategy Forum on Livestock Traceability in Denver this September
- Additionally, the website, [Interstatelivestock.com](http://Interstatelivestock.com), continues to grow in use across the country as a valuable resource for livestock movement requirements.

Our Committee on Government Relations met in March in Washington, D.C., coordinated by our chair Dr. Kristin Haas, with an excellent set of meetings throughout the week. We have recently expanded our time to include Hill visits, with significant discussion this past year on the Farm Bill. We also want to thank our AAVLD colleagues for participating again.

I had the pleasure of attending each of the Regional Meetings this spring as president. Each region is unique in their issues, and it is certainly a learning experience to be a part of this process. I traveled to each of the following, and very much appreciated the hospitality at each meeting:



## II. D. USAHA MEMBERSHIP MEETINGS

- Western States, April, Las Cruces, NM
- North Central, May, Green Bay, WI
- Northeast, May, Atlantic City, NJ
- Southern, June, Raleigh, NC

President-elect, Barb Determan attended the World Organisation for Animal Health (OIE) in Paris in May as a technical advisor in the U.S. Delegation. We are gracious for the opportunity to be represented on that trip.

Additionally, we received an invitation to a meeting with Dr. Monique Eloit, OIE Director General in Washington, DC in June, which was organized by Dr. Elizabeth Parker at Institute for Infectious Animal Diseases (IIAD). This provided a nice opportunity to hear the direction and priorities of the OIE and visit with her in a small setting.

This year, we have instituted a new Mentoring Program, under the direction of Dr. Haas. Our goal is to better connect new members with seasoned veterans in navigating USAHA and this meeting.

I would also like to recognize Valerie Ragan and our partnership with the Center for Public and Corporate Veterinary Medicine. This has been a great asset to our student involvement, and I am pleased to report there are approximately 50 student registrations this year. Thank you to all the regions that provide scholarships, including a significant increase this year.

Thank you all for your time and support of this great organization, I most certainly have enjoyed my time as President this past year.

II. D. USAHA MEMBERSHIP MEETINGS

**Report of the Committee on Nominations**  
David Schmitt

The action of the Report of the Committee on Nominations will take place at 2:05 p.m. on October 18, 2017, during the Membership Meeting. The 2017-2018 Nominations are:

**2016-2017 OFFICER NOMINATIONS**

PRESIDENT..... Barbara C. Determan, Early, IA  
PRESIDENT-ELECT..... Kristin M. Haas, Montpelier, VT  
FIRST VICE-PRESIDENT..... Martin A. Zaluski, Helena, MT  
SECOND VICE-PRESIDENT..... Paul J. McGraw, Madison, WI  
THIRD VICE-PRESIDENT..... Charles W. Hatcher, Nashville, TN  
TREASURER..... Annette M. Jones, Sacramento, CA

**DISTRICT DELEGATES**

NORTHEAST..... Guy Hohenhaus, Maryland  
Belinda Thompson, New York  
NORTH CENTRAL..... Louis Neuder, Michigan  
Paul Brennan, Indiana  
SOUTH..... L. "Gene" Lollis, Florida  
Eric Jensen, Alabama  
WEST..... H. M. Richards, III, Hawaii  
Timothy Hanosh, New Mexico

The nominations are as a report only at this time.

**Committee Chair Recognition**

The following committee chairs were recognized for their service:

- o Dustin Oedekoven, Tuberculosis
- o Heather Simmons, Animal Emergency Management
- o Lester Khoo, Aquaculture
- o William Brown, Livestock Identification
- o Pat McDonough, Food and Feed Safety

With no further business, the First Membership Meeting was adjourned.

Dr. Kristin Haas then introduced Lieutenant Colonel (LTC) Dr. Lisa Read for a special presentation on the Armed Services Veterinary Corps, following the meeting.

II. D. USAHA MEMBERSHIP MEETINGS

**USAHA MEMBERSHIP MEETING  
WEDNESDAY, OCTOBER 18, 2017**  
Boyd Parr, Presiding

The Second Membership Meeting was called to order by Dr. Boyd Parr.

**Report of the Action of the Committee on Nominations**  
David Schmitt

**2016-2017 OFFICER NOMINATIONS**

PRESIDENT..... Barbara C. Determan, Early, IA  
PRESIDENT-ELECT..... Kristin M. Haas, Montpelier, VT  
FIRST VICE-PRESIDENT..... Martin A. Zaluski, Helena, MT  
SECOND VICE-PRESIDENT..... Paul J. McGraw, Madison, WI  
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Paul Brennan, Indiana  
SOUTH..... L. "Gene" Lollis, Florida  
Eric Jensen, Alabama  
WEST..... H. M. Richards, III, Hawaii  
Timothy Hanosh, New Mexico

A motion was made and seconded to approve the nominations report and elect the individuals as slated in the report. The motion was approved without dissent.

## II. D. USAHA MEMBERSHIP MEETINGS

### **Passing the Presidential Gavel** Boyd Parr



Immediate Past President Boyd Parr presented incoming President Barbara Determan with her president's gavel and pin.

### **Recognition of Immediate Past President** David Schmitt



David Schmitt presented Boyd Parr with the Past President's plaque, recognizing him for his dedicated leadership and service to USAHA.

## II. D. USAHA MEMBERSHIP MEETINGS

### **Executive Director's Report**

Benjamin D. Richey

Welcome everyone to the final Membership Meeting for the 2017 Annual Meeting. As always, much work goes into making this meeting happen, so the work and credit should be spread widely and abundantly. With that said, I would like to recognize the following people for their hard work and efforts.

CDFA Staff, with Dr. Fowler, Kimberly, Robyn and Dr. Jones for all the extra time they've put in leading up to the meeting, and for being here throughout the week as our home state hosts. California Staff

Jackie and Kaylin, our fearless meeting planners who have overseen all of the details this week. I specifically wish to thank Jackie for taking us on as we transition, and welcome Kaylin to the ranks, she will become a familiar face to these meetings.

Kim Sprout has continued to serve us in exemplary fashion as the central hub for the resolutions process, working closely with Dr. Schmitt and the committees this year.

I want to thank the Executive Committee: Dr. Parr for his leadership as president this year, Dr. Schmitt as he rotates off his tenure and welcoming Barb Determan to take the gavel. It has been a productive year for the association, thanks to these as well as Drs. Haas, Zaluski, and McGraw. I want to be among the first to welcome Dr. Hatcher to the ranks going forward.

Our Committee Chairs are the lifeblood of the past week, many hours of planning and coordinating agendas. Thank you for your continued time especially this week working on deadlines.

And certainly, most notably of all, Kelly Janicek. Kelly celebrated her 10-year anniversary this year with USAHA. This is quite an accomplishment, particularly that she has put up with me for this long. I'd like to take a moment to have her come up and be recognized. On behalf of the Executive Committee, we wish to present you with a small token of appreciation and gratitude for your continued service to the members of this association. It is well deserved. Let us all thank her!

Back to the meeting, this year has surpassed our expectations. Attendance is excellent, as we approach a total of 1,300, nearly 100 more than most recent years.

The new Committee Structure has brought new nuances to the meeting. Overall feedback is good, but with anything new there will be bugs and lessons learned. We will welcome input with the survey – coming soon after the meeting. It certainly has worked well overall, and we will continue to improve wherever needed.

Moving forward, last night the Board approved a dues increase (\$10 and \$25) effective January 1. USAHA will again offer a one-time discount for pre-paid before the end of the year. Further, it is an exciting year ahead with the changes, continuing to evaluate our processes and services to the

## II. D. USAHA MEMBERSHIP MEETINGS

organization at a staff level, the EC is very involved with this and providing great oversight and direction for Kelly and me.

As I've looked across the meeting this year, we have a lot of new faces in addition to some of you that have been around longer than I have. Clearly we are seeing many changes, not just within USAHA but across the industries we serve. My hope is that we will continue to evolve and improve, with new ideas that align with the great tradition that is USAHA. Thank you all.

### **Report of the Committee on Nominations and Resolutions\***

David Schmitt

The Committee on Nominations and Resolutions presented its report with the following recommendations:

Combine the following Resolutions:

- 1, 6, 13, 16, and 22
- 4 and 7
- 11 and 28

The following Resolutions were held for individual action, with final action indicated.

- Resolution 2: Approved as Amended
- Resolution 3: Not Approved, Referred to Executive Committee for action.
- Resolution 15: Approved as Amended
- Resolution 23: Approved as Amended

All other resolutions were approved by consent calendar by the Membership.

With no further business, the Membership Meeting was adjourned.

*\*The detailed report of the Committee on Nominations and Resolutions is included in these proceedings, Section E.*

## **II. E. COMMITTEE REPORTS**

**REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL  
EMERGENCY MANAGEMENT**

Co-Chairs: Heather Simmons, TX  
Charlotte Krugler, SC

Sara Ahola, CO; Bruce Akey, TX; Jamee Amundson, IA; Gary Anderson, KS; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Lyndon Badcoe, WA; Deanna Baldwin, MD; Jamie Barnabei, MD; Karen Beck, NC; Tammy Beckham, KS; Lisa Becton, IA; Danelle Bickett-Weddle, IA; Fred Bourgeois, LA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broaddus, VA; William Brown, KS; Kenneth Burton, KS; Minden Buswell, WA; Bruce Carter, IA; Gregory Christy, FL; Matt Cochran, TX; Dustin Cox, NM; Stephen Crawford, NH; Tarrie Crnic, KS; Wendy Cuevas-Espelid, GA; Marie Culhane, MN; Ignacio dela Cruz, MP; Amy Delgado, CO; Leah Dorman, OH; Brandon Doss, AR; Roger Dudley, NE; Thomas Easley, MO; Anita Edmondson, CA; Cheryl Eia, MN; Brigid Elchos, MS; Dee Ellis, TX; Larry Elskan, IA; François Elvinger, NY; Allison Flinn, DC; Kent Fowler, CA; Susan Gale, AZ; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Michael Gilsdorf, MD; K. Fred Gingrich II, OH; Linda Glaser, MN; Timothy Goldsmith, MN; Alicia Gorczyca-Southerland, OK; Larry Granger, CO; Kristin Haas, VT; Rod Hall, OK; Timothy Hanosh, NM; Charles Hatcher, TN; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Kristi Henderson, IL; Melinda Hergert, TX; Warren Hess, IL; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Guy Hohenhaus, MD; Richard Horwitz, CO; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; Pamela Hunter, FL; Carla Huston, MS; Russell Iselt, TX; Beth Johnson, KY; Annette Jones, CA; Jamie Jonker, VA; Subhashinie Kariyawasam, PA; Naree Ketusing, VA; Darlene Konkle, WI; Charlotte Krugler, SC; T.R. Lansford, TX; Dale Lauer, MN; Elizabeth Lautner, IA; Delorias Lenard, SC; Randall Levings, IA; Mary Lis, CT; Eric Liska, MT; Lindsey Long, WI; Kevin Maher, IA; Bret Marsh, IN; Barbara Martin, IA; Beatriz Martinez Lopez, CA; Chuck Massengill, MO; Rose Massengill, MO; James Maxwell, WV; Paul McGraw, WI; Sara McReynolds, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Marvin Meinders, VA; Andrea Mikolon, CA; Gay Miller, IL; Mendel Miller, SD; Janice Mogan, IA; Alfred Montgomery, DC; Peter Mundschenk, AZ; Lee Myers, GA; Yvonne Nadler, IL; Sherrie Nash, MT; Michael Neault, NC; Cheryl Nelson, KY; Sandra Norman, IN; Kristen Obbink, IA; Dustin Oedekoven, SD; Kenneth Olson, IL; Kristy Pabilonia, CO; Elizabeth Parker, TX; William (Steve) Parker, GA; Boyd Parr, SC; Janet Payeur, IA; Barbara Porter-Spalding, NC; Lisa Quiroz, CA; Jeanne Rankin, MT; M. Gatz Riddell, AL; Julia Ridpath, IA; Jonathan Roberts, LA; Paul Rodgers, WV; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; John Sanders, WV; Michael Sanderson, KS; Joni Scheffel, MN; David Schmitt, IA; Gary Sherman, DC; Kathryn Simmons, DC; Heather Simmons, TX; Susan Skorupski, OH; Julie Smith, VT; David Smith, NY; Justin Smith, KS; Harry Snelson, NC; Diane Stacy, LA; Patricia Stonger, WI; Nick Striegel, CO; Darrel Styles, MD; Manoel Tamassia, NJ; Vincent Tavella, VA; Belinda Thompson, NY; Peter Timoney, KY; Jeff Turner, TX; Liz Wagstrom, DC; Michele Walsh, ME; John Walther, LA; James



## ANIMAL EMERGENCY MANAGEMENT

Watson, MS; Patrick Webb, IA; Michelle Willette, MN; Brad Williams, TX; Raquel Wong, HI; Mark Wood, GA; Melissa Yates, AR.

The Committee met on Saturday, October 14, 2017, at the Town and Country Hotel, San Diego, California, from 8:00 a.m. to 1:00 p.m. There were 73 members and 53 guests present. At the beginning of the meeting, the mission statement was reviewed along with the response to the committee resolutions. Resolution #1, *National Foot-and-Mouth Disease Preparedness*; #2, *Radiological Incident Response and Resources*; and #3, *Resource Typing for Animal Emergency Response*. Members and guests were referred to the USAHA website to view the responses to all of the 2016 resolutions. Eighteen presentations were heard.

### **Presentations**

#### **USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) Update: VS Report**

Jon Zack, USDA-APHIS-VS, National Preparedness and Incident Coordination (NPIC) Surveillance, Preparedness and Response Services (SPRS)

Dr. Zack provided an update over VS. His presentation included information from New World Screwworm (NWS) in the Florida Keys, highly pathogenic avian influenza (HPAI), low pathogenic avian influenza (LPAI) in Tennessee, Alabama, Georgia, and Kentucky, the VS: Training and Exercise Program, and foreign animal disease (FAD) Preparedness and Response Plan (PreP) updates. For NWS, VS partnered with USDA, APHIS, International Services (IS) and Florida Department of Agriculture and Consumer Services (FDACS) to organize a unified command in Florida. Information management and communication with States, local government, stakeholders, and the public occurred. There will be an upcoming Agriculture Response Management and Resources (ARMAR) exercise in 2018; VS Training and Exercise Plan (TEP) resources are now available on FAD eye website. The HPAI Response Plan: The Red Book was released as a new version in May 2017.

#### **USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) Update: Emergency Management Response System (EMRS) Update**

Fred Bourgeois, USDA-APHIS-VS, National Preparedness and Incident Coordination (NPIC) Surveillance, Preparedness, and Response Services (SPRS)

Dr. Bourgeois discussed EMRS FY2017 investigations and traces. EMRS supported the New World Screw Worm (NWS) incident in the Florida Keys, the highly pathogenic avian influenza (HPAI), low pathogenic avian influenza (LPAI) incident and foreign animal disease (FAD) investigations. There were 1,670 total FAD investigations during FY2017. New upgrades

## REPORT OF THE COMMITTEE

have occurred to EMRS with additional security upgrades and mobile platform capabilities.

### **USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) Update: National Veterinary Stockpile (NVS)**

Rodney White, USDA-APHIS-VS-NVS

Mr. White provided an update on the new supplies and equipment available in the National Veterinary Stockpile and status of written plans. He also provided discussion on current three-dimensional (3D) response support services and the training and exercise program for foam maintenance training.

### **USDA, Center for Epidemiology and Animal Health (CEAH) Update: Foot-and-mouth Disease (FMD) Vaccination Modeling**

Amy Delgado, USDA-APHIS-VS-STAS-CEAH

A national model for FMD spread and control in the U.S. has been developed in InterSpread Plus<sup>®</sup> v. 6.01.13 to explore control strategies such as vaccination. The model includes 1.8 million farm locations and twenty-four production types for commercial and backyard bison, cattle, goat, sheep, and swine operations within the conterminous United States. This model allowed for the evaluation of integrated control strategies combining movement restrictions, depopulation of infected animals, and vaccination in limiting the severity and duration of disease outbreaks. Initial scenarios examined outbreaks in high-density beef, dairy, and swine production regions with varying vaccine strategies and doses available. The model highlights the complex interplay between local outbreak conditions, vaccination strategy, and the rate of vaccine application. For instance, preliminary results suggest that overly aggressive vaccine use early in the course of outbreaks can limit vaccine availability for use in additional species or vaccination zones later in the outbreak, which may contribute to a wider geographic spread of FMD. Further work examining possible plans for FMD vaccination will be pursued in collaboration with State and Federal partners.

### **Carcass Management Research and Development Updates**

Lori Miller, USDA-APHIS-VS-STAS

Dr. Miller discussed recent findings and products from a number of projects being conducted by USDA in collaboration with Department of Homeland Security (DHS) Environmental Protection Agency (EPA), and several state/academic/private partners. The products include a non-freezing portable vehicle wash tunnel with robotics to clean livestock carrier interiors; an Emergency Carcass Management Desk Reference Guide for responders; a generic state highly pathogenic avian influenza (HPAI) response plan template; and a web-based dashboard interface that allows responders and planners to quickly input the location and amount of carcasses to be managed and obtain the most suitable management options with links to maps, calculators, cost estimators, guidance documents and training

modules. The dashboard includes a library of relevant articles, reports, and recorded webinars, as well as a current listing of upcoming conferences, workshops, and symposia.

### **Secure Food Supply Plans: What's New?**

Danelle Bickett-Weddle, Center for Food Security and Public Health (CFSPH), Iowa State University

Significant progress was made in 2017 to enhance the Secure Food Supply (SFS) Plans for poultry and livestock. The lessons learned from the highly pathogenic avian influenza (HPAI) outbreaks in 2014-2017 have led to improvements in business continuity resources for both poultry and livestock. One of the lessons was to make the Plans more concise and uniform wherever possible. The University of Minnesota is taking the lead on the Secure Poultry Supply (SPS) Plans, consolidating concepts for Eggs, Turkeys and Broilers. More information is available at:

<http://securepoultrysupply.umn.edu/>. Iowa State University's Center for Food Security and Public Health (CFSPH) is leading similar efforts for Milk, Pork and Beef. More information is available at [www.securefoodsupply.org](http://www.securefoodsupply.org)

After the HPAI outbreaks in 2014-15, effective biosecurity implementation was identified as a gap in disease prevention. To address this, a biosecurity checklist was created by USDA in partnership with the CFSPH. That checklist was reviewed extensively by industry and regulatory officials. In September 2016, the delegates at the National Poultry Improvement Plan (NPIP) Biennial Conference approved the 14 Biosecurity Principles. Modifications were made including an auditing\* component. It became NPIP Program Standard E and was published in the Code of Federal Regulations (CFR) in May 2017. These principles provide the foundational guidance for poultry operations to develop farm-specific or complex-wide specific plans and are available at: <https://www.poultryimprovement.org/documents/StandardE-BiosecurityPrinciples.pdf>

The lessons learned from the HPAI outbreak have been applied to foot-and-mouth disease (FMD) preparedness planning. Concise summary plans for Secure Milk, Secure Pork and Secure Beef were released this year. Each can be found on their respective websites: [www.securemilk.org](http://www.securemilk.org), [www.securepork.org](http://www.securepork.org), and [www.securebeef.org](http://www.securebeef.org). All Plans include references to Federal foreign animal disease (FAD) response guidance documents, how to participate prior to an outbreak and once the FAD is diagnosed, and recommendations to implement enhanced biosecurity, conduct surveillance, and request a movement permit.

The enhanced biosecurity materials for Milk, Pork and Beef include checklists that follow the same principles as the NPIP Standard E, with the exception of auditing. The biosecurity materials (checklist, information manual and templates) for Secure Milk were pilot tested by consultants working in the Mid-Atlantic region. Improvements were made to all livestock biosecurity materials and they are available on the respective websites.

## REPORT OF THE COMMITTEE

Surveillance guidance to support continuity of business for dairy, swine, and beef operations in a regulatory Control Area was developed this year. The ability to provide a very high degree of confidence that animals are negative for FMD virus using currently available, validated laboratory testing methods, and sample collection protocols for large groups or certain types of animals is limited at this time.

The academic partners would like to thank USDA National Preparedness and Incident Coordination Center (NPIC) (poultry, milk, and pork), USDA Cattle Health Programs (beef), and National Pork Board (NPB) (pork) for funding the Secure Food Supply Plans. USDA funding for Secure Milk and Secure Pork has ended given the completion of the Plans. The NPB is funding the implementation phase of Secure Pork for calendar year 2018. USDA will continue to fund Secure Beef for FY18 focusing on the unique needs of the cow-calf sector. The resources developed for each of the Plans will continue to be hosted on their respective websites. Given the volume of resources available, the Secure Milk, Pork and Beef websites are all undergoing a software upgrade and reorganization. The same great resources will soon be easier to find.

Additional funding is needed to continue preparedness planning. The economic impact of an FMD outbreak has been estimated to be more than \$200 billion over a ten-year period. To lessen that impact, the livestock commodity groups are requesting funding be included in the next Farm Bill: \$150 million per year for five years to enhance the FMD vaccine bank; \$30 million per year for the surveillance component through the National Animal Health Laboratory Network (NAHLN); and \$70 million for state animal health agencies to better prepare for an FAD outbreak. Investing in prevention will minimize the losses to livestock producers and taxpayers should this devastating disease strike.

*\*Auditing is based on flock size described in the CFR and is done at least once every two years by the Official State Agency. A satisfactory audit makes the poultry operation eligible for indemnity should their flock become infected with HPAI and need to be depopulated. Audit guidelines are available at:*

*<https://www.poultryimprovement.org/documents/AuditGuidelines-BiosecurityPrinciples.pdf> The biosecurity resources originally developed in 2015 by CFSPH will be updated in FY18 and will be available at [www.poultrybiosecurity.org](http://www.poultrybiosecurity.org).*

### **Lessons Learned Highly Pathogenic Avian Influenza (HPAI) / Low Pathogenic Avian Influenza (LPAI) 2017 Events and National Assembly LPAI Work Group**

State summaries are provided as follows.

#### Tennessee

Charlie Hatcher, Tennessee Department of Agriculture;

## ANIMAL EMERGENCY MANAGEMENT

### 2017 Tennessee HPAI and LPAI Outbreak and Response Summary

Tennessee is a primary breeder state and supplies poultry genetics to the world. Around the second or third week of February, a showering of virus by migratory waterfowl occurred across a wide path in the Southeastern United States affecting Alabama, Tennessee, Kentucky and Georgia. There were multifocal pinpoint introductions of the influenza virus into poultry flocks.

The Tennessee outbreak was managed using the Incident Command Structure (ICS) following USDA's HPAI response plan. The Co-Incident Commanders were Dr. Hatcher and the USDA Assistant District Director. A 10km control zone was set up for the HPAI locations and a 10km surveillance zone was set up for the LPAI location. Once the second HPAI location was detected, extending the HPAI control zone into Alabama, a unified command was formed between Tennessee and Alabama.

Two Tennessee commercial poultry operations (both broiler breeder flocks) were confirmed as having HPAI. The first was diagnosed on March 3, 2017 and the second was diagnosed on March 13, 2017. One commercial poultry operation (primary breeder flock) and two backyard flocks were confirmed as having LPAI. All confirmations were of North American wild bird lineage H7N9. At the time of depopulation of both HPAI flocks, only one house on each of the premises was affected. There was no evidence of lateral transfer between premises during the outbreak except for the two HPAI locations. The two LPAI backyard flocks showed no clinical signs and eventually tested out of quarantine. Depopulation of the two HPAI flocks was by foaming. Depopulation of the one LPAI commercial flock was by cervical dislocation. Disposal of the birds at all three locations was accomplished by burial on site. Wet cleaning and wet disinfection was the method of C/D at the HPAI locations (houses had dirt floors and wooden slats). The use of a lot of water in houses with dirt floors is problematic. A combination of wet and dry C/D was performed at the LPAI location (houses had concrete floors). C/D took longer than expected at the HPAI locations delaying USDA's notification of Tennessee's HPAI free status to OIE until August 11<sup>th</sup>.

National Veterinary Stockpile (NVS) was instrumental in supplying equipment and contractors. Emergency Management Response System (ERMS) was used for permitting and it worked well. Tennessee is fortunate to have the State Veterinarian's office, National Animal Health Laboratory Network (NAHLN) Laboratory and USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) all on the same campus making communication and response much easier.

The Kord Animal Health Diagnostic Laboratory (NAHLN Laboratory) played a pivotal role in the outbreak response performing over 3,400 polymerase chain reaction (PCR) tests in a timely and efficient manner working seven days a week for over a month. ERMS was used for permitting based on surveillance testing and it worked well.

#### **Suggestions for future responses:**

- Plan like it's going to happen even if you think it won't.

## REPORT OF THE COMMITTEE

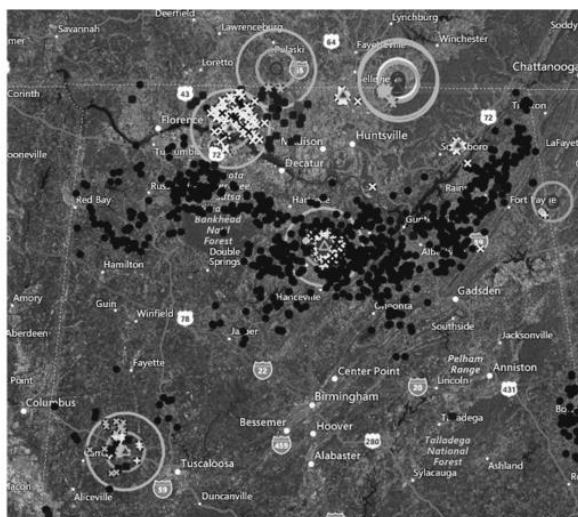
- Have your Incident Management Team (IMT) in place with specific names and consider back up IMT if the outbreak is long in duration.
- Do your NPIP biosecurity audits.
- Collect site specific depopulation, cleaning, disinfection, and disposal plans.
- Locate response resources now.
- Target surveillance of sick and dead birds.
- Once indemnity/compensation is approved, depopulate, dispose (compost if at all possible), cleaning, disinfection, all as soon as possible for what's best for that particular site.
- Collaborate and communicate with stakeholders.
- Work with subject matter experts (SMEs)
- Avoid the use of water if you can. It is hard to wet clean/disinfect wooden slats and a dirt floor.
- Consider trained/experienced strike teams for depopulation, cleaning, disinfection, and disposal. Contractors are slow and inefficient.
- Consider CO2 to depopulate. True euthanasia.
- Be EMRS ready.
- Make decisions based on risk. It is hard to get to no risk.
- Use common sense.

### Alabama

Tony Frazier, Alabama Department of Agriculture and Industries;

Dr. Frazier provided a brief overview of the 2017 HPAI/LPAI outbreak that affected Tennessee, Alabama, Georgia and Kentucky. He discussed response efforts including establishment of control and surveillance zones, monitoring commercial and backyard poultry flocks, depopulation, disposal, virus elimination and control marketing efforts.

**Avian Influenza Zone Maps  
in USDA EMRS:  
One Control Zone  
7 Surveillance Zones**



## ANIMAL EMERGENCY MANAGEMENT

### Kentucky

Bradley Keogh, Kentucky Department of Agriculture

Kentucky's 2017 LPAI incident, while smaller than some other avian influenza (AI) incidents. It demonstrated industry's ability to respond quickly to decrease virus and to collaborate effectively with regulatory officials. It also reinforced the need for timely communication among USDA staff, state animal health officials (SAHOs), National Poultry Improvement Plan (NPIP) and the poultry industry regarding State LPAI Response Plans especially in the areas of indemnity, testing protocols, and commercial versus backyard premises designation.

### Georgia

Robert Cobb, Georgia Department of Agriculture

In March 2017, LPAI and HPAI were found in commercial and backyard poultry flocks in the Southeast Region. AI was found first in Tennessee (HPAI and LPAI premises) and then in Alabama, Kentucky and Georgia (LPAI). All premises were diagnosed by National Veterinary Services Laboratories (NVSL) as H7N9.

In Georgia, the AI positive flock was found on March 23, 2017 during routine NPIP pre-slaughter testing by The Georgia Poultry Laboratory Network (GPLN), one of Georgia's three (3) National Animal Health Laboratory Network (NAHLN) laboratories. On the same day, March 23, additional samples (swabs) were obtained and avian influenza Polymerase chain reaction (PCR) matrix positive and avian influenza PCR H7 positive results were obtained. By 5:00 a.m. on March 24, positive serology was confirmed with Agar-gel immunodiffusion (AGID). On March 24, samples were mailed to NVSL and a confirmed diagnosis of Confirmed H7N9 /Presumptive LPAI was forthcoming.

The premises, located in Northwest Georgia, Chattooga County, approximately two (2) miles from the Georgia/Alabama state line, represents the first positive Avian Influenza (LPAI or HPAI) ever found in commercial or backyard poultry in Georgia. The premises consisted of four (4) houses. The spent hens from two (2) houses had been marketed three (3) weeks previously following negative NPIP pre-slaughter serological testing and were empty. The remaining two (2) houses contained approximately eighteen thousand (18,000) spent hens that were 60 weeks old. These remaining spent hens had experienced a slight drop in egg production several weeks previously. This drop in production coincided with a severe storm that damaged the houses. Since that time and prior to the pre-slaughter testing, the houses had been repaired and production had returned to normal. No increased mortality or other clinical signs were noted.

Upon notification by the Georgia NAHLN laboratory of the presumptive positive (pending NVSL confirmation) and at the request of the integrator/owner of the birds, the Georgia Department of Agriculture (GDA) activated the GDA Incident Management Team (IMT). The state multi-agency

## REPORT OF THE COMMITTEE

IMT along with GPLN, industry and the poultry grower were able to eliminate the LPAI virus while containing it to the one premises only.

- Summary: The presumptive positive was found by GPLN (NAHLN Laboratory) on March 23, 2017; the premises was quarantined on March 24; Depopulation was completed on March 24; On-site burial completed on March 25; All testing within surveillance zone, both commercial (10K) and backyard (3K), completed on April 18, 2017; Surveillance zone closed on April 19, 2017; Cleaning and disinfecting/virus elimination completed on May 16; Quarantine lifted on May 16, 2017. The event lasted fifty-five (55) days. After planned repairs, the poultry premise is back in business. GDA continues to train and make ready for any future emergency responses needed in poultry and other commodities.
- Epidemiology: The source of the virus is thought to be migrating wild waterfowl. During the period of late April/early March, the Southeast experienced severe weather. The weather consisted of high winds and rain. On the Georgia premise, the high winds ripped the curtains off the houses and required immediate temporary repairs. Due to the high cycle threshold (CT) values associated with this outbreak, it appears the exposure to the virus occurred during this time of severe weather. The poultry, with the exception of the two (2) Tennessee HPAI premises where mutation from LPAI to HPAI occurred, were all found on pre-slaughter testing. The LPAI premises were not showing clinical symptoms at the time of the testing. A small pond is located on the premises approximately 300 feet of the first poultry house (one of the two (2) affected houses). The grower stated that he repeatedly was required to “run-off” waterfowl from the pond. Additionally, a city water treatment facility with multiple small ponds is located approximately 1,500 feet from the premises. At the time of the outbreak, migratory waterfowl were present in large numbers. At the request of GDA, testing of the waterfowl at the water treatment facility was performed by USDA-APHIS, Wildlife Services (WS). After several weeks of preparation, due to regulation restraints, samples were obtained by trapping. Testing resulted in no positive samples. Of note, due to the delay in the GDA request and thus obtaining samples, the migratory waterfowl had departed, and samples were obtained from resident birds only.



## ANIMAL EMERGENCY MANAGEMENT

### Wisconsin

Paul McGraw, Wisconsin Department of Agriculture

Wisconsin had one turkey flock with LPAI H5N2 North American Wild Bird Lineage found on March 4, 2017. A decision to control market was made after a conference call with USDA-VS, State Animal Health Officials (SAHOs) and Industry. Several issues developed during the response that were unique to LPAI and controlled marketing.

### Mississippi

Jim Watson, Mississippi Board of Animal Health

As part of the LPAI outbreak in March of 2017, the Mississippi Board of Animal Health was asked to assist with the depopulation of one of the farms. The flock consisted of 25,000 63-week old broiler breeders. The farm had two long houses, one house 700 feet the other 750 feet, each one with an egg handling room in the middle, so each house had two barns. A foaming unit was set up on the road between the two houses about half the distance from the egg room and the rear of the house, and a fold-a tank set up for water on the road between the two houses. The birds were driven off the slats onto the scratch and confined there in about half of the house, at which time the birds were depopulated using about 1,600 gal of water with 1% foam. This process was then replicated on the rear barn of the other house directly across the road.

While the foaming was conducted, a whole house carbon dioxide (CO<sub>2</sub>) unit was set up in the front barn of the house (on the other side of the egg handling room). The barn was sealed by covering the fan outlets, putting insulation around the openings into the egg room and using insulation to seal the front barn door. The CO<sub>2</sub> source was an 18-wheeler with liquid CO<sub>2</sub> which was attached to a manifold with hoses leading to the CO<sub>2</sub> distributors inside the barn. CO<sub>2</sub> was released until the CO<sub>2</sub> monitor showed 40% CO<sub>2</sub> inside the barn, at which time the CO<sub>2</sub> was shut off (13,000 lb. CO<sub>2</sub>). The barn was allowed to sit for approximately 30 minutes prior to evacuating the CO<sub>2</sub> by raising the curtains and turning on the ventilation fans. This process was then replicated on the other front barn of the house across the road. Due to age and condition of the second barn as well as slight wind, it only got to 39% CO<sub>2</sub> and required 16,000 lbs.

Whole-house gassing with CO<sub>2</sub> is a viable option in curtain sided floor raised birds, even when the barns are very old and drafty. More time spent sealing the house would have made the process more efficient and required less CO<sub>2</sub>. Overall the company was very pleased with the results of the whole house gassing.

### **Lessons Learned from Wildfires (Panel Discussion)**

Jeff Turner, Texas Animal Health Commission; Rod Hall, Oklahoma Department of Agriculture; Justin Smith, Kansas Department of Agriculture

In March of 2017, wildfires spread across the Oklahoma panhandle, northern Texas, and western Kansas. Three hundred ten thousand acres

## REPORT OF THE COMMITTEE

were burned in Oklahoma, Texas lost 520,500 acres, and 651,000 acres were destroyed in Kansas. Human lives were lost, residents were displaced, and livestock herds and grazing lands were devastated. Mr. Turner, Dr. Hall and Dr. Smith discussed emergency response and recovery activities undertaken by local and state entities with a special emphasis on sharing the lessons they learned during the event.

### **Boots and Cowboy Hats – An Important Resource for Effective All-Hazards Emergency Management Response**

Nick Striegel, Colorado Department of Agriculture

Dr. Striegel's presentation covered: 1.) The problem: during a wildfire, ranchers often have no access to land or cattle or to roads with which to move them; 2.) The Incident Management Team (IMT) has their top priorities and objectives as public safety and protection of property but agriculture is often not on their radar screen; 3.) Local agricultural concerns or issues are not well understood by a deployed IMT; 4) Our goal to get agriculture to understand how incidents are managed and to get IMTs to understand the agriculture interests and that they are an important resource for response; and 5) Connecting local ranchers to the local incident through education and involvement with the Colorado Rapid Response for Agriculture and Livestock (CORRAL) program.

Last summer, Colorado had a number of wildfires that impacted ranchers in the southwestern part of the State. In that area, many ranchers graze cattle on private and public lands; the public lands are grazed mainly through U.S. Forest Service (USFS) grazing permits but there are other grazing allotments that are located in mountainous area with forested areas, river/creek bottoms, and hay meadows. Some of the hay meadows are irrigated from streams and rivers. There are also stock dams located on private properties.

During some of those wildfires, land, buildings, fences, cattle, other livestock, equipment, and irrigation infrastructure were impacted. Fires can be complex incidents and often a national Type II Forest Service IMT is deployed. Those teams are highly organized, skilled, and have exercised together in many types of incidents. But some of the teams may have very little experience with agriculture and especially Western beef cattle operations.

The problem that arises is that the incident management teams (IMTs) don't understand or are unaware of the implications to agriculture when the fire zones are identified, and movement restrictions are put in place. In addition, the personnel that are deployed to manage the traffic control points (the checkpoints for access to property) strictly follow the incident command orders that may not have considered the agricultural concerns. Ranchers cannot get access to their land, cattle, or equipment to care for their cattle or operations. In addition, sometimes the way that the fire zones are set up, they don't allow for access to key roads through which to move cattle.

## ANIMAL EMERGENCY MANAGEMENT

At the Colorado Department of Agriculture (CDA), the Animal Health Division (State Veterinarian's Office) is responsible for the response to significant livestock disease outbreaks and serves as a supporting agency in livestock incidents from natural disasters. During those fires, CDA was contacted by the Colorado Cattlemen's Association on behalf of local ranchers to help solve the access problem.

Two of the most important objectives for an IMT are safety for people and protecting property. By closing roads and shutting off access to the affected area and the buffer zone, the IMT thought they were providing for the safety of people and responders, yet, the local ranchers would find the back-way into the property to protect their cattle and operations. CDA stepped in and worked with the State Emergency Operations Center (SEOC) and the State emergency management field managers to work with the Type II national IMT, the sheriff's office who has the jurisdictional authority for the incident, and the local ranchers to come up with some solutions.

In the process, the IMT learned that an important fact: the ranchers are an important resource for emergency response for natural disasters as they are the people who know the premises, the people, and the problems. In addition, the ranchers bring expertise in moving cattle out of the danger zone and they also have resources that can be used for the response. Likewise, the agricultural community and ranchers learned a lot about how incidents are managed.

The result is that CDA developed a way for the local agricultural community and ranchers to be more closely connected to the incident management. CDA is working within the ranching community to create awareness of incident management practices; and also creating better awareness of the importance of agriculture among emergency managers. CDA will credential specific local ranchers to be involved in working with the IMT during an incident so that their interests are heard. Within CDA, we have the CORRAL program. Within the CORRAL program CDA has a credentialed position of "Livestock Specialist" along with other positions such as veterinarians, animal health technicians, and veterinary support staff. By creating these CDA credentialed livestock specialist positions within local communities, they will better be able to connect with the local multiagency coordination systems before an incident and with the IMT during an incident. Ultimately, in future incidents these CDA CORRAL livestock specialist will help to coordinate a reasonable, safe, and efficient method of protecting people, land, and cattle.

### **Blue Ribbon Study Panel on Biodefense: Defense of Animal Agriculture Challenges and Solutions**

Ellen Carlin, EcoHealth Alliance

The increasing rate of emerging and reemerging zoonotic disease, along with threats and attempts by those with nefarious intent to attack food and agriculture, point to the need to exert more effort to eliminate vulnerabilities and reduce consequences associated with America's agricultural sector. In

## REPORT OF THE COMMITTEE

the 2015 report of the bipartisan Blue Ribbon Study Panel on Biodefense, the Panel determined that national biodefense lacked sufficient centralized leadership, interagency coordination and accountability, collaboration with non-federal stakeholders, and incentives for innovation to achieve needed capabilities and maximize mission effectiveness. Because the Panel views protection of agriculture as a critical part of the overall biodefense mission space, it has developed a special focus report, *Defense of Animal Agriculture*, published just this month. This presentation will be the first public discussion about the Panel's proposals to strengthen agro-defense policies. These proposals address agriculture-law enforcement planning and investigation coordination; surveillance at the wildlife-livestock interface; animal disease reporting; and medical countermeasure development, among others. This session will provide a brief overview of these findings.

### **The National Livestock Readiness Program (NLRP)**

Ken Burton, Kansas State University

Dr. Burton discussed the NLRP. Effective local, state, regional, tribal nations and national animal disease outbreak response is dependent upon coordinated efforts across disciplines in planning, training and education. Trans-boundary animal disease identification and response are initiated at the local, state, or tribal nation level. Minimizing the deleterious effect of a disease outbreak on the U.S. livestock industry requires local, state, tribal nations and regional agriculture response entities be fully prepared in their response planning, training, and education. Current response planning, training, and education across the U.S. varies greatly in form, function, and levels of development. There exists no common resource for sharing local or state animal disease outbreak plan development and content, outbreak response knowledge and training, or educational credentialing for positions within the Incident Command System (ICS). A coordinated NLRP for local and state, tribal, and regional response entities provides much needed guidance. There exist four areas of emphasis within the NLRP framework:

#### 1. Training and Information Outreach Website

There are a large number of agriculture-related information and training sites addressing transboundary animal disease (TAD) and agricultural response throughout the internet. End users in the agricultural response community have a need to access that information in a timely manner but can be easily overwhelmed by the daunting amount of searching they must endure before finding the information they need. USDA, Animal and Health Inspection Service (APHIS), Department of Homeland Security (DHS) Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD), Institute for Infectious Animal Diseases (IIAD), Food Protection and Defense Institute (FPDI), Federal Emergency Management Agency (FEMA), training consortiums, and independent information sources are just a few of the many sites available, yet these can be difficult

## ANIMAL EMERGENCY MANAGEMENT

and time consuming to locate. The National Livestock Readiness Program (NLRP) ([www.livestockreadiness.org](http://www.livestockreadiness.org)) will bring the sourcing of state information to one site, making it much easier and less time-consuming for the end user to locate what they need. The website will include a question/answer capability where users can request information resources and receive a response within 24 hours. The website will also include a training calendar showing scheduled training opportunities within the U.S. agricultural response community.

### 2. Training/Credentialing Management Tool

An effective Agriculture training management system will track individual responder training status and position capabilities in relation to their role within the ICS structure. This framework has had previous attention and development but review and acceptance by the agricultural response community has been limited. This challenge is addressed through NLRP. An initial two-day workshop identified the priorities of the agricultural response community in relation to training and credentialing ICS positions nationwide. Focus working groups will identify and evaluate existing credentialing tools and provide guidance for future development in later stages of the NLRP project.

### 3. State Animal Disease Response Planning and Evaluation

There will soon be a new generation of TAD response planning personnel tasked with developing and maintaining state, local, tribal, and territorial response plans. Many of these individuals have emergency management background/knowledge but little agriculture/animal disease exposure. NLRP will develop a one to two hour Introduction to Agriculture Planners Course (IAPC 101) which would serve as an introductory course for future agriculture planners and an overview for state level agriculture preparedness program managers. This course will focus on explaining the process for identifying who within a state, local, tribal, or territorial government entity is best qualified to develop and prepare TAD response plans. It will also address how to prepare for TAD plan development, provide a format for TAD plans, and introduce the additional tools available through NLRP for plan development and assessment. Additionally, this aspect of NLRP will provide workshops for new TAD response planners to hear from livestock industry experts on their concerns regarding disease response, share real-world experiences with subject matter experts (SME's) from agricultural response incidents, and develop a mentoring system within the U.S. for young agricultural response planners to gain insight from experienced planners.

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### 4. Sustainability

Develop a strategy for a sustainable NLRP such as through philanthropic or corporate support, providing training programs on a fee basis, obtaining grants, and potential consultant fees. The basis of this will be identifying the programs users and stakeholders and how to target them through various strategies.

### **Committee Business:**

One resolution was submitted by committee members and adopted through motions made, seconded, and passed by voice vote.

Resolution #1 – Adequate Funding for Prevention, Diagnosis, and Response for Foreign Animal Disease Outbreaks

The meeting was adjourned at approximately 1:03 p.m.

## **USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS**

Chair: Marianne, Ash, IN  
Vice Chair: Kate Mueller, IA

Sara Ahola, CO; Bruce Akey, TX; Celia Maria Antognoli, CO; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Karen Beck, NC; Tammy Beckham, KS; Lisa Becton, IA; Charlie Broaddus, VA; Craig Carter, KY; Matt Cochran, TX; Marie Culhane, MN; Cristy Dice, CO; Anita Edmondson, CA; François Elvinger, NY; Tam Garland, TX; Joseph Garvin, VA; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Patrick Halbur, IA; Neil Hammerschmidt, MD; Charles Hatcher, TN; Kristi Henderson, IL; Ashley Hill, CA; John Huntley, AZ; Annette Jones, CA; Jamie Jonker, VA; Ellen Kasari, CO; Diane Kitchen, FL; Elizabeth Lautner, IA; Donald Lein, NY; Kevin Maher, IA; Rodger Main, IA; Stu Marsh, AZ; Michael Martin, SC; Beatriz Martinez Lopez, CA; Rose Massengill, MO; Patrick McDonough, NY; Shelley Mehlenbacher, VT; Gay Miller, IL; Kate Mueller, IA; Greg Onstott, MO; Roger Parker, TX; Barbara Porter-Spalding, NC; Cassidy Rist, VA; Margaret Rush, MD; Mo Salman, CO; Stacey Schwabenlander, MN; David Smith, NY; Justin Smith, KS; Patricia Stonger, WI; Nick Striegel, CO; Jerry Torrison, MN; Jessie Trujillo, IA; Patrick Webb, IA; Michelle Willette, MN; Nora Wineland, MO; Thach Winslow, WY; Katie Woodard, IA.

The Committee met on October 15, 2017 at the Town and Country Hotel in San Diego, California from 3:00 to 6:00 p.m. There were 15 members and 25 guests present. Dr. Marianne Ash gave a short presentation about basic housekeeping and the purpose of the Committee on Animal Health Surveillance and Information Systems.

### **Presentations and Reports**

#### **Report from the Data Standards Working Group**

Michael Martin, Clemson University and Justin Smith, Kansas Department of Agriculture

This report was presented with a summary included at the end of this report.

#### **National List of Reportable Animal Diseases (NLRAD) and National Animal Health Reporting System (NAHRS)**

Stan Bruntz, USDA-APHIS-VS

Dr. Bruntz gave a brief description of the nature and purpose of the NLRAD for those not familiar with this entity. It was reported that NLRAD is a nationally supported standardized list of animal diseases and agents where selection is based on science and policy. The framework for the NLRAD is available at:

[https://www.aphis.usda.gov/animal\\_health/downloads/us-national-list-of-reportable-animal-diseases-framework.pdf](https://www.aphis.usda.gov/animal_health/downloads/us-national-list-of-reportable-animal-diseases-framework.pdf)

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It was reported that the value of the NLRAD was largely that it provides basis for consistency and uniformity, helps State, Federal, and industry officials document disease, enables monitoring and evaluation of emerging diseases and facilitates commerce and international reporting.

An update on the NLRAD rulemaking informed the audience that the “framework” was released for public comments in September 2016, the work plan was signed by the APHIS Administrator in January 2017 and is currently in the regulatory development process. He also reported on the status of the NAHRS. This is a cooperative program involving American Association of Veterinary Laboratory Diagnosticians (AAVLD), USAHA, and Federal and State authorities. It is a reporting mechanism for monitored diseases, provides trade support and contributes to the National Animal Health Surveillance System (NAHSS) and Comprehensive and Integrated Surveillance. The planned activities for 2018 include: continued work on information technology (IT) security issues; determine future goals for the steering committee once there is a regulatory NLRAD; continuation of NLRAD rulemaking process.

### **Piloting mHealth and AgConnect HealthNet System**

Maryn Ptaschinski, Institute for Infectious Animal Diseases

Dr. Ptaschinski reported on a Department of Homeland Security (DHS) funded project directed toward capture and consolidation of data from multiple sources in real-time for the purpose of having information needed for best response to high consequence disease events. An important feature of this project was the development of tools and software for collection of animal health information while in the hands of producers, private veterinarians and others. The prototype (proof of concept) project is now being expanded due to interest from project users in using the tool for disease management on a regular basis. The re-build and expansion is occurring through commercial development.

The project consolidates data in real time and has the ability to share data granularly to different users under the control of the data owner. Examples of data were: premises, movement data, production data (mortality, genetics, flows, etc.), and laboratory test data. Field level observational data has also been added to the information collected through use of field applications on mobile devices by private veterinarians, producers and others. Data on clinical signs, vaccinations, weekly mortality, medication use, nutrition and more are also built into the system. Data sharing can be qualified by defining specifics that a data owner (someone like a producer or private veterinarian) wants to share.

A short demo of some features of the application was presented.

### **EMRS CRM 2016/EMRS2GO Update**

Fred Bourgeois, USDA-APHIS-VS

Dr. Bourgeois gave an update on fiscal year 2017 activity in Emergency Management Response System (EMRS). Year to date there have been



## ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS

4,375 investigations recorded in EMRS and associated with 26 incidents. The 2017 fiscal year number of traces recorded in EMRS is 1,139 associated with 17 incidents. Year 2017 platform updates were identified and included additional security upgrades and additional mobile platform capabilities.

EMRS also supported 1,670 foreign animal disease (FAD) investigations of which 1,297 were swine vesicular disease investigations with the following distribution by state: Seneca Valley Virus (SVV) - WI (580), CA (183), MN (141), MI (136), OH (102), IA (34).

An EMRS2GO FAD Investigation Upgrade has been finished and is waiting on permission from IT security to be released. The plans for 2018 include release of all current modules and enhancements for EMRS2GO and hopefully completion of enhancements for other commodities in the EMRS Permit Gateway. There is intent to continue to push for messaging of all diseases from *National Veterinary Services Laboratories (NVSL)* and *National Animal Health Laboratory Network (NAHLN)* Laboratories and an ability to send order messages.

### **Consensus – or Not – Laboratory Results Messaging Content**

Michael Martin, Clemson University

Dr. Martin discussed the outcome of a study designed to identify what belongs in a laboratory message. A big question in information systems architecture is which system should capture which pieces of information.

The results of the study were in summary: a lack of consensus among study participants; a majority were in favor of each system focusing on its own job; the main reason that others want laboratories to gather “other” data is that no other system is providing the information.

### **Practical Applications of Disease Bio-Portal: How Next Generation of Animal Health Surveillance and Information Systems Solve Problems Using Real-time Big Data Visualization and Analytics**

Beatriz Martinez Lopez, University of California

Dr. Lopez discussed and demonstrated use of the Disease Bio-Portal that is a product of the Center for Animal Disease Modeling and Surveillance at UC Davis in California. She demonstrated how the portal can provide near real time access to disease information and data that ranges from local to global. There is access to public databases, as well as private where sharing of data can be securely managed. A key characteristic of the system is the very large network of national and international collaborators. The tool is available for use by veterinarians, producers, researchers, etc. She demonstrated how data can be presented in many forms including maps, graphs and phylogenetic diagrams.

## **Data Collection and Reporting for Comprehensive and Integrated Swine Surveillance**

Rich Baca, USDA, Center for Epidemiology and Animal Health (CEAH)

Mr. Baca reported on a new laboratory submission module Comprehensive *Laboratory Submission Module* (CLSM) that Veterinary Services (VS) developed during FY17 and will ultimately replace Veterinary Services Laboratory Submissions (VLS). This module supports comprehensive and integrated swine surveillance objectives. Completed activities associated with this project include definition of system scope, software specification and user acceptance testing. Remaining steps include: completion of federally required security assessment process, authority to operate CLSM and prioritizing surveillance streams to implement.

Goals for 2018 include:

1. Move CLSM into production and prioritize additional swine diseases for implementation
2. Validate dashboard requirements with stakeholders for a planned roll-out in Spring 2018
3. Finalize a data collection strategy to increase use of electronic tools for field data collection

## **Foot and Mouth Disease Vaccination and Post-Vaccination Monitoring**

Pascal Hudelet, Boehringer Ingelheim, Lyon, France

Dr. Hudelet began his presentation with a discussion of Foot and Mouth Disease global distribution including identification of seven endemic pools around the world that require tailor-made vaccines and diagnostics. He discussed the trends in inter-pool movement and the role of the Indian sub-continent in recent distribution of their native strains to other regions of the world with ultimate emergence of new variants.

He then introduced the principles of vaccine matching and how to use R1 values in vaccine selection. This topic was followed by presentation of information on post vaccination surveillance; why it is necessary and how to do it. In summary he noted that for a foot-and-mouth disease (FMD) free country, antigen banks are an essential tool in the emergency response stockpile. However, preparedness also means constant monitoring of the world wide epidemiological situation, vaccine matching in endemic regions and provision for resources, systems and tools for post vaccination monitoring.

## **Committee Business:**

Maryn Ash informed the membership that last year's resolution concerning "Sustained Fiscal Year 2017 Funding for the United States Department of Agriculture, Animal and Plant Health Inspection Service Influenza A Virus – Swine Surveillance Activities" was approved and directed to the U.S. Congress and USDA-APHIS-VS. She reported that she has no knowledge of a response at this time.

## ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS

There was a motion by Michael Martin to support a resolution with subject matter being “Near Real-Time Mapping of High Quality Veterinary Diagnostic Laboratory Data for Improved Animal Health Situational Awareness”. The motion was seconded by Matt Cochran. Following a discussion of the resolution, a vote for support was passed unanimously with 10 “Yes” votes by committee members and 0 “No” votes.

There was a motion to adjourn. Motion was seconded. All voted in favor.

## REPORT OF THE COMMITTEE

### **REPORT OF THE DATA STANDARDS WORKING GROUP**

Michael Martin, SC

Justin Smith, KS

The group is continuing to monitor effectiveness and validity of the certificates of veterinary inspection (CVI) standards originally developed by the group. There have been a number of topics and questions on uses that have emerged with the implementation of version 1 of the health certificate standards. This has led to a good deal of time spent talking about the project scope. There have been new movement documents that have emerged and it is questioned whether or how the standards apply to them, examples being permits, commuter herd agreements, others. It was determined by the committee that at this time they will only be focusing on eCVI data transfer in developing version 2 of the health certificate standards. The committee also reported that they will be seeking a couple of replacements for members that are no longer available to participate in the committee work.

## **COMMITTEE ON ANIMAL WELFARE**

Chair: Belinda Thompson, NY

Vice Chair: Chelsea Good, MO

Bobby Acord, NC; Jamee Amundson, IA; Paul Anderson, MN; Chris Ashworth, AR; James Averill, MI; Deanna Baldwin, MD; Bill Barton, ID; Peter Belinsky, RI;Carolynn Bissett, VA; Paul Brennan, IN; Gary Brickler, CA; Charlie Broaddus, VA; William Brown, KS; Tom Burkgren, IA; Beth Carlson, ND; Matt Cochran, TX; Stephen Crawford, NH; Ron DeHaven, CA; Jacques deMoss, MO; Barbara Determan, IA; Linda Detwiler, NJ; Leah Dorman, OH; Brandon Doss, AR; Mark Drew, ID; Roger Dudley, NE; Brigid Elchos, MS; Dee Ellis, TX; Heather Fenton, GA; Kathy Finnerty, NY; Katie Flynn, CA; Larry Forgey, MO; Kent Fowler, CA; Tolani Francisco, NM; Nancy Frank, MI; Julie Gard, AL; Robert Gerlach, AK; Eric Gingerich, IN; K. Fred Gingrich II, OH; Gail Golab, IL; Eric Gonder, NC; Chelsea Good, MO; Alicia Gorczyca-Southerland, OK; James Grimm, TX; Kristin Haas, VT; Thomas Hairgrove, TX; Rod Hall, OK; Steven Halstead, MI; Charles Hatcher, TN; Bill Hawks, DC; Carl Heckendorf, CO; Julie Helm, SC; Linda Hickam, MO; Robert Hilsenroth, FL; Sam Hines, MI; Heather Hirst, DE; Donald Hoenig, ME; Danny Hughes, AR; Dennis Hughes, NE; John Huntley, AZ; Russell Iselt, TX; Eric Jensen, AL; Annette Jones, CA; Dena Jones, DC; Jamie Jonker, VA; Anne Justice-Allen, AZ; Susan Keller, ND; Donna Kelly, PA; Bradley Keough, KY; Diane Kitchen, FL; Terry Klick, OH; Michael Kopp, IN; Daniel Kovich, DC; Eileen Kuhlmann, MN; Dale Lauer, MN; Mary Lis, CT; Pat Long, NE; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN; David Marshall, NC; Scott Marshall, RI; Chuck Massengill, MO; Brittany McCauslin, NZ; Paul McGraw, WI; David Meeker, VA; Antone Mickelson, WA; Mendel Miller, SD; Eric Mohlman, NE; Peter Mundschenk, AZ; Louis Neuder, MI; Sandra Norman, IN; Dustin Oedekoven, SD; Elizabeth Parker, TX; Boyd Parr, SC; William Pittenger, MO; Barry Pittman, UT; Maryn Ptaschinski, IA; David Pyburn, IA; John Ragan, VA; Tim Richards, HI; M. Gatz Riddell, AL; Cassidy Rist, VA; Keith Roehr, CO; Bill Sauble, NM; Travis Schaal, IA; Shawn Schafer, OH; David Schmitt, IA; Dennis Schmitt, MO; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Kathryn Simmons, DC; David Smith, NY; Julie Smith, VT; Harry Snelson, NC; Diane Stacy, LA; Nick Striegel, CO; Scott Stuart, CO; Manoel Tamassia, NJ; Robert Temple, OH; Belinda Thompson, NY; Beth Thompson, MN; Alberto Torres, AR; Bob Tully, KS; Jeff Turner, TX; Charles Vail, CO; Liz Wagstrom, DC; Jessica Watson, DC; Sherrie Webb, IA; Patrick Webb, IA; Michelle Willette, MN; Brad Williams, TX; Cliff Williamson, DC; Ross Wilson, TX; Josh Winegarner, TX; Nora Wineland, MO; Richard Winters, Jr., TX; Cindy Wolf, MN; Peregrine Wolff, NV; Ernest Zirkle, NJ.

The Committee met on Wednesday, September 18, 2017 at the Town and Country Hotel in San Diego, California from 8:00 to 11:30 a.m. There were 51 members and 14 guests present. Committee Chair Dr. Belinda Thompson welcomed the committee and reviewed the committee mission statement.

## **Presentations**

### **Poultry Welfare Initiatives and Poultry Welfare Impact of Pressure to Engage in Antibiotic-Free Production – One Perspective**

David Shapiro, Perdue Farms

Perdue is a top four poultry supplier in the United States. Migration to almost 100% no-antibiotics-ever (NAE) has been a 12+ year process for Perdue, stair stepping down usage of antibiotics starting with beginning to eliminate growth promoting antibiotics in 2002. Perdue does still treat flocks with antibiotics when they are sick. Perdue spends more on vaccines than they did prior to stepping down antibiotic use and spends more on vaccines than is industry standard. Increased vigilance in monitoring for disease and increased lay out /downtime between flocks (ideally three weeks instead of the standard two weeks) have been key pieces of a successful transition. Higher retail price for chicken is a major incentive in Perdue Farm's decision. However, Shapiro shared that not all NAE poultry is marketed with those labels. While industry wide 47% of production is NAE, only 5-10% is sold as such.

### **Poultry Welfare Initiatives and Poultry Welfare Impact of Pressure to Engage in Antibiotic-Free Production – Second Perspective**

Phil Stayer, Sanderson Farms

Along with Perdue Farms, Sanderson Farms is another top four poultry supplier in the United States. Sanderson Farms utilizes antibiotics in their production system. Ionophores are the mostly commonly used antibiotics, which are different from other classes of antibiotics because they are not considered important to human health. Antibiotics in chicken production are used to control ubiquitous clostridial challenges. Options for antibiotics that can legally be used in poultry production are limited. Stayer believes antibiotic use helps him live up to his veterinary oath. He stated that he believes using the limited antibiotics available in chicken production helps ensure animal welfare, sustainability, and human health. The American Association of Aviation Pathologists (AAAP) supports the ability for poultry veterinarians to utilize antibiotics in production.

### **Swine Welfare Initiatives and Swine Welfare Impact of Pressure to Engage in Antibiotic-Free Production – One Perspective**

Tom Burkgren, American Association of Swine Veterinarians (AASV)

The official position of the AASV is that the use of antibiotics should closely involve veterinarians in the management of herd health. The AASV statement goes on to state that if a pig is sick, or at risk of getting sick, it is the veterinarian's responsibility to prevent or treat illness. Also, farmers should have an alternative marketing plan for pigs that need to be treated with an antibiotic. Finally, it is important that the decision to treat or euthanize is made in a timely manner to minimize the pig's pain or distress.

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David Shapiro, Phil Stayer, and Tom Burkgren the participated on the question and answer panel with the committee audience.

### **Update from Ohio – Minimum Standards for Livestock Care**

Tony Forshey, Ohio Department of Agriculture

Dr. Forshey last spoke at the Committee meeting on this topic in 2009. The Ohio animal care program is focused on compliance and driven by complaints. The most common complaint is concerns about horses not being fed properly. Each year, investigations typically find a violation 30–39 % of the time. While the Ohio Department of Agriculture has the ability to issue civil penalties, this tool has only been used once to enforce the minimum standards for livestock care. Most of the time, they are able to achieve compliance prior to escalating to civil penalties. One challenge he shared is the time and expense investigating complaints.

### **Depopulation Guidelines – Update from AVMA**

Cia Johnson, American Veterinary Medical Association (AVMA)

AVMA started working on their depopulation guidelines in 2015 and are close to completing the document. The draft document is on AVMA's website. This document is separate from the existing AVMA guidelines for Euthanasia of Animals. The depopulation document breaks methods down into three categories. The bottom category is not recommended. There will be a symposium in late 2018 to go over the depopulation and euthanasia guidelines.

### **Committee Business:**

There were no resolutions, old business, or new business brought before the committee during the business portion of the meeting.

## USAHA/AAVLD COMMITTEE ON AQUACULTURE

Chair: Lester Khoo, MS

Vice Chair: William Keleher, ME

Sara Ahola, CO; James Averill, MI; Peter Belinsky, RI;Carolynn Bissett, VA; Y Reddy Bommineni, FL; Deborah Brennan, MS; Gary Brickler, CA; Sandra Bushmich, CT; Beverly Byrum, OH; Lynn Creekmore, CO; Fred Cunningham, MS; Ignacio dela Cruz, MP; Larry Elskan, IA; Tony Forshey, OH; Nancy Frank, MI; Richard French, NH; Kathleen Hartman, FL; Jennifer Haugland, NC; Jerry Heidel, OR; Donald Hoenig, ME; Dudley Hoskins, VA; John Huntley, AZ; Myron Kebus, WI; William Keleher, ME; Donna Kelly, PA; Lester Khoo, MS; Bruce King, UT; Timothy Kniffen, IA; Christina Loiacono, IA; Beatriz Martinez Lopez, CA; Danielle Nelson, WA; Akinyi Nyaoke, CA; Jenee Odani, HI; Lanny Pace, MS; Amar Patil, NJ; William Pittenger, MO; James Roth, IA; John Sanders, WV; John Schiltz, IA; Kevin Snekvik, WA; Manoel Tamassia, NJ; Robert Temple, OH; Lee Ann Thomas, MD; Kathy Toohey-Kurth, WI; Michele Walsh, ME; Richard Whittington, AL; John Williams, MD; Paul Zajicek, FL.

The Committee met on October 15, 2017 at the Town and Country Hotel in San Diego, California from 12:30-5:20 p.m. There were 21 members and 22 guests present. The mission statement of the committee was reviewed at the start of the committee and suggested changes to the mission statement are included within this report.

### Presentations and Reports

#### Proactive Public-Private Partnership

Paul Zajicek, National Aquaculture Association (NAA)

Mr. Zajicek provided background information of the U.S. Aquaculture industry and how diverse it is. He then provided information including achievements and challenges of the various partnerships which included:

#### **Commercial Aquaculture Health Programs Standards (CAHPS)**

The example of where this program has been adopted in Maine, North Carolina, Rhode Island, Florida and Washington was cited. This program faces challenges of getting state and producer buy in.

#### **Aquaculture Health Management Symposium**

The symposium was held at the 147<sup>th</sup> American Fisheries Society Meeting Florida. This was CAHPS oriented and included 3.5 hours of presentations (8 presentations) and had 40 attendees. This represented a new venue and outreach effort. He identified the challenges as building momentum and finding new and different venues to deliver the message.

#### **National Conference Calls**

The NAA acted as third-party organizer to engage the various stakeholders on two important concerns namely Tilapia Lake Virus and Shrimp Pathogen (Vibrio). It connected the NAA membership with the 39 state and species aquaculture associations. While successful (the



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development of a fact sheet on Tilapia Lake Virus), it still had the challenge to have stake holders speaking up.

### **USDA-APHIS-VS Aquaculture Program Update 2017**

Kathleen Hartman, USDA-APHIS

Dr. Hartman provided an update on the efforts of the Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) Aquaculture program which included the program accomplishments for 2016 and 2017, the program goals for 2019 and what is trending.

Accomplishments for 2016 and 2017 encompassed completion of the Infectious Salmon Anemia (ISA) surveillance in the Pacific Northwest, the completion of the National Animal Health Monitoring System (NAHMS), Aquaculture 2020 pre-assessment survey (March to April 2016), cooperative agreement support for the commercial aquaculture *health* program standards (CAHPS), proof of concept projects, the regulatory burden surveys, the development of the ISA case definition (for producers and trading partners) and Fish Foreign Animal Disease Training which was held in Ames, Iowa. She gave a brief summary background and results of the ISA surveillance of the Northwest where zero positive cases were found out of the over 4,000 samples taken. She provided information on the regulatory burden surveys which have been done under the direction of Dr. Carole Engle. The bait and sportfish survey had been completed and she provided some of the data obtained. There will be a publication on the results of this survey in the Journal of the World Aquaculture Society. Dr. Hartmann also shared the results of the USDA-NAHMS pre-assessment survey where the top five health topics that were identified were infectious diseases, regulatory confusion, domestic animal movement, environmental stewardship/sustainability and biosecurity and infectious diseases not in the United States. The producers specifically identified the greatest health risk to their farms were emerging diseases and regulatory confusion while the greatest risks to the U.S. aquaculture were inadequate knowledge/training on health issues, emerging diseases and regulatory misperception. She then outlined the goals for the program which includes collaboration with the National Aquatic Health Plan (NAAHP) partners, CAHP, comprehensive and integrated surveillance for U.S. Aquaculture Comprehensive and Integrated Surveillance (CIS), emergency preparedness and response, and the support of the productivity and viability of U.S. aquaculture industry sectors. It will be the 10<sup>th</sup> year anniversary of the NAAHP and the partners will be drafting a status report. The pathogen list as well as the diagnostic criteria and case definitions need to be updated. Preparations will be made for the next 5-year memorandum of agreement signing. With regards of CAHPS, she shared about the proof of concept projects which are in Washington, Maine, North Carolina, Idaho and Florida. A template (self-populating *Portable Document Format* (PDF) document) is being drafted from the CAHPS site specific plan which will assist producers who want to enroll in the program. The master program for CAHPS will be placed in the Surveillance Collaboration Services

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(SCS) CoreOne database and there will be continued outreach for the CAHP program. With regards to CIS, with the completion of the ISA surveillance in the Pacific Northwest, a publication of the results will be coming. Through CAHPS projects zone and zone management salmon and shellfish will be established. One of the goals of CIS is that data gaps in risk pathways will be identified. For emergency preparedness and response, draft case definitions for World Organisation for Animal Health (OIE)-listed pathogens will be done and the National List of Reportable Animal Diseases (NLRAD) will be reviewed. The training for USDA personnel for aquatic Foreign Animal Diseases that was held at the National Veterinary Services Laboratory (NVSL) in Ames, Iowa in 2017 is hoped to be repeated every other year. The USDA will be developing emergency plans and increasing diagnostic capabilities. In industry support, the USDA will continue education and outreach through National Aquaculture Association (NAA) and state and producer associations. She also provided information of the National Veterinary Accreditation Program (NVAP) modules (the aquatic ones are 13, 14, 15 and 28). Dr. Hartman also provided information on USDA Center for Veterinary Biologics on behalf of Dr. Melissa Schilling. This included information on the guidance document 546. Comments on this document are due October 24, 2017. Dr. Hartman shared what is trending (current issues) which includes Tilapia Lake Virus, Early Mortality Syndrome (in shrimp) and Koi Herpes Virus. On the emerging issues are concerns of testing methodologists and problems in pooling samples.

### **Highlights from the Information Needs Assessment Survey for the Upcoming NAHMS Aquaculture 2020 Study**

Chuck Fossler, USDA-APHIS-VS-CEAH

Dr. Fossler provided information on the upcoming National Animal Health Monitoring System (NAHMS) Aquaculture 2020 study. This will be broad in scope (not just catfish as in the past), be science based, collaborative in nature, voluntary and confidential. He shared about the process which includes the needs assessment, study design, study implementation, study analysis and information dissemination. The needs assessment survey took place from March 21 to May 31, 2017. It was an on-line survey consisting of 25 questions and had 363 respondents (52% of which were producers) from 44 states and two foreign locations. He also provided the breakdown of the responders with regards to their involvement with the aquaculture industry, the breakdown of the producers by animal type raised and the producer priority issues as well as the priority disease, disorders and pathogens for fish, mollusks, and crustaceans. The study design will include development of study objectives, questionnaire design and pre-testing, and study promotion. All U.S. aquaculture operations on the National Agricultural Statistics Service (NASS) Census of Aquaculture 2018 will be eligible to participate with the questionnaire sent out via mail (first mailing expected in mid-2020 and second mailing to non-respondents three weeks later). Respondents will have two weeks to complete and return the questionnaire.

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The analysis will be undertaken and results are anticipated to be completed in 2021. The needs assessment results will be published soon. He provided contact information for Meg Parker for the study.

### **National Oceanic and Atmospheric Administration (NOAA) Focus on Aquatic Animal Health Management**

Janet Whaley, NOAA, National Marine Fisheries Service (NMFS), Office of International Affairs and Seafood Inspection

Dr. Whaley started her presentation sharing NOAA's involvement in aquaculture which involves seafood safety, food security and national resource conservation. NOAA's goal is to renew focus on seafood trade and aquaculture. They hope to close the gap via:

- a. National Marine Aquaculture Initiative  
In this initiative, they hope to streamline regulations for (federal and state waters), establish regional partnerships and through science, research and development and technology transfer accelerate production.
- b. Seafood Import Monitoring Program  
They hope to prevent illegal unreported, unregulated catch and/or misrepresented seafood from entering the U.S.
- c. Marine Mammal Protection Act protection rule  
Reduce marine mammal by-catch in countries that are importing seafood to the U.S.

She provided examples of NOAA efforts in the various regions (Greater Atlantic Region, Southwest Region, Northwest region, Alaska, the Pacific Islands and the Southeast and Gulf of Mexico). Dr. Whaley shared the objectives for the Aquatic Animal Health Planning which is to facilitate successful aquatic farming, lessen the risks of disease threats (between farmed fish as well as between farmed fish and wild fish populations), production of safe seafood and increase potential for trade. She shared NOAA's role in seafood safety via the Office of International Affairs and Seafood Inspection (OIASI) which is involved in establishment of sanitation inspections, system and process audits, product inspection and grading, product lot inspections, laboratory analysis, training consultation and export certification. NOAA also has the National Seafood Inspection Laboratory in Mississippi that provides laboratory analysis and scientific support for the OIASI. This laboratory is involved in method development, screening, testing and verifications for indicator and pathogenic bacteria, histamines, veterinary drug residues, sulfites, metals, biotoxins and species identification.

### **Veterinary Licensing in U.S. Waters Outside of State Jurisdiction**

Warren Hess, American Veterinary Medical Association (AVMA)

Dr. Hess started off his presentation by sharing information about the Exclusive Economic Zone (EEZ) and the history of AVMA's efforts as they relate to aquatic animal medicine and aquaculture which includes the AVMA

## REPORT OF THE COMMITTEE

policy on Veterinary Licensing in U.S. Waters Outside of State Jurisdiction. He then shared the key components of the policy which includes:

- a. The veterinarian is licensed and in good standing to practice veterinary medicine in any state within the U.S.
- b. The veterinarian holds a USDA-APHIS category II veterinary accreditation and includes the completion of the USDA-APHIS aquatic health modules.
- c. The veterinarian has a valid veterinarian-client-patient relationship with the faculty.

The AVMA also recommends that USDA-APHIS-VS be the lead agency for aquatic animal health oversight for commercially cultured aquatic animals in waters outside state jurisdiction.

He shared that the AVMA's Aquatic Veterinary Medicine Committee had sent request to the AVMA which included:

- a. AVMA, through its network with the state departments of agriculture and state veterinary licensing boards should assess where individual state regulations currently are in regards to jurisdiction over the practice of veterinary medicine in state waters and whether their regulations require certificates of veterinary inspection (CVIs) signed by a licensed veterinarian in order to import aquatic species into the state. In addition, the AVMA should also attempt to determine if CVIs are required for movement of aquaculture intrastate.
- b. AVMA, through its network with the National Association of State Animal Health Officials (NASAHO) should send the new policy on Veterinary Licensing in U.S. Waters Outside State Jurisdiction to all states and seek feedback, specifically seek from all states that boarder U.S. EEZ waters.
- c. AVMA, with its network of federal agencies, should share the new policy on Veterinary Licensing in U.S. Waters Outside State Jurisdiction with all federal agencies that would be involved in regulating aquaculture in the EEZ (NOAA, USDA) and seek specific feedback.
- d. Once feedback has been obtained from states and federal agencies, the AVMA should serve as a neutral convener to host an in-person meeting of potential involved regulators and other key stakeholders to assess how the absence of veterinary licensing oversight in the EEZ should be resolved.
- e. To enable the last portion of the request:  
AVMA is scheduling a two-day meeting for Fall 2018 in the Chicago area where AVMA will reimburse 50% of travel expenses for up to two regulatory individuals from each invited state (coastal and Great Lake States), Federal and Industry Representatives also invited to attend, The AVMA is currently seeking a facilitator for the meeting and once identified meeting dates will be selected.

**Aquatic Animal Health Regulations: Needs to create a more harmonized and effective system for aquatic animal testing and movements**

Bill Keleher, Kennebec River Biosciences

Mr. Keleher provided a presentation on the problems of aquatic animal health regulation due to the multi-agency and state jurisdiction. He summarized the problem as below:

The framework within the United States as it applies to aquatic animal health regulations are quite fractured and changes need to be made going forward as aquaculture grows domestically. Movement of aquatic animals is covered by the USDA and U.S. Fish and Wildlife Service (USFWS) on the federal level and most importantly to individual states. In general, USDA is the competent authority for exports and USFWS for imports on the federal level while states have the final say on any movements into individual states. This has led to issues with trading partners and to a large number of imports with no health requirements for import. The protocols for inspections and testing is generally provided for either the American Fisheries Society (AFS) Blue Book or World Organisation for Animal Health (OIE) Manual with the Blue Book used most often for inter-state movements. Given the growing complexity of trade in aquatic animals, improvements will need to be made for the existing system. There will either need to be drastic changes made to the Blue Book or some other process used such as the National Aquatic Animal Health Plan (NAAHP). There needs to be a process that includes input from industry as well as regulators and academia allowed for the U.S. to be in a more proactive stance with regard to our trading partners and emerging threats to the domestic aquaculture industry.

**Hubbs Sea World Research Institute (HSWRI)**

Pamela Yochem, Hubbs Sea World Research Institute

Dr. Yochem provided information on HSWRI efforts in aquaculture. HSWRI has four core areas of research which includes wildlife populations, animal behavior, ocean health and sustainable seafood. She shared the goals of HSWRI which are replenish wild stocks of depleted species, demonstrate sustainable aquatic farming as a means to provide supplemental resources of fish, develop methods that are innovative, efficient and environmentally responsible, raise products of the highest quality, and bridge the gap between research and commercial scales of production. She provided information on HSWRI's facilities, experimental systems, research on white bass, California Yellowtail, California halibut, and ocean resources enhancement and hatchery program. She shared about the research that they were undertaking with regards to fish health, fisheries biology/ecology, nutrition, genetics and sustainability. They have collaborative research in the areas of climate change, ocean noise impacts and effects of coastal development. She also informed about HSWRI's education and outreach efforts.

## **U.S. Fish and Wildlife Service (USFWS) Update**

Joel Bader, USFWS

Dr. Bader provided his report on USFWS efforts via Skype which included the following topics:

**Laboratory Information Management System (LIMS):** The National Hatchery System of aquatic animal health laboratories has purchased an off-the shelf Laboratory Information system to track all aspects of laboratory management. We have purchased Advance Technology Laboratory (ATL) Titan Software. It has already been installed in our national server and plan to begin testing it at four laboratories in the next few weeks with anticipation to roll it out to all laboratories by the end of 2018. It hopes that USFWS will be able to share information with their partners through this database.

**Lab Certification:** All FWS aquatic animal health laboratories have agreed to apply for Tier I American Fisheries Society Laboratory Certification. SOPs have been drafted for all laboratory procedures and each laboratory will apply independently in 2018. The intent of American Fisheries Society (AFS) Certification is to prepare laboratories for eventual independent certification by nationally and internationally recognized organizations such as the American Association of Veterinary Laboratory Diagnosticians (AAVLD).

**FWS 713 Aquatic Animal Health Policy:** FWS has drafted a rewrite of the policy for how aquatic animal health is conducted within the Service. The draft is presently undergoing internal review and will eventually be available to our partners for review. Reviews will be completed in 2018 and then be published.

**Title 50 Program:** All Title 50 forms have been approved for use for another three years and all are available on of the FWS website. The Service has begun to recertify Canadians to act as T50 testing and signing officials. Certification is good for five years. Applications can be obtained on the FWS website. The Canadian Food Inspection Agency (CFIA) as determined that their Officials cannot sign FWS T50 forms. Numerous Canadian officials have been certified this year, with imports from Canada continuing to increase.

**Injurious Species:**

**BSal Rule:** The Service presently continues to respond to public comments to the new interim Bsal regulations which prohibit the importation of 201 species of Salamander capable of hosting Bsal. The plan remains to finalize the interim rule in 2018.

**Lacey Act:** Based on Court action in 2017, the Lacey Act's interstate movement provisions for injurious species have been limited to only U.S. territories and the District of Columbia. The courts actions are likely to significantly impact future regulations.

## **Committee Business:**

A subcommittee was established to discuss and draft language regarded to a resolution for support of domestic aquatic animal health regulation. The

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subcommittee will consist of: Bill Keleher (Chair), Kathleen Hartman, Warren Hess, Kevin Snekvik, Paul Zajicek, Tim Kniffen,Carolynn Bissett, and Jo Chapmen.

The suggested changes to the mission statement to ensure that diagnostics are included:

“The USAHA/AAVLD Joint Committee on Aquaculture is to provide a forum for discussion and cooperation between members of the diverse aquaculture industries, regulatory and tribal agencies, and the diagnostic laboratories and research community, as they address problems and opportunities related to aquatic animal health and well-being, seafood safety, and public health. The committee develops and recommends policies and actions for the USAHA/AAVLD that will facilitate harmonization of aquatic animal health diagnostics, regulations and the activities of stakeholder federal, state, tribal, and local agencies, and in so doing, ensure the economic stability of the aquaculture industries.”

The meeting was adjourned at 5:20 p.m.

## **COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY**

Chair: Donna Gatewood, AI

Vice Chair: Joseph Huff, CO

Gary Anderson, KS; Chris Ashworth, AR; Randall Berrier, CO; Bruce Carter, IA; Barbara Determan, IA; Larry Elsken, IA; James England, ID; James Evermann, WA; William Fales, MO; Allison Flinn, DC; Patricia Foley, IA; Donna Gatewood, IA; K. Fred Gingrich II, OH; Larry Granger, CO; Keith Haffer, SD; Paul Hauer, IA; Percy Hawkes, UT; Christine Hoang, IL; Amanda Houston, TX; Joseph Huff, CO; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Joanne Maki, GA; David Marshall, NC; Kent McClure, DC; Scott McVey, KS; Don Myers, KS; William (Steve) Parker, GA; Julia Ridpath, IA; Kathryn Simmons, DC; Bruce Thomsen, IA; Bob Tully, KS; Mary Anne Williams, TX; Brad Williams, TX; Mark Wood, GA; Alan Young, SD; Bereket Zekarias, KS.

The Committee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00 a.m. to 12:00 p.m. There were 11 members and 14 guests present. After introductions, the previous year resolutions and response were reviewed.

### **Presentations and Reports**

#### **Animal Serum – an Unregulated Commodity and Industry**

Percy Hawkes, Biowest USA

Animal serum is an essential ingredient for growing animal cells, and of incalculable importance to researchers, diagnostic laboratories, and the biologics industries. Despite this, it is surprising to know that the serum industry is not required by law to correctly label the products they sell.

The International Serum Industry Association (ISIA) has done an outstanding job of creating high standards to guarantee the integrity of animal serum products. However, as anyone involved in the serum industry can tell you, there is always a small number of serum companies, who take advantage of the fact that serum is not regulated, thus putting at risk the research, diagnostic tests, vaccines, etc., which require the use of cell cultures.

Serum sold by a few, sometimes unsuspected dishonest companies, might be labeled as Fetal Bovine Serum (FBS), when in reality it might be New Born Calf Serum (NBCS) or have been adulterated with other undeclared additives such as adult Bovine Serum Albumen (BSA), water, or cell growth promoting ingredients. At the same time, the real country of origin may be different than what is declared on the Certificate of Origin.

In the past, USDA has not been able to respond as expected to reports of this kind of fraud, due to the lack of authority to regulate the animal serum industry. Even though industry ethics standards have been established by ISIA, they cannot fully succeed without the corresponding support from USDA and other regulatory authorities.



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We think problems with serum come with serum from other countries. Not all problems with serum are related to the importation. Individuals may take shortcuts to boost their products. This can occur during processing. Far too often, an incentive exists to take shortcuts with quality.

Regulatory reform is essential. Fortunately, the ISIA now exists and is pushing for traceability standards. Two other organizations, the Brazilian FBS Serum Producers Association, and the European Serum Producers Association were formed last year. The standards between the European Commission (EC) and the U.S. are wildly divergent.

What is the magnitude of the problem? In 2006, the serum industry began to organize. Most major companies joined the effort. In 2013, problems related to adulterated serum occurred with a company that was providing 25% of U.S. serum.

This presentation is available on the Committee web page.

### **International Serum Industry Association (ISIA) Activities Update**

Rosie Versteegen, International Serum Industry Association

Everyone knows that serum presents risk. Although we've been trying to get away from using serum in cell culture, it's still with us. The ISIA is actively developing standards and best practices for testing traceability of serum. Mass balance and financial balance is examined during ISIA audits. The ISIA process would have identified the 2013 issue associated with adulterated serum.

ISIA certification covers about 90% of serum providers. Serum comes from a lot of different places. ISIA is looking for methods that can distinguish materials that seem to be identical. Stable isotopes looked promising, showed good separation for many geographies, but couldn't detect differences between Texas and Mexico, which could be important. Trace elements provide a better opportunity. Now they can identify seven countries, looking to focus on the seven major serum-producing countries in the world.

### **Center for Veterinary Biologics (CVB) Updates**

Byron Rippe, USDA-APHIS, Science, Technology and Analysis Services (STAS), VS-CVB

- Budget: budget has been static. Staffing is about 40% less than what it was in 2005.
- Single-tier labeling: data summaries are at [productdata.aphis.usda.gov](http://productdata.aphis.usda.gov) (no "www"). Being implemented over a four-year period of time.
- NCAH Portal: makes for an entirely paperless process for submissions.
- Extraneous agents in serum and trypsin: American Association of Swine Veterinarians' (AASV) paper in March, manufacturer detected Seneca A virus in trypsin. Embarked on some testing at CVB. Developed polymerase chain reaction (PCR) assay to detect

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Senecavirus A (SVA). Looked at 77 different products in repository, used Iowa State University (ISU) and Foreign Animal Disease Diagnostic Laboratory (FADDL) to confirm results. Found two serials of one product that were positive for SVA. Could not isolate virus from the samples. So, from 77 different swine products tested, no viable SVA was found.

Risk assessment for serum has been conducted by Center for Epidemiology and Animal Health (CEAH) for National Import and Export Services (NIES). Center for Veterinary Biologics (CVB) was a client of that risk assessment. Addresses six different pathogens that could be contaminants of serum. All fall into low or negligible risk group. Plan is to have discussions with industry to develop best practices.

- Pharmacovigilance final rule: Proposed rule published in fall or 2015. A rollout plan is being formulated by the department, which may be published early 2018.
- Platform technologies: first published in 2015. New memo is coming out soon to clarify processes and requirements.
- National Environmental Policy Act (NEPA) categorical exclusion: no movement, no date set for publication. Although widely supported, it has not yet been approved for publication.
- International quality standards: looking to add things to 9CFR to close gaps between Code of Federal Regulations (CFR) vs. Good Manufacturing Practices (GMPs).
- Antigen overages: still a work in progress

This presentation is available on the Committee web page.

### **AHI Activities and Update**

Will McCauley, Animal Health Institute (AHI)

Current issues: regulatory reform—seeks to remove burdensome and outdated regulations.

Presentation is available on the Committee web page.

### **A Subunit Approach to Development of Foreign Animal Disease Vaccines**

Alan Young, Medgene Laboratories

Presentation is available on the Committee web page.

### **Committee Business:**

Donna Gatewood asked members to contact her if interest in taking on Chairmanship of the committee, as her term ends in 2018.

### **Resolutions:**

#### **Standards for Labeling Requirements for Fetal Bovine Serum.**

Discussion: The Virus-Serum-Toxin Act does not cover serum as an ingredient. The CVB can require testing, but it's incumbent on the vaccine

## BIOLOGICS AND BIOTECHNOLOGY

manufacturer to ensure that ingredients such as serum meet requirements for purity, safety, etc.

The resolution was amended to encourage Veterinary Services (VS) to explore regulation of Fetal Bovine Serum (FBS) labeling. The resolution passed as amended.

### **Funding Request for the Elimination of Raccoon Rabies in the United States**

Discussion: The resolution as presented requested funding in the Farm Bill. Several attendees expressed concern that since the Farm Bill contains no “new” money, supporting the resolution as written would risk having funding taken from other areas such as foot-and-mouth disease (FMD) preparedness and the National Veterinary Stockpile (NVS). The resolution was revised to support funding, but from the FY2019 appropriation rather than the Farm Bill.

The resolution passed as amended.

There was no other Committee business, so the meeting was adjourned at approximately 11:35 a.m.

## COMMITTEE ON CATTLE AND BISON

Chair: Dale Grotelueschen, NE

Vice Chair: Dustin Oedekoven, SD

Helen Acland, PA; Bruce Addison, MO; Bruce Akey, TX; Michelle Albin, CA; Paul Anderson, MN; Chris Ashworth, AR; James Averill, MI; Bill Barton, ID; Randall Berrier, CO; Danelle Bickett-Weddle, IA; Brian Bohl, TX; Tom Bragg, NE; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broaddus, VA; Charles Brown, WI; Nancy Brown, KS; William Brown, KS; Mark Camacho, NC; Beth Carlson, ND; Michael Carter, MD; John Clifford, DC; Robert Cobb, GA; Michael Coe, KS; Michael Collins, WI; Kathleen Connell, WA; Karen Conyngham, TX; Walter Cook, TX; Joseph Corn, GA; Stephen Crawford, NH; Wendy Cuevas-Espelid, GA; Donald Davis, TX; Jacques deMoss, MO; Grant Dewell, IA; Jere Dick, MD; Bud Dinges, TX; Leah Dorman, OH; Brandon Doss, AR; Mark Drew, ID; Edward Dubovi, NY; Roger Dudley, NE; Anita Edmondson, CA; Hank Edwards, WY; Dee Ellis, TX; Philip Elzer, LA; James England, ID; Donald Evans, KS; James Evermann, WA; William Fales, MO; Kathy Finnerty, NY; John Fischer, GA; Keith Forbes, NV; Larry Forgey, MO; Kent Fowler, CA; Nancy Frank, MI; Kendra Frasier, KS; Tony Frazier, AL; Francis Galey, WY; Tam Garland, TX; Donna Gatewood, IA; Robert Gerlach, AK; Michael Gilsdorf, MD; Linda Glaser, MN; Timothy Goldsmith, MN; Chelsea Good, MO; Michael Greenlee, WA; Dale Grotelueschen, NE; Keith Haffer, SD; Thomas Hairgrove, TX; Rod Hall, OK; Timothy Hanosh, NM; Noel Harrington, ON; Percy Hawkes, UT; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Kristi Henderson, IL; Linda Hickam, MO; Bob Hillman, ID; Siddra Hines, WA; Bruce Hoar, WY; Donald Hoenig, ME; Dennis Hughes, NE; Noah Hull, WY; David Hunter, MT; John Huntley, AZ; Carla Huston, MS; Annette Jones, CA; Paul Jones, AL; Jamie Jonker, VA; Anne Justice-Allen, AZ; Susan Keller, ND; Bruce King, UT; Diane Kitchen, FL; Terry Klick, OH; T.R. Lansford, TX; John Lawrence, ME; James Leafstedt, SD; Brad LeaMaster, OR; Gregory Ledbetter, CA; Molly Jean Lee, IA; Scott Leibsle, ID; Donald Lein, NY; Rick Linscott, ME; Mary Lis, CT; Eric Liska, MT; Coleman Locke, TX; Jim Logan, WY; Gene Lollis, FL; Pat Long, NE; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN; Barbara Martin, IA; Beatriz Martinez Lopez, CA; Chuck Massengill, MO; Jay Mattison, WI; Patrick McDonough, NY; Paul McGraw, WI; Sara McReynolds, KS; Shelley Mehlenbacher, VT; Bob Meyer, CO; Antone Mickelson, WA; Andrea Mikolon, CA; Mendel Miller, SD; Michele Miller, WI; Richard Mock, NC; Eric Mohlman, NE; Igor Morozov, KS; Peter Mundschenk, AZ; Sherrie Nash, MT; Alecia Naugle, MD; Cheryl Nelson, KY; Jeffrey Nelson, IA; Dustin Oedekoven, SD; Steve Olsen, IA; Gary Olson, MN; Kenneth Olson, IL; Kathleen Orloski, CO; Lanny Pace, MS; Mitchell Palmer, IA; Elizabeth Parker, TX; Chris Parmer, AL; Boyd Parr, SC; Elisabeth Patton, WI; Janet Payeur, IA; William Pittenger, MO; Valerie Ragan, VA; Jennifer Ramsey, MT; Jeanne Rankin, MT; Grant Rezabek, OK; Jack Rhyan, CO; Tim Richards, HI; M. Gatz Riddell, AL; Julia Ridpath, IA; Suelee Robbe-Austerman, IA; Jonathan Roberts, LA; Paul Rodgers, WV; Keith Roehr, CO; Susan Rollo, TX; Allen Roussel, TX; Mark Ruder, GA; Mo Salman, CO; Michael Sanderson, KS; Bill Sauble, NM; Shawn

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Schafer, OH; Patty Scharko, SC; Dennis Schmitt, MO; David Schmitt, IA; Krysten Schuler, NY; Brant Schumaker, WY; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Kathryn Simmons, DC; Daryl Simon, MN; Shri Singh, KY; Justin Smith, KS; David Smith, NY; Julie Smith, VT; Rebecca Smith, IL; Diane Stacy, LA; Iga Stasiak, KY; Susan Stehman, PA; Robert Stout, KY; Kelly Straka, MI; Nick Striegel, CO; Scott Stuart, CO; Diane Sutton, MD; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Patrick Tarlton, TX; Robert Temple, OH; Tyler Thacker, IA; Lee Ann Thomas, MD; Beth Thompson, MN; Tracy Tomascik, TX; Michael VanderKlok, MI; Ray Waters, IA; Jessica Watson, DC; James Watson, MS; Scott Wells, MN; Margaret Wild, CO; Richard Willer, HI; Brad Williams, TX; William Wilson, KS; Kyle Wilson, TN; Ross Wilson, TX; Josh Winegarner, TX; Thach Winslow, WY; David Winters, TX; Cindy Wolf, MN; Peregrine Wolff, NV; Mary Wood, WY; Marty Zaluski, MT; Glen Zebarth, MN; Ralph Zimmerman, NM.

The Committee met on Tuesday, October 17, 2017, at the Town and Country Hotel in San Diego, California from 1:00 to 4:06 p.m. There were 55 members and 39 guests present. Chairman Dr. Dale Grotelueschen welcomed the committee and reviewed the mission of the Committee.

### **Reports of the following subcommittees were presented:**

- Brucellosis Subcommittee – Eric Liska, Montana Department of Livestock
- Bovine Viral Diarrhea Virus (BVDV) Subcommittee – Shollie Falkenberg, National Animal Disease Center (NADC), USDA-APHIS
- Johne's Disease Subcommittee – David Smith, New York Department of Agriculture
- Trichomoniasis Subcommittee – Carl Heckendorf, Colorado Department of Agriculture
- Tuberculosis Subcommittee – Beth Thompson, Minnesota Board of Animal Health

### **Bovine Leukemia Virus in the U.S.: Impact and Options for Control**

Paul Bartlett, Michigan State University

The complete text of this presentation is included at the end of this report.

### **Overview of the Upcoming NAHMS 2017 Beef Cow-calf Study**

Chuck Fossler, National Animal Health Monitoring System (NAHMS)

The complete text of this presentation is included at the end of this report.

### **Committee Business:**

A resolution was presented from the Brucellosis Subcommittee: "Permitted Research on *Brucella abortus* as a Select Agent." The resolution was amended and passed unanimously.

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A resolution was presented for consideration from the floor: "Adequate Funding for Prevention, Diagnosis, and Response for Foreign Animal Disease Outbreaks." The motion passed unanimously.

**REPORT OF THE SUBCOMMITTEE ON BRUCELLOSIS**

Chair: Eric Liska, MT

The Subcommittee met on October 16, 2017 at the Town and Country Hotel in San Diego, California from 1:00 until 6:00 p.m. There were 51 members and 36 guests present. After a call-to-order, speakers for the session were introduced. Previous resolutions were discussed during the business portion of the meeting.

**Revisiting Brucellosis in the Greater Yellowstone Area (GYA)**

Dustin Oedekoven, South Dakota Animal Industry Board  
National Academies of Sciences, Engineering, and Medicine. 2017.

*Revisiting Brucellosis in the Greater Yellowstone Area*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24750>.

**RECOMMENDATIONS**

With elk now viewed as the primary source for new cases of brucellosis in cattle and domestic bison, the committee concludes that brucellosis control efforts in the GYA will need to sharply focus on approaches that reduce transmission from elk to cattle and domestic bison (Conclusion 1).

**Recommendation 1:** To address brucellosis in the GYA, federal and state agencies should prioritize efforts on preventing *B. abortus* transmission by elk. Modeling should be used to characterize and quantify the risk of disease transmission and spread from and among elk, which requires an understanding of the spatial and temporal processes involved in the epidemiology of the disease and economic impacts across the GYA. Models should include modern, statistically rigorous estimates of uncertainty.

**Recommendation 2:** In making timely and data-based decisions for reducing the risk of *B. abortus* transmission from elk, federal and state agencies should use an *active* adaptive management approach that would include iterative hypothesis testing and mandated periodic scientific assessments. Management actions should include multiple, complementary strategies over a long period of time, and should set goals demonstrating incremental progress toward reducing the risk of transmission from and among elk.

**Recommendation 3:** Use of supplemental feedgrounds should be gradually reduced. A strategic, stepwise, and science-based approach should be undertaken by state and federal land managers to ensure that robust experimental and control data are generated to analyze and evaluate the impacts of feedground reductions and incremental closure on elk health and populations, risk of transmission to cattle, and brucellosis prevalence.

**Recommendation 4:** Agencies involved in implementing the Interagency Bison Management Plan (IBMP) should continue to maintain a separation of bison from cattle when bison are outside Yellowstone National Park (YNP) boundaries.

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**Recommendation 5:** In response to an increased risk of brucellosis transmission and spread beyond the GYA, USDA-APHIS should take the following measures:

- 5A: Work with appropriate wildlife agencies to establish an elk wildlife surveillance program that uses a modeling framework to optimize sampling effort and incorporates multiple sources of uncertainty in observation and biological processes.
- 5B: Establish uniform, risk-based standards for expanding the designated surveillance areas (DSA) boundaries in response to finding seropositive wildlife. The use of multiple concentric DSA zones with, for example, different surveillance, herd management, biosecurity, testing, and/or movement requirements should be considered based on differing levels of risk, similar to current disease outbreak response approaches.
- 5C: Revise the national brucellosis surveillance plan to include and focus on slaughter and market surveillance streams for cattle in and around the GYA.

**Recommendation 6:** All federal, state, and tribal agencies with jurisdiction in wildlife management and in cattle and domestic bison disease control should work in a coordinated, transparent manner to address brucellosis in multiple areas and across multiple jurisdictions. Effectiveness is dependent on political will, a respected leader who can guide the process with goals, timelines, measured outcomes, and a sufficient budget for quantifiable success. Therefore, participation of leadership at the highest federal (Secretary) and state (Governor) levels for initiating and coordinating agency and stakeholder discussions and actions, and in sharing information is critical.

**Recommendation 7:** The research community should address the knowledge and data gaps that impede progress in managing or reducing risk of *B. abortus* transmission to cattle and domestic bison from wildlife.

- 7A: Top priority should be placed on research to better understand brucellosis disease ecology and epidemiology in elk and bison, as such information would be vital in informing management decisions.
- 7B: To inform elk management decisions, high priority should be given to studies that would provide a better understanding of economic risks and benefits.
- 7C: Studies and assessments should be conducted to better understand the drivers of land use change and their effects on *B. abortus* transmission risk.
- 7D: Priority should be given to developing assays for more accurate detection of *B. abortus* infected elk, optimally in a format capable of being performed “pen-side” to provide reliable rapid results in the field.
- 7E: Research should be conducted to better understand the infection biology of *B. abortus*.



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- 7F: To aid in the development of an efficacious vaccine for elk, studies should be conducted to understand elk functional genomics regulating immunity to *B. abortus*.
- 7G: The research community should (1) develop an improved brucellosis vaccine for cattle and bison to protect against infection as well as abortion, and (2) develop a vaccine and vaccine delivery system for elk.

### **CONCLUDING REMARKS**

Even over the course of the committee's 16-month review, there were rapid changes in management practices and new cases of brucellosis in cattle and domestic bison, which reemphasizes the difficulty in handling this complex and expanding problem. Brucellosis was eliminated from cattle in the United States after nearly a century of dedicated funding and resources from USDA, states, and livestock producers. With increasing incidence of brucellosis in cattle and domestic bison herds in the Greater Yellowstone Area (GYA) in the past few decades due to transmission from elk, significant resources are needed to address a problem that is expanding in scale and scope; without the changes and investments necessary to aggressively address this problem in a coordinated and cost-effective manner, brucellosis may spread beyond the GYA into other parts of the United States resulting in serious economic and potential public health consequences. Efforts to reduce brucellosis in the GYA will depend on significant cooperation among federal, state, and tribal entities and private stakeholders as they determine priorities and next steps in moving forward. The report's intent is to be useful for decision makers and stakeholders as they address the challenging matter of brucellosis in the GYA.

### **Greater Yellowstone Area (GYA) Update: Idaho**

Bill Barton, Idaho State Department of Agriculture

In 2016, 9,789 head of cattle were tested to meet designated surveillance areas (DSA) testing requirements. This number does not include cattle in other areas of the state outside of the DSA that were tested to meet other states import requirements. The Idaho State Department of Agriculture (ISDA) continues its ongoing review of all brucellosis individual herd plans for producers within our DSA and updating when appropriate. There are no herds currently under quarantine due to brucellosis in Idaho. One whole herd test was conducted as a result of a Market Cattle Identification (MCI) traceback during the past year. That whole herd test was negative.

The Idaho Department of Fish and Game (IDF&G) continues conducting wild elk surveillance around the outside borders of Idaho's DSA. This year surveillance will focus on the western and southern edge of our DSA. The Idaho Brucellosis Coordination Team consisting of ISDA, IDF&G and Idaho VS personnel continues to meet annually to discuss surveillance and mitigation strategies and make improvements when necessary.

The ISDA and Idaho's cattle producers remain committed to managing appropriately to prevent the risk of transmission of brucellosis from wildlife to

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cattle. Industry support and assistance with enforcement of Idaho's brucellosis testing requirements for cattle leaving our DSA are paramount to our success.

In Spring of 2017, CS Beef Packers completed construction on a 400,000-sq. ft. slaughter facility near Kuna, Idaho and commenced operations on the most modern, state of the art, green-field beef plant built to date. Brucellosis slaughter surveillance is being conducted on 100% of all intact adult cattle slaughtered in Idaho including CS Beef Packers. Testing is conducted at the USDA Idaho Brucellosis Laboratory located in the ISDA Animal Health Laboratory. Our close proximity to the CS plant allows for excellent sample quality arriving at the laboratory daily and immediate follow up on non-negative results. To maintain the highest level of testing efficiency and disease surveillance, the ISDA and Idaho's cattle industry are in total agreement that all brucellosis testing services must remain at the Idaho state laboratory, rather than being redirected to Kentucky.

Since CS processing began in June 2017, 66,394 head of cattle have been tested at the plant with 19 of those samples being non-negative (as of 10/11/17). Non-negative samples were submitted to National Veterinary Services Laboratories (NVSL) for confirmation and traces were sent to six states. Five of those 19 traces were to Idaho herds resulting in one whole beef herd test (all negative). The other four Idaho traces were dairy herds which, based on confirmatory testing at NVSL, were classified as negative. All four of those dairies have had negative quarterly brucellosis ring tests (BRTs) for many years.

### **Greater Yellowstone Area (GYA) Update: Wyoming**

Jim Logan, Wyoming Livestock Board

Mary Wood, Wyoming State Game and Fish Veterinarian

Wyoming had one cattle herd under quarantine during the past year in north-western Wyoming. This herd was found by routine, required testing in Wyoming in late October 2015. The herd is located in the Wyoming Brucellosis Designated Surveillance Area (DSA) in Sublette County (60 miles south of Yellowstone National Park [YNP]). The herd had been exposed to Brucellosis infected elk and genomic testing verified elk as the source of infection. The herd was released from quarantine on June 1, 2017 and will have an assurance test this fall. There were seven contact/commingled herds associated with this affected herd. All contact herds had an assurance test the fall of 2016 following summer grazing and all animals were test negative.

We are privileged to have the valued assistance of the Wyoming State Veterinary Laboratory (WSVL) in the diagnostic work on all Wyoming brucellosis cases. We have also been fortunate to have the good cooperation of USDA-APHIS in dealing with the epidemiology and regulation of these cases.

Due to findings of brucellosis in free-ranging elk in the Bighorn Mountains of Wyoming during the fall of 2012 (since 2012 there have been a

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total of 11 Brucellosis seropositive elk found on hunter killed surveillance), the Wyoming Livestock Board (WLSB) initiated voluntary brucellosis testing of test-eligible, adult cattle originating from Big Horn and Sheridan counties. Approximately 18,000 head of cattle have been tested since initiation of the surveillance program in both Sheridan and Big Horn counties with no suspect or reactor cattle found.

The Wyoming Game and Fish Department (WGFD) increased surveillance for Brucellosis in elk herds that reside in the Bighorn Mountains through hunter kill surveillance and also through a radio collar movement study. Although the number of elk that have been found seropositive is relatively small, both the WLSB and WGFD remain concerned and vigilant of the threat of disease transmission from elk to cattle.

Forty veterinarians conducted testing for brucellosis on cattle from the Designated Surveillance Area (DSA) and the Brucellosis Area of Concern during the past year from September 1, 2016 to September 7, 2017. 35,886 cattle/bison were tested on Wyoming ranches and at livestock markets and 3,103 cattle were sampled at Wyoming slaughter plants to comply with WLSB Chapter 2 Brucellosis rules. The WLSB Brucellosis Chapter 2 rule was recently revised to clarify brucellosis testing requirements. The board voted on September 15 to require testing on all sexually intact females 12 months of age and over that leave or are sold from within the DSA. The WLSB declined to impose mandatory test requirements in Big Horn County until further information on elk surveillance testing and the WGFD's elk radio collar study are available. The board is depending on voluntary testing of cattle sold from Big Horn and Sheridan counties to provide adequate surveillance for Brucellosis from the Brucellosis Area of Concern.

### **National Surveillance and Vaccination**

Sara Ahola, USDA-APHIS-VS

In Fiscal Year 2017, USDA-APHIS-VS sampled 1.92 million and tested 1.85 million adult cows at slaughter for brucellosis. From that, no herds were determined to be affected by brucellosis.

In addition, 275,720 animals were tested from the Greater Yellowstone Area (GYA) states of Idaho, Montana, and Wyoming where a wildlife reservoir of brucellosis exists. Two newly affected herds were detected in Montana as part of Designated Surveillance Testing and are currently undergoing a test and remove protocol. A third herd in Montana previously detected remains on a test and remove protocol.

2017 U.S. Brucellosis Herd Prevalence = 0.0002% or 2.2 per 1 million herds.  
National Surveillance Summary Map:

[https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/cattle-disease-information/sa\\_tb\\_bruc/ct\\_tb\\_bruc\\_index](https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/cattle-disease-information/sa_tb_bruc/ct_tb_bruc_index)

## **GYA Update and USDA/Wyoming Brucellosis Management Plan Review**

Sara Ahola, USDA-APHIS-VS

An in-person review was conducted on Wyoming's Brucellosis Management Plan in June 2017. The review was conducted by USDA-APHIS-VS with these objectives: 1) review the adequacy of Wyoming's brucellosis rules to prevent the spread of brucellosis beyond the Designated Surveillance Area (DSA); 2) assess the enforcement of those rules; 3) assess the diagnostics, risk mitigations, and education in place to support the program; 4) assess wildlife surveillance and risk mitigation activities, and 5) evaluate if the DSA boundary is appropriate.

Overall observed strengths: 1) Solid regulatory rules with a common sense approach; 2) both live-animal and slaughter surveillance on animals in or leaving the Wyoming DSA; 3) WY cooperates closely with markets serving the DSA to test all test-eligible animals as well as voluntarily testing many animals leaving the Area of Concern; 4) Wyoming State Veterinary Laboratory provides a strong diagnostic system with rapid reporting; 5) recent affected herds have been detected early based on low intra-herd prevalence and therefore Wyoming has been successful at early detection; and 6) effective and capable Wyoming Game and Fish Department (WGFD).

Overall weaknesses: 1) surveillance is based on individual animal testing versus a whole herd test approach; 2) there is no written rule or policy establishing specific criteria or threshold for re-evaluating the DSA boundary; 3) Wyoming reports monthly the number of animals tested across the state (DSA and non-DSA but lacks measurable metrics to monitor compliance and enforce the rules with respect to testing of animals when required; 4) herd plans are voluntary within the DSA with less than 30 percent of eligible herds participating, yet Wyoming focuses on herds with known risks; and 5) lack of adequate information to fully assess the current risk of brucellosis wildlife-livestock transmission in the Bighorn Mountains.

### Key Recommendations:

- 1) Develop written guidelines or policy based on specific criteria for defining the boundary of Wyoming's DSA. Base the area on: Elk range/location, changes in observed elk seroprevalence or culture positive elk, elk-livestock interface, or other risk factors such as amount or frequency of live animals exported beyond the DSA.
- 2) Establish criteria that would trigger a change in the DSA based on these risk factors.
- 3) Develop a method to report the testing of animals leaving the DSA to ensure compliance with rules and regulations, including the number tested on a herd-level basis. Reporting should be annually at a minimum.
- 4) Establish a minimum annual target for percentage of animals tested from each DSA herd. This target can be based on expected cull and replacement rates within the average herd.
- 5) Classify DSA-herds into high-, medium-, or low-risk categories.

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- 6) Continue reimbursement for pre-movement testing for all test-eligible animals moving out of the DSA as well as supporting the laboratory testing.
- 7) Work with WGFD to maintain or increase elk surveillance, especially in the Bighorn Mountains.
- 8) Implement wildlife management strategies to decrease prevalence when necessary.
- 9) Require testing at change of ownership for eligible animals in Big Horn County and continue voluntary testing in Sheridan County.
- 10) Maintain funding for Wyoming's brucellosis management program. A decrease in funding may put any portion of activities at risk and therefore the effectiveness of this program at risk.

### **Research Update: Brucellosis Polymerase Chain Reaction (PCR), *B. suis*/*B. abortus* Differentiation**

Noah Hull, University of Wyoming

Bovine brucellosis (*B. abortus*) remains a persistent disease that plagues animal and human health practitioners. Current diagnostics are not ideal for the identification of infected animals. Currently, serology is the only ante-mortem diagnostic assay to identify an animal as exposed. The current gold-standard test, bacterial culture, maintains perfect specificity, but is imperfectly sensitive. In fact, 30-50% of sero-positive animals will produce a culture, thus leaving 50-70% of those sero-positive animals as an indeterminate overall status.

First protocols were developed to identify ideal commercial deoxyribonucleic acid (DNA) extraction kits for *B. abortus*. Secondly, the laboratory wanted to validate a DNA concentration technique to increase the available DNA for a real-time qPCR assay. Using spiked blood and tissues (spiked with S19 vaccine strain) tissues were extracted with varying extraction kits. Based on cycles of quantification, the IBI Genomic Mini Prep kit was ideal for blood products and the Omega Bio-tek EZNA was optimal for tissue extractions. Using a Zymo DNA Clean and Concentrator kit, we were able to obtain a 10x concentration while purifying the sample.

The second step of the project was utilizing 103 whole genome sequences for the identification of novel single nucleotide polymorphism (SNPs) for a novel real-time qPCR assay. Of the 103, 88 were field isolates from the United States that date back to 1989. These sequences were assembled and aligned. Candidate sequences were obtained and after testing a final set of primers and/or probes were selected for validation. No one SNP was able to differentiate between *B. abortus* and vaccines strains for bovine brucellosis. Testing against 42 sero and culture-positive animals (cattle and bison) and 127 sero and culture-negative animals, the point estimate for sensitivity and specificity were 100%.

This assay was ultimately used to elucidate the apparent prevalence of brucellosis in the Yellowstone National Park (YNP) bison herd. One-hundred-and-fifty-nine bison were sampled in the winter of 2017. This novel assay

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demonstrated four times the apparent prevalence compared to the gold-standard of culture. Interestingly, a high proportion of calves (~70%) were PCR positive indicating a potential driving factor for infection. Apparent prevalence across all age groups was estimated to be 66%.

The continuation of this project will be following this validation and primer/probe target to field validate a novel real-time qPCR assay for the detection of swine brucellosis (*B. suis*). Sampling on this project will begin October of 2017. We hope these two sets of primers/probes can be multiplex and used to identify infected animals more accurately. Additionally, we are working towards the sampling of live-infected animals to determine the potential ante-mortem possibilities of this assay.

### **Select Agent Status of *Brucella abortus/suis*: Overview of the process of recommendations by the Federal Experts Security Advisory Panel (FESAP)**

Mark Davidson, USDA-APHIS, Veterinary Services (VS)

In January 2017, APHIS published a Final Rule to amend the select agent regulations but deferred a decision on changes to the list of select agents and toxins after considering input from Federal experts, public comment, and recommendations from federal advisory groups.

This presentation provides an overview of APHIS' last biennial review of the list of select agents and toxins, including proposed *Brucella* de-listing and the outcome of interdepartmental review of proposed changes through FESAP.

### **RB51 Exposure: A Human Case of RB51 Brucellosis from Drinking Raw Milk in Texas**

Susan Rollo, Texas Animal Health Commission

In late July, the Department of State Health Services (DSHS) notified Texas Animal Health Commission (TAHC) of a human case of brucellosis in Texas. The case patient reportedly drank raw milk in June from a permitted raw milk jersey dairy of about 43-47 head in the milking string in Wise County. The sale of raw milk is allowable by Texas law if sold at the farm of origin. TAHC assisted DSHS with the on-farm investigation by collecting samples for submission to NVSL. DSHS utilized state public health control orders to stop the sale of milk at the dairy and initiated an investigation with the assistance of a Centers of Disease Control (CDC) to identify and assess additional persons that consumed the raw milk between June 1-August 7. According to a CDC press release, about 800 households were identified from the dairy records to potentially have consumed raw milk during the time period and could be exposed to this vaccine strain of brucella.

Previously, the bulk milk from this dairy was routinely tested with the Brucellosis ring test biannually with negative results, the last test in May. After the DSHS notification, the accredited veterinarian on July 27 and TAHC later in August conducted a whole herd serological test and all results were negative on both occasions. Additionally, bulk milk samples were taken on

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July 30 and August 18 each test yielded negative results. Individual cow milk samples were collected on August 10 and 23 and sent to NVSL. The first round confirmed two culture and polymerase chain reaction (PCR) positive cows with RB51 brucella. All other cows were negative for culture and PCR on both whole herd tests. The DSHS Milk and Dairy Group sampled bottled milk from the dairy and successfully cultured RB51 brucella. Whole genome sequencing conducted at NVSL demonstrated correlation between the case patient's blood culture and the two positive cows' milk cultures. The two positive cows (#120 and #124) were removed from the herd on September 11 and the dairy was allowed to resume sale on October 11, 2017 after completing a specified series of tests required by DSHS.

Both positive cows were born on the dairy in September and November 2014 and vaccinated with RB51 between 7-8 months of age. Both cows were on their second calving (#124 in June and #120 in August). At slaughter, cow #120 did not have any gross lesions and RB51 brucella was confirmed in the mandibular, prescapular, and the internal iliac lymph nodes. Cow #124 was grossly infected with a diffuse micropustular lesions throughout the udder. In addition, RB51 brucella was cultured from multiple tissues including all four mammary glands, the uterus, spleen, kidney, and eight different lymph nodes. Since this particular case was highly unusual, other compromising conditions are being investigated including the potential of increased susceptibility due to genetics, vaccine lot issues (to date, does not appear to be a factor), administration issues, or immunosuppression of the cattle including other complicating diseases like bovine viral diarrhea (BVD) or bovine leukosis.

This is the first case of a human infected with RB51 brucellosis from drinking raw milk in the U.S. according to CDC. Previous cases RB51 brucellosis in humans have been occupational in nature, that is, exposed to the vaccine via a needle stick or exposure to aborted infected calves or placentas. Risk factors that may have contributed to this perfect storm include the breed of cow, an unidentified immunocompromised condition of the cows, human consumption of raw milk, and the immunocompromised condition of the patient. The risk of getting sick from drinking raw milk is greater for infants and young children, the elderly, pregnant women, and people with weakened immune systems. Any symptomatic person that consumes raw milk should seek medical care and ask for a blood culture since this is the required test for confirmation. Consumers that drink unpasteurized milk compared with consumers of pasteurized dairy products are much more likely to experience an illness and to be hospitalized. The majority of illnesses are from salmonellosis and campylobacteriosis, but brucellosis is also a very important risk.

## **Evaluation of the Brucellosis Milk Enzyme Linked Immunosorbent Assay (ELISA) Validation as an Additional Test for Brucellosis in Bulk Milk**

Suelee Robbe-Austerman, National Veterinary Services Laboratories (NVSL)

**Introduction:** The bulk tank ring test (BRT) is the only approved brucellosis milk test in the USA. The objective of this study was to evaluate commercial ELISA kits that are available in Europe and compare their performance to the BRT, with the focus on larger >1000 cow dairies. NVSL evaluated three commercial ELISA platforms on ten cows.

**Materials and Methods:** Based on data generated from the study in 2015, the top three performing ELISA kits of that study, IDVET, IDEXX, and Prionics, were compared using milk from ten brucellosis positive cows. Four of these were mid-lactation beef cows submitted to NVSL from the University of Wyoming and confirmed infected with *Brucella abortus* by tissue culture. Five were dairy cows provided by Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) as part of a collaboration from a known infected herd in Mexico and the last cow was a Florida dairy cow confirmed infected with *Brucella suis*. Milk was diluted with non-infected bulk tank milk from a local dairy. The 4 mL BRT test was performed according to the Uniform Methods and Rules using the following dilutions, 1: 50, 100, 200, 400, 800, 1000, 1250, 1500, 1750, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 6000. These dilutions were also used in the three ELISA platforms, tested in triplicate with each replicate on a different day.

**Results and Discussion:** The beef cows had fluorescence polarization immunoassay (FPA) results that were between 20-54, and the dairy cows had FPA responses between 40-240. In general, the stronger the FPA response, the higher the milk dilutions were detected by both the BRT and ELISA. The beef cows had a stronger antibody response in the milk than the dairy cows. The ELISA was significantly more sensitive (ave 3.4 X) than the BRT in five of the ten cows and three of those had detectable antibody at the maximum dilution of 1:6000. However, the BRT performed similarly or slightly better in five cows. This variation in sensitivity between the two methods may be caused by the type of antibody detected. The BRT is able to detect IgM and IgA, and the ELISA only recognizes IgG.

**Conclusion:** All three commercial ELISA kits evaluated in this study appeared to have similar sensitivity. The ELISA was able to detect 50% of the positive cows with a dilution of 1,250 or lower. In contrast, the BRT was only able to detect 50% of the animals at a dilution of 400 or lower. Further work is needed to evaluate the specificity of these ELISA kits within the North American dairy population.

### **Subcommittee Business:**

#### **Old business:**

The subcommittee reviewed USDA-APHIS-VS responses to two resolutions from the 2016 USAHA meeting.

1. Resolution 19: Review of State Brucellosis Management Plans



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- USDA has started the review process with the review of Wyoming's BMP in 2017
- 2. Resolution 20: Brucellosis Milk Enzyme Linked Immunosorbent Assay Validation as an Additional Test for Brucellosis in Bulk Milk
  - Suelee Robbe-Austerman presented on this evaluation. USDA intends to continue to evaluate milk bulk tank brucellosis surveillance test methods.

### **New Business:**

1. Marty Zaluski sponsored a resolution for "*Permitted Research on Brucella abortus as a Select Agent*"
  - The subcommittee moved and seconded the resolution and during discussion, two changes were made and accepted. The resolution passed unanimously to be considered by the Committee on Cattle and Bison.
2. Travis Lowe brought a resolution "Brucellosis Testing in Farmed Cervidae"
  - The subcommittee moved and seconded the resolution and during discussion, one change was made and accepted. The resolution passed unanimously for consideration by the Farmed Cervidae Committee.

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### **REPORT OF THE SUBCOMMITTEE ON BOVINE VIRAL DIARRHEA VIRUS (BVDV)**

Chair: Shollie Falkenberg, IA

Vice Chair: Jamie Henningson, KS

The Subcommittee met on Sunday October 15, 2017 at the Town and Country Hotel in San Diego, California at 5:30 p.m. There were approximately 20 participants present. Changes in the committee structure were defined stating the Subcommittee on BVDV will reside within the Committee on Cattle and Bison, and the subcommittee report is to be forwarded to that committee.

The following questions were proposed within the committee and further discussion was offered.

#### **Should a BVDV subcommittee be formed and on the USAHA schedule?**

Yes, we should form a subcommittee. Dr. Falkenberg will work with Drs. Grotelueschen and Oedekoven, Chair and Vice-Chair, respectively, to be on the official schedule for USAHA in 2018. Consideration for making the Subcommittee on BVDV a joint subcommittee with AAVLD. Drs. Falkenberg and Henningson would continue in the Chair/Vice Chair role. The recommendation was moved and passed.

#### **What's the subcommittees objective and content?**

The Chair/Vice Chair will work with committee members throughout the year to determine the agenda in subsequent years. Science can help drive policy recommendations. Possible mission statement for the subcommittee: goal to control/reduction of BVDV for the cattle industry; eradication of persistently infected (PI) not BVDV.

Discussion topics to help control BVDV and support the subcommittee objective:

- Develop guidelines/best practices for the control of BVDV.
- Should this be a joint effort with other bovine organizations?
- Keep BVDV awareness high and push awareness. Marketing. Value added for PI testing, gold level calves. Maybe, focus on individual markets.
- Tiers of recognition program for herds, model after the Johne's program.
- Can BVDV vaccines be updated?
- Vaccine is not a BVDV control program. Do we need to revise the control program?
- Do we make recommendations of what goes into a program and talk to the industries?
- Should we require a BVDV test to move animals?

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### Overview of BVDV subcommittee report presentation

1. Pestivirus taxonomy
  - a. Short communication in Journal of General Virology to rename the Pestivirus genus reflect Pestivirus A, B, etc. rather than using the nomenclature Bovine Viral Diarrhea Virus (BVDV), Classical Swine Fever Virus, etc.
2. Serosurvey for ruminant pestiviruses using cattle sera
  - a. Approximately 2,000 samples collecting from 2014 to 2015 U.S. Brucellosis Testing Program were evaluated. Type 1 BVDV is the predominant titer and data would suggest 1 in 10 animals reach breeding age with no protection against BVDV.
3. Serosurvey for ruminant pestiviruses using sheep sera
  - a. Approximately 500 samples from domestic sheep were evaluated and similar to the samples collected as part of the Brucellosis Testing program and found BVDV type 1 titers predominated.
4. Protection needed to prevent fetal infections
  - a. Titers greater than 1:256 are generally thought to be protective titers to protect against fetal protection. Recent data from Auburn University (Walz et al., 2017; Vaccine 35 (2017) 1046–1054) reported geometric mean titers greater than 1000 in the modified-live treatment group and BVDV virus was detected, suggesting titers may not be the best or only indicator of protection. Further data reported from NADC (Bauermann et al., 2017; Transboundary and Emerging Diseases) suggests that fetal protection was not achieved against HoBi-like virus in cows that previously gave birth to BVDV PIs and had greater than 1000 titers to BVDV and half of the animals had titers greater than 256.
5. Is vaccination enough? Vaccination in the presence of PIs.
  - a. Two case reports from dairy operations reported well-vaccinated herds in the absence of BVDV testing to observe ill-thrift calves and upon testing for BVDV found BVDV 1b persistently infected (PI) calves. Further, in one of the dairies vaccine virus was detected in multiple affected animals as well as in PI animals when vaccination occurred in the presence of PI animals.
6. Diagnostic submissions
  - a. Approximately ten years of diagnostic submission data from Kansas State University has reported 22% BVDV in tissues and 6% in nasal swabs. While a greater percent of BVDV PI's are 1b, a greater number of positive samples are 2a in diagnostic samples. 65-75% of clinical cases that are 1a positive are 1a vaccine virus (Singer, NADL and C24V) and

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of those samples positive for 1a vaccine virus greater than 75% are Singer strain.

7. How effective are our current BVDV vaccines?
  - a. Due to the diversity of BVDV and continued prevalence of BVDV 1b PIs, it is being further investigated if more contemporary isolates should be included in BVDV vaccines to help provide cattle producers with the best tools to control BVDV.

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### REPORT OF THE SUBCOMMITTEE ON JOHNE'S DISEASE

Chair: David Smith, NY

Vice Chair: Elisabeth Patton, WI

The Subcommittee met on October 16, 2017 at the Town and Country Hotel in San Diego, California from 1:00 to 5:30 p.m. There were 20 members and 11 guests present. There were no new resolutions or old business to discuss. The fact that the committee had been converted to a subcommittee under Committee on Cattle and Bison was briefly discussed. We reviewed the basic housekeeping procedures for conducting the subcommittee meeting.

#### **Presentations**

##### **Update from the National Cattlemen's Beef Association**

Kathy Simmons, National Cattlemen's Beef Association

This presentation is available on the committee web page at [usaha.org](http://usaha.org).

##### **MAP Early Diagnostics Project**

Vivek Kapur, Penn State University

Dr. Kapur described a novel multiplex approach to early detection of *M. avium paratuberculosis*. This presentation is available on the committee web page at [usaha.org](http://usaha.org).

##### **Global Coordination of Animal Health Research**

Alex Morrow, Department for Environment, Food and Rural Affairs (DEFRA)

Dr. Morrow described opportunities for worldwide coordination of research efforts. This presentation is available on the committee web page at [usaha.org](http://usaha.org).

##### **Update on New Johne's Diagnostics Kits from Zoetis**

Stephane Guillosou, Zoetis

Dr. Guillosou covered advances in Johne's Diagnostics at Zoetis.

##### **Use of Phage – Polymerase Chain Reaction (PCR) to Detect *M. avium paratuberculosis* in Blood and Milk Samples**

Catherine E. D. Rees, University of Nottingham, PBD Biotech Ltd

This paper is included immediately following this report.

##### **Johne's Proficiency Testing Update**

Kevin Stokes, National Veterinary Services Laboratory

This presentation is available on the committee web page at [usaha.org](http://usaha.org).

##### **Subcommittee Business:**

There was one question put forth to the committee during this meeting. The issue was whether the committee chair should write a letter to STAR-

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IDAZ recommending that Johne's disease should be added to the list of diseases for international coordination by that body.

**UPDATE ON USE OF THE PHAGE ASSAY FOR DIAGNOSING TUBERCULOSIS (TB) IN CATTLE AND OTHER SPECIES**

Cath Rees, Benjamin Swift, University of Nottingham, U.K.

Bacteriophage are viruses that infect bacteria. We have been exploiting a broad host range phage (D29) that specifically infects Mycobacteria to detect the presence of viable bacteria, and have combined this with molecular methods to identify the pathogen detected (phage-PCR; Stanley et al., 2007 Appl. Environ. Micro, 73:1851). We have used this method to show that low levels of *M. bovis* are present within white blood cells in the circulating blood of SICCT-positive animals that were on annual screening program (Swift et al., 2016 Virulence, 7:779). Since our results indicate that only low numbers of cells are present in these samples, any deoxyribonucleic acid (DNA) amplification method used needs a limit of detection of less than ten cells. This method took two days, the use of agar plates to detect the infection event and manual extraction of DNA from the agar plates and therefore is not ideal for high throughput testing of large numbers of samples. We have now developed a new phage-based method that takes only six hours and removes the need for agar plates. Using this method, we have been studying a herd in the U.K. that has had a chronic bTB infection for over ten years and has allowed us to compare our test results with other markers of infection. First, parallel culture and direct polymerase chain reaction (PCR) of blood samples was performed and showed that while *M. bovis* could be cultured from phage-PCR samples, no Mycobacteria were detected using a direct PCR method, demonstrating that phage-PCR is more sensitive than PCR alone. We have also found that more than 50% of animals giving a positive single intradermal comparative cervical tuberculin test (SICCT) test result based on a super-severe interpretation have very low levels of mycobacteria in their circulating blood. It is notable that none of these animals – or any of the others culled on this farm over this 10-year period - have ever been found to have visible lesions at slaughter. Some animals showed fluctuating results on consecutive 60-day tests, and some of these eventually progressed to a SCCIT-positive result on the standard interpretation and were then culled from the herd. Other animals tested consistently gave a phage-PCR positive but did not progress to be SICCT-positive and remained in the herd as potential sources of further infection. Since this method directly detects *M. bovis*, we have recently applied the method to detect infection in other species, including alpacas, llamas and badgers suspected to have disease. In all cases phage-PCR positive samples were detected and we are currently carrying out other tests to independently verify these results.

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**REPORT OF THE SUBCOMMITTEE ON TRICHOMONIASIS**

Chair: Carl Heckendorf, CO

Vice Chair: Bud Dinges, TX

The Subcommittee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00-10:00 a.m. There were 24 members and 11 guests present. No presentations or reports were given.

**Subcommittee Business:**

Laboratory validation was discussed. It was recommended that a survey of the committee members be conducted to establish how to complete a third inter-laboratory comparison. It was also discussed how the laboratories and the State Animal Health Officials (SAHOs) can communicate more effectively. Several of the SAHOs felt that the laboratories have been functioning very well. The survey that is to be sent out will also try to address any gaps that exist in the Trichomoniasis program and how to communicate more effectively between laboratories and between laboratories and SAHOs. A brief discussion occurred on the female issue with regard to Trichomoniasis. There was not consensus on this topic.



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### REPORT OF THE SUBCOMMITTEE ON TUBERCULOSIS

Chair: Beth Thompson, MN

Vice Chair: Michael VanderKlok, MI

The Subcommittee met on Sunday October 15, 2017 at the Town and Country Hotel in San Diego, California from 1:00 to 5:30 p.m. There were 60 members and 36 guests present. Dr. Thompson welcomed committee members and guests, introduced Dr. Michael VanderKlok as Vice Chair, and determined there was quorum for the committee to meet and vote on resolutions. Dr. Thompson provided a review of the agenda and the mission and operating procedure for the Subcommittee on Tuberculosis, as well as the process for recommendations and resolutions.

#### Presentations and Reports

##### **USAHA Tuberculosis (TB) Scientific Advisory Working Group Report**

Tyler Thacker, USDA-ARS-NADC

Dr. Thacker provided a report on the TB Scientific Advisory Working Group which met earlier in the day. A motion was made and seconded, and the subcommittee voted to accept the report of the TB Scientific Advisory Working Group. The complete text of the working group report is included at the end of this report.

##### **Tuberculosis (TB) Test Performance**

Mark Schoenbaum, USDA-APHIS-VS

Dr. Schoenbaum provided information regarding the performance of the Caudal fold, Comparative Cervical, and IDEXX ELISA tests in a TB infected dairy herd in Texas and a TB infected beef herd in South Dakota.

##### **Update on Tuberculosis (TB) in South Dakota**

Dustin Oedekoven, South Dakota Animal Industry Board

Dr. Oedekoven provided an update on TB infected beef herds found in Northwestern South Dakota in 2017. On February 7, 2017 South Dakota was notified by the USDA National Veterinary Services Laboratory (NVSL) that a slaughter surveillance sample from an adult beef cow had been diagnosed as TB compatible. Within a week, two additional adult cows were also determined to be TB compatible. All three of these animals traced to a 650 head beef herd in northwestern South Dakota. Official identification devices and documents aided in the successful trace. The cows had been sold through two South Dakota auction markets in November 2016 and were fed for approximately 90 days at feedlots in Nebraska and South Dakota before being sent to slaughter at two different Nebraska packers. Initial testing of the index herd identified 78 CFT responders. Forty-four cows from this herd were ultimately determined to have the disease.

The index herd was depopulated with federal indemnity. A majority of the herd was slaughtered, and the last animals were euthanized on April 18,

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2017. During the course of the response, 20 adjacent herds were tested including nearly 11,000 cattle. Testing of trace out animals and herds revealed two additional South Dakota herds each with a single TB infected animal that had been purchased from the index herd. These animals were removed, and those two herds remain under quarantine as they complete test and remove plans. Both herds have had two negative whole herd tests and are scheduled for verification herd testing in the fall of 2017. Epidemiologic tracing of animals from the affected herds involved primary movements to 12 states and over 100 other South Dakota herds.

Whole genome sequencing from the infected animals has identified this isolate as being very similar to an isolate identified in a dairy animal in Queretaro, Mexico in 1997. This isolate is new to the U.S., and its pathway of introduction into South Dakota is as of yet unknown.

### **Uruguay/U.S. Tuberculosis (TB) Targeted Surveillance Study**

Scott Wells, University of Minnesota

Dr. Wells provided an update on the ongoing research project comparing the cost and effectiveness of different strategies for conducting TB surveillance in cattle in Uruguay.

### **Bi-National Tuberculosis (TB) Committee Update**

Andrea Mikolon, California Department of Food and Agriculture

Dr. Mikolon provided an update on the tuberculosis-related activities of the United States/Mexico binational committee on Brucellosis and Tuberculosis.

### **Update on Tuberculosis (TB) in the Texas Panhandle**

Andy Schwartz, Texas Animal Health Commission

Dr. Schwartz provided a summary and update on a TB infected dairy herd identified in Texas in 2015. An organic dairy complex in the Texas panhandle consisting of two dairies and a heifer feed yard, with a total of approximately 11,000 head, was quarantined in April 2015 as the result of a slaughter trace back. Trace outs were conducted on thousands of animals removed in the past five years, but no additional affected animals have been identified. The source of TB for this herd has not been identified to date.

The initial herd plan called for a 60-day testing schedule, with removal of all caudal fold test (CFT) positive animals. An initial assessment test plus seven removal tests have been completed. The dairy complex remains under quarantine. To date, a total of 1,294 CFT responders have been necropsied, with lesions from 50 animals confirmed histocompatible. Stochastic modeling performed by USDA-APHIS-VS indicates 12 additional removal tests will be necessary to achieve 95% confidence of disease freedom at 1% prevalence.

Federal indemnity was offered in 2017, but the herd owner declined. Regular removal tests continue. No histocompatible animals were identified on the seventh removal test. Only one histocompatible animal was found on the sixth and fifth removal tests, with one being from each of the two dairies.

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No histocompatible animals have been found in the heifer feed yard on the three most recent tests.

### **Analysis of Surveillance data for bTB in Captive Cervids Request**

Alecia Naugle, USDA-APHIS-VS

Dr. Naugle provided a proposed approach and timeline to respond to the Tuberculosis subcommittee's request for an analysis of surveillance for bovine tuberculosis (bTB) in farmed cervids in the United States. Subcommittee members provided input to clarify and refine the proposal and data requests.

### **USDA Update**

Mark Schoenbaum, USDA-APHIS-VS

Dr. Schoenbaum provided an update on the status of the Gamma interferon test for use in cattle, the status of Dual-Path Platform DPP® test in cervidae, and a summary of the tuberculosis (TB) Summit held by USDA in July 2017. Dr. Schoenbaum also provided an update on occurrences of bovine tuberculosis identified in the United States in Fiscal Year 2017. This presentation is available on the committee web page at [usaha.org](http://usaha.org).

Dr. Michael Carter, USDA-APHIS-VS, provided an update on the status of the proposed Brucellosis/Tuberculosis Federal Rule from the floor.

### **Findings, Conclusions and Recommendations of Cervid Tuberculosis (TB) working group**

Beth Thompson, Minnesota Board of Animal Health

Dr. Thompson provided a summary of the findings, conclusions, and recommendations from the Cervid TB working group which was formed at the request of the chairman of the former Committee on Tuberculosis. This presentation is available on the committee web page at [usaha.org](http://usaha.org).

### **Subcommittee Business:**

Dr. Thompson provided the responses from USDA-APHIS-VS to the three resolutions related to the former USAHA Committee on TB passed at the 2016 meeting. The resolutions are as follows:

- Resolution Number 22 and 37 combined: Cervid Import from Manitoba
- Resolution Number 31 and 39 Combined: National Cervid Tuberculosis Herd Accreditation Program
- Resolution Number 38: Optimization and Standardization of Purified Protein Derivative Tuberculin Application for Interferon-gamma Release Assays

Dr. Thompson then opened the floor for receipt of recommendations of resolutions regarding tuberculosis to be considered for discussion and approval and forwarding to the USAHA Committee on Cattle and Bison, Committee on Farmed Cervid, or Committee on Wildlife and Captive Wildlife.

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One proposed resolution titled Cervid TB Herd Certification Testing Intervals was received from the floor and discussed by committee members and guests. The proposed resolution received slight wording changes for clarity from the chair, and a motion was made and seconded to approve the resolution for forwarding to the USAHA Committee on Farmed Cervidae. The proposed resolution was passed on a voice vote by the committee.

A second proposed resolution titled Tuberculosis Testing Protocol for Farmed Cervidae was introduced from the floor and received discussion by the committee members and guests. A motion to table the proposed resolution was made and seconded by committee members, and the motion was passed on a voice vote by the committee. It was noted that discussion included a recommendation that the issue addressed by this resolution would be served by a scientific evaluation and the USAHA Tuberculosis Scientific Advisory Working Group may be an appropriate avenue for continuing such an evaluation.

There was no additional new business. A motion to adjourn was made and seconded. The meeting concluded at 5:30 p.m.

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### REPORT OF CERVID TUBERCULOSIS (TB) WORKING GROUP

October 15, 2017

Working Group (WG) members: Beth Thompson, Bob Meyer, Boyd Parr, Chuck Massengill, Tony Forshey, Kathy Orloski, Laurie Seale, Suelee Robbe-Austerman, Travis Lowe, Scott Wells, and Shawn Schafer.

The Cervid TB WG was formed at the direction of Dustin Oedekoven, chair of the USAHA Committee on TB. The charge of the WG was to review and discuss the potential for reducing the cost of TB testing to the cervid industry. The WG addressed:

1. The potential to advance state status in an effort to recognize minimal risk for transmission of TB by farmed cervids in interstate movement.
2. The potential to reduce the frequency of official herd testing intervals for TB-Accredited herds.

The WG met via conference calls. The following analysis of state data from four states, (Colorado, Minnesota, Oklahoma, Wisconsin) was completed by Drs. Wells and Orloski, and will be presented at the Subcommittee on TB meeting:

- TB testing information from accredited herds was analyzed, the herd data was summarized for two 3-year testing cycles, 2011-2013 and 2014-2016.
- About 30% of farmed cervid herds and 50% of farmed cervids have been represented in each 3-year cycle of *M. bovis* testing in the four states that provided testing data.
- During 2014-2016, there were 13,302 TB tests performed from 325 TB-accredited herds in the four states.
- The estimated true prevalence upper bound is 0.03% (95% confidence interval) using 2014-2016 test data\*.

*\*This estimate represents the tested farmed cervid population (TB-accredited herds) and should not be extrapolated to untested populations.*

Additionally, a request to USDA-APHIS was made for information and analysis; this ongoing information sharing is being directed and coordinated by Dr. Alecia Naugle. Information sharing from states will be part of the ongoing analysis.

The WG members collaborated on a Resolution addressing #2 above. The majority of WG members support said Resolution, which will be presented for consideration to the Subcommittee by Travis Lowe.

**REPORT OF THE TUBERCULOSIS SCIENTIFIC ADVISORY WORKING GROUP**

Chair: Tyler Thacker, IA

**Identification of Novel Antigens Recognized in Bovine Tuberculosis (TB) for Development of Improved Serodiagnostic Tests**

Konstantin Lyashchenko, Chembio Diagnostic Systems, Inc.

Bovine tuberculosis caused by *Mycobacterium bovis* remains an important zoonotic disease posing a serious threat to livestock and wildlife. The current TB tests relying on cell-mediated and humoral immune responses in cattle have performance limitations. To identify new serodiagnostic markers of bovine tuberculosis, we screened a panel of 101 recombinant proteins, including ten polypeptide fusions, by multi-antigen print immunoassay with well-characterized serum samples serially collected from cattle with experimental or naturally acquired *M. bovis* infection. A novel set of 12 seroreactive antigens was established. Evaluation of selected proteins in Dual-Path Platform (DPP®) assay showed that the highest diagnostic accuracy (~95%) was achieved with a cocktail of five best-performing antigens, thus demonstrating the potential for improved and more practical serodiagnostic tests for bovine TB. Development of novel polypeptide fusion proteins including sequences of predominantly recognized antigens identified in this study is in progress.

**Update on Use of the Phage Assay for Diagnosing Tuberculosis (TB) in Cattle and Other Species**

Cath Rees, Benjamin Swift, University of Nottingham, U.K.

This paper can be found in the Report of the Subcommittee on Johne's Disease.

**Use of the Qiagen Quantiferon-Plus In-Tube System for Detection of Tuberculosis (TB) in Experimentally and Naturally Infected Cattle in the U.S.**

Tyler C. Thacker, W. Ray Waters, and Mitchell V. Palmer; USDA-ARS, National Animal Disease Center

Detection of *Mycobacterium bovis* (*M. bovis*) infected cattle using interferon-gamma release assays (IGRA) currently requires collecting blood at the farm, then transporting it, usually, by commercial carrier to an approved laboratory where it is stimulated with antigens for 24 hours followed by detection of interferon-gamma by enzyme-linked immunosorbent assay (ELISA). Success of the assay depends on the cells being viable upon arriving at the laboratory. Adverse events during shipment can affect cell viability. Qiagen has developed an in-tube stimulation system that could reduce/eliminate the uncertainty involved in transporting samples to the laboratory. To test the utility of the QuantiFERON® TB Gold In-Tube System (QFT), blood was collected from experimentally infected cattle housed at the National Animal Disease Center. The QFT detected 14 of 17 infected

animals at four weeks post infection, the earliest time point assayed, and remained positive during the remainder of the study. Uninfected controls were repeatedly tested throughout the study. Of the 72 QFT assays performed on samples from controls, only one false positive occurred and that was at the 4-week time point. To analyze the potential for use of the QFT in naturally infected animals, blood was collected from 73 animals that were caudal fold test (CFT) positive. Of these, 38 animals were comparative cervical test (CCT) negative and had no-visible-lesions (NVL); six of these 38 were positive using QFT. Thirteen of the CFT positive animals had histocompatible visible-lesions (VL) and were positive using QFT. Eleven of the twelve animals were CCT suspect/reactive but NVL were also positive on QFT. Four animals had lesions that were not compatible with TB but were CCT suspect/reactive. One of these was positive on QFT.

**Use of the Qiagen Quantiferon Tuberculosis (TB) Gold In-Tube System for Detection of *Mycobacterium Bovis* Infection in Wildlife**

Michele A. Miller, Stellenbosch University, South Africa

Detection of *Mycobacterium bovis* infection in wildlife is complicated by the logistical constraints associated with access and handling of wild animals, lack of species-specific diagnostic tests, and knowledge gaps in understanding the disease in different species. Blood-based assays provide a convenient sample that can be obtained. Although the Bovigam assay has been OIE-approved for use in African buffalo, it can be difficult to perform under field conditions. The Qiagen QuantiFERON TB Gold In-Tube (QFT) system provides ease of use with pre-prepared tubes containing antigens and positive and negative controls. The other advantage is that the stimulated sample can be used for multiple assays, including detection of interferon-gamma, other cytokines (e.g. IP-10), and cytokine gene expression assays. Pilot studies performed in African buffalo also suggest that use of mycobacterial peptides instead of purified protein derivatives increase specificity of the assay. Current studies have demonstrated the value of the QFT platform for measuring *M. bovis*-specific immune responses in lions, warthogs, African wild dogs, white rhinoceros, and African buffaloes. Future research will focus on optimizing diagnostic assays using QFT samples for multiple wildlife species.

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### USDA-APHIS-VS Annual Update for the State and Federal Cooperative Bovine Tuberculosis (TB) Eradication Program Fiscal Year (FY) 2017

#### **Bovine State Status**

As of September 30, 2017, 49 States, two Territories (Puerto Rico and the U.S. Virgin Islands), and one zone (Michigan) were TB accredited-free. California advanced from modified accredited advanced (MAA) status in July 2016. Michigan has an accredited-free and a modified accredited (MA) zone.

#### **Captive Cervid State Status**

All States and territories have MA status.

#### **TB Program Reviews**

No formal program reviews were conducted in FY2017.

#### **TB-Affected Herds Identified in FY2017**

Ten TB-affected cattle herds were identified during FY2017 including three Michigan beef herds in the MA zone, one small Michigan beef herd in the accredited free (AF) zone, a small Indiana beef herd, three South Dakota beef herds, and two New Mexico dairies. A Texas dairy found in FY2015 remains under quarantine and a testing program. The beef herd in Michigan's AF zone and the index South Dakota beef herd were depopulated with federal funding. Other South Dakota and Michigan herds were under test-and-removal plans. The management plans for Indiana and New Mexico herds were still being determined.

#### **National TB Surveillance**

**Granuloma Submissions:** For FY2017, 5,182 granulomas from 114 federally inspected establishments were identified through three quarters of the Fiscal Year. Overall, 2.28 granulomas were submitted per 2,000 adult cattle (culled dairy and beef cows and bulls) slaughtered, a slight decrease from last year. The granuloma submission rate was 2.6 in FY2016. For FY2016, 6,389 granulomas were identified. TB slaughter surveillance during FY2014-17 has experienced lower submission rates than FY2006-13. During FY2006-13, the submission rate ranged from 2.9-3.5 per 2,000 culled adult cattle slaughtered. The minimum standard for slaughter surveillance is one granuloma submitted per 2,000 adult cattle slaughtered annually. Thirty-three of the 40 highest volume adult cattle slaughter establishments met or exceeded the submission standard in FY2017, compared to 33 in FY2016. These 40 highest volume establishments slaughter approximately 95 percent of adult cattle processed with federal inspection in the United States.

**Slaughter Cases:** During FY2017, a total of 15 granuloma submissions had histology compatible with mycobacteriosis, out of a projected 6,909 granuloma submissions (0.22 percent). Of these, TB was confirmed in 13 (88 percent) cases. TB is confirmed by polymerase chain reaction (PCR) testing of formalin-fixed and direct PCR and culture of fresh tissue. Of the remaining two cases, other *Mycobacterium* species were identified.

Five of the 13 confirmed cases occurred in adult cows. Three of the five cases lead to one TB-affected beef herd in South Dakota, one lead to a TB-



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affected dairy in New Mexico, and the last lead to a California dairy that is under quarantine and awaiting testing in October 2017. Of the eight fed cattle cases, five occurred in Mexican-origin cattle and three were in domestic origin steers. Two of the three were feedlots in Michigan with whole genome sequence of isolates matching Michigan. The final fed case was a roping steer in Arizona still under investigation. Whole genome sequence of this isolate matches cases current and past from Indiana.

***Mexican-Origin Slaughter Cases:*** A total of five TB-infected animals identified through slaughter surveillance were determined to be of Mexican-origin. The official Mexican ear tags collected at slaughter indicated origin from the State of Nuevo Leon (one case), Yucatan (one case), and Baja California (one case). Two cases were from Mexico, though the state of origin could not be determined.

***Animal Identification Collection for Slaughter Cases:*** During October 1, 2015 thru September 30, 2016 (Fiscal Year 2016), 3,122 of 5,964 (52.3 percent) submissions had official animal identification collected at the time of slaughter (2,371 with attached tissue), 1,375 submissions (23.1 percent) had unofficial identification (268 with attached tissue) and 1,467 (24.6 percent) had no identification collected. During October 1, 2016 thru September 30, 2017, 3,793 of 6,887 (55.1 percent) submissions had official animal identification collected at the time of slaughter (2,780 with attached tissue), 1,777 submissions (25.8 percent) had unofficial identification (457 with attached tissue) and 1,317 (19.1 percent) had no identification collected.

***Live Animal Testing, Cattle:*** Tuberculin skin testing in live animals is another component of national TB surveillance in cattle and bison. During October 1, 2016 through August 31, 2017, a total of 779,035 caudal fold tuberculin skin tests (CFT) of cattle and bison were reported, with 11,228 responders (1.4 percent, 44 states reporting, data not available for Alabama, Florida, Nevada, New York, Tennessee, and West Virginia). During FY2016, 665,224 CFT tests of cattle and bison were reported, with 10,574 responders (1.6 percent, 48 States and 1 Territory reporting).

The gamma interferon test was approved for use in cattle only as an official supplemental test in the TB program since 2003. Laboratories in seven States (California, Colorado, Michigan, Nevada, Pennsylvania, Texas, and Washington) and the National Veterinary Services Laboratories (NVSL) in Iowa were approved to conduct gamma interferon testing. These laboratories completed approximately 2,894 tests for cattle residing in eight states during FY2017 (data incomplete for some laboratories). On May 13, 2017 APHIS suspended use of gamma interferon test, except for unusual circumstances with only official testing done at NVSL. Evidence was found that sensitivity of the test (with NVSL purified protein derivative [PPD] since September 2016) was significantly less than comparative cervical tuberculin (CCT) based on parallel applications of the tests in a couple TB-affected herds. Work has been ongoing by NVSL, Cattle Health, and State gamma laboratories to return use of this test to the U.S. TB program. Efforts have been directed at standardizing stimulating PPD and gamma interferon

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enzyme-linked immunosorbent assay (ELISA) detection portions of the test. Sensitivity, specificity, and cutoff points continue being evaluated into FY2018 with targeted return to use of gamma interferon testing sometime in FY2018.

**Live Animal Testing, Cervids:** The Cervid TB Stat-Pak® and Dual Path Platform® (DPP) tests were approved for program use in elk, red deer, white-tailed deer, fallow deer, and reindeer. Official program testing began on February 2013. During FY2017, a total of 12,588 cervid serological TB tests were completed. These samples were submitted from 9,578 white-tailed deer (76 percent), 2,630 elk (21 percent), 197 fallow deer (1.5 percent), 109 red deer (0.9 percent), and 74 reindeer (0.6 percent). Of 20 suspects in FY2017, nine retested with final results negative. Two suspects are pending retest. The remaining nine animals were examined postmortem without evidence of tuberculosis. Four of these tested positive a second time and were considered reactors; cultures are pending. The remaining five suspects were culture negative.

Single cervical tuberculin tests were reported by fiscal year: 2017, 4,427 with 40 responders; 2016, 2,086 with 19 responders; 2015, 6,121 with 43 responders; 2014, 6,049 with 71 responders; and 2013, 9,229 with 160 responders.

**Collaborations with Mexico:** In FY2017, APHIS teams conducted reviews in Tamaulipas, Nuevo Leon, and Coahuila. In addition, APHIS and International Services staff assisted Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) in conducting pre-certification reviews in Coahuila, the Isthmus Region (Chiapas, Veracruz, Tabasco, and Oaxaca), the Coast of Guerrero, and Guanajuato.

**TB Serum Bank:** APHIS continues to maintain a serum bank of well-characterized serum samples for both uninfected and infected animals. The serum bank contains 5,340 serum samples from cattle, of which 524 are from TB-infected animals, and 3,737 samples from cervids, of which 92 are from confirmed TB-infected animals. Serum bank samples continue to be available to researchers and diagnostic companies for serologic test development. The serum bank has a sufficient amount of samples from uninfected animals, but states are encouraged to submit blood and tissue samples from potentially infected cattle and captive cervids.

**IDEXX® M. bovis Antibody Test Kit:** The IDEXX® M. bovis Antibody Test Kit was approved for official TB program use in TB-affected cattle herds in FY2013. Guidance for the use of the test can be found in VS Guidance 6702.1 - The IDEXX Antibody (Ab) Test Serological Test for Diagnosing Bovine Tuberculosis (TB) in TB-Affected Cattle Herds. The serology test continues to be evaluated in affected herds, to determine if its use in conjunction with skin testing will reduce the risk of not detecting truly infected animals that are skin test negative. The test was used in TB affected herds in FY2015, as part of the test and remove herd management plan. As part of evaluations of the test, cattle were tested during depopulation of two TB-affected herds in FY2017; evaluation of results of this testing is pending.

**Gamma Interferon Testing for Bovine Tuberculosis:** testing was suspended for general use in May 2017 due to noted overall inconsistency and low sensitivity in infected herds. There had been changes in stimulating PPDs in each of the previous two years, attempting to correct issues with test irregularities. The NVSL and Agricultural Research Service (ARS) researchers have been studying at two aspects of the test, the stimulating PPDs, and the ELISA gamma interferon detection systems. Four different PPDs are being evaluated for incorporation into a gamma test of the future. Different ELISA detection systems for gamma interferon have been and continue to be evaluated. Once these initial evaluations are complete, targeted for end of October 2017, focus will be on determining the best cutoff points for field use and relationship with sensitivity and specificity. In the past year and ongoing, U.S. infected dairies have been gamma interferon tested with different stimulating PPDs – and compared to comparative cervical test results. These field results will assist with cutoff determination on the sensitivity side. A field study of specificity will also be necessary, looking at TB-free herds to assure that the false positive rate of the gamma interferon test will be manageable for producers and regulatory officials. APHIS targets evaluations to be completed by end of year 2017, or early 2018. Then, NVSL will coordinate purchasing and distribution of gamma test components and will performance test outside laboratories. Target for return of the test for general use is March 2018. It is important for APHIS to release a test that will be reliable and consistent for years into the future.

**Selected State Updates:**

**California:** A TB-confirmed cow was slaughtered on June 28, 2017 at a California slaughter plant. DNA on the brucellosis vaccination tag matched the lesioned tissue. The entire group of cattle in the lot came from one dairy of approximately 4,200 milking cows. The herd was quarantined with permitting and surveillance of cull cows. Testing is planned in mid-October 2017 due to extreme heat in this desert area of California.

**New Mexico:** A TB-confirmed cow was slaughtered on December 6, 2016 from a New Mexico dairy of about 5,000 milking cows. TB test in late January, early February 2017 disclosed 16 additional infected cows. A sister dairy of 4,500 milking cows was test negative. On second test in May 2017, 12 additional infected cows were found, and 44 infected calves. In the sister dairy, 58 infected calves were detected. There was evidence for transmission of infection to the sister via waste milk from the index dairy that was fed to calves from both dairies, before confirmation in the index dairy. Additional testing in the dairies is planned in fiscal year 2018 along with continuation of quarantines.

**South Dakota:** There were three slaughter-cow cases from two plants in Nebraska in early February 2017. The whole genome sequence of the isolates were unique among genomic library at NVSL. These cows were traced back to two different feedlots and ultimately to one 640 head cow-calf operation in Northwest South Dakota. These cows had entered the feedlots in fall 2016. Source herd was depopulated in March and April 2017. Traces in

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FY2017 of exposed cattle from this herd involved 465 animals, 71 herds, 13 states (Arkansas, Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, North Dakota, Nebraska, New Mexico, South Dakota, Wisconsin, and Wyoming), and about \$455,000. Two additional infected cows were found in two different trace herds in South Dakota. These additional herds are under TB-affected test and removal plans.

**Indiana:** One new infected beef herd in Franklin County of about 50 cattle was identified in December 2016 based on testing a ten-mile surveillance from an affected herd disclosed in 2015. Whole genome sequence of isolates were related to cervid TB from 2009. This latest herd is on a test and removal plan. A trace from this herd through an Indiana trader of roping cattle lead to finding an infected animal in a Michigan herd in March 2017. On May 9, 2017, a TB slaughter case in a Texas plant was found with a closely matching sequence. This case lead to a group of roping cattle in Arizona. Connection of roping cattle in Arizona with infection in Indiana is still under investigation.

**Michigan:** Four new affected herds were identified in FY2017 described by the summary table listed below:

State	County	Herd Type	Size	Disclosed By	Herd Plan
MI	Montmorency	Beef	175	Annual test	Test & remove
MI	Alpena	Dairy	300	Annual test	Test & remove
MI	Lake	Beef	10	Trace/epi	Depopulation
MI	Alcona/Alpena	Beef	40	Annual test	Test & remove

## **Bovine Leukemia Virus in the U.S.: Impact and Options for Control**

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Bovine Leukosis or Enzootic bovine leukemia is a disease of cattle caused by the retrovirus bovine leukemia virus (BLV). The (ribonucleic acid (RNA) virus invades blood lymphocytes and integrates into the DNA as a provirus. Most transmission is thought to occur from the integrated provirus inside B lymphocytes. Free RNA virus is fragile and probably does not last long in the environment.

Newly infected cattle develop enzyme linked immunosorbent assays (ELISA) antibodies within a few weeks, at which time internal spread via the free RNA virus seems to end and further proliferation is by the provirus as the lymphocytes multiply by mitosis. Older cattle are more likely to be positive because they have had a longer time to become exposed. About two-thirds of ELISA-positive cattle maintain low concentrations of lymphocytes and provirus in their blood. The other one-third of ELISA-positive cattle develop persistent lymphocytosis due to an accumulation of B lymphocytes, typically with a high proviral load (concentration of provirus per unit of blood or other fluid) and increasing immune disruption (Bartlett, 2015). Mammary epithelial cells, T-cells lymphocytes and maybe other types of cells may also be infected, but their importance in transmission is unknown.

**BLV prevalence:** Cow-specific prevalence in U.S. dairy herds was herds < 10% in the 1970s and has since increased dramatically (Bartlett, 2015). The prevalence of BLV in the U.S. has now surpassed 40% of dairy cattle ([Bartlett, 2015](#); [Erskine, 2012a, b](#); [Norby, 2016](#)). According to USDA surveys, 83% of U.S. dairy herds have at least one infected animal ([Ott, 2003](#)). Our most recent national analysis of 40 cows in each of 103 dairy herds in 11 states is finding overall 42% BLV prevalence ([LaDronka, 2016](#)). In contrast to the U.S., at least 21 countries have eradicated BLV from all their cattle and more nations have national programs to control the disease. This was accomplished by testing for BLV antibodies and culling the antibody positive animals. Sometimes they separated (segregated) the positives as a temporary measure until culling was more economically feasible. Most countries began their control programs when their overall BLV prevalence was < 5% (CABI, 2017).

**Immunology:** Recent research has shown that cattle infected with BLV have altered immune systems which probably accounts for their reduced milk production, shortened cow longevity and lymphoma (Frie, 2015 and 2016). An increase in lymphocytes is the most easily measured immunological impact of BLV and is often used as a marker of disease progression. Lymphocytosis (high blood lymphocyte counts) results from an accumulation of B cells in blood and lymphoid tissue ([Debacq, 2002](#); [Florins, 2008](#); [Sordillo, 1994](#)) and deregulated B cell survival in BLV-positive cattle ([Cantor et al., 2001](#); [Dequiedt et al., 1999](#); [Florins et al., 2008](#)). Advanced BLV infection has been characterized with significant decrease in CD4<sup>+</sup> and CD8<sup>+</sup>

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T cells ([Sordillo, 1994](#)), decreased proinflammatory cytokine secretion ([Pyeon, 1996](#)), as well as decreased phagocytotic activity of monocytes. Our group has demonstrated that BLV-infected cattle had reduced levels of anti-J5 specific IgG2 as compared to BLV-negative cattle following vaccination, and that there was increased apoptosis and cell death among T cells in PL as compared to cows without PL ([Erskine, 2011a](#); [Erskine, 2011b](#)). We recently published descriptions of the impact of BLV infection on humoral and cell-mediated immunity ([Frie and Coussens, 2015](#); [Frie, 2016](#)).

**Economic Impact:** BLV costs are from tumors, lost milk production, shortened cow longevity, regulatory burdens and restrictions, loss of breeding stock and any costs spent for prevention and control. Animal welfare issues and public health concerns are also gaining attention and could negatively impact the industry.

**Lymphoma:** USDA data indicates that malignant lymphoma accounts for 13.5% of beef cattle condemnations and 26.9% of dairy cattle condemnations at U.S. slaughter plants, making BLV the most common reason for condemnation in the U.S. (USDA-APHIS, 1999; White and Moore, 2009).

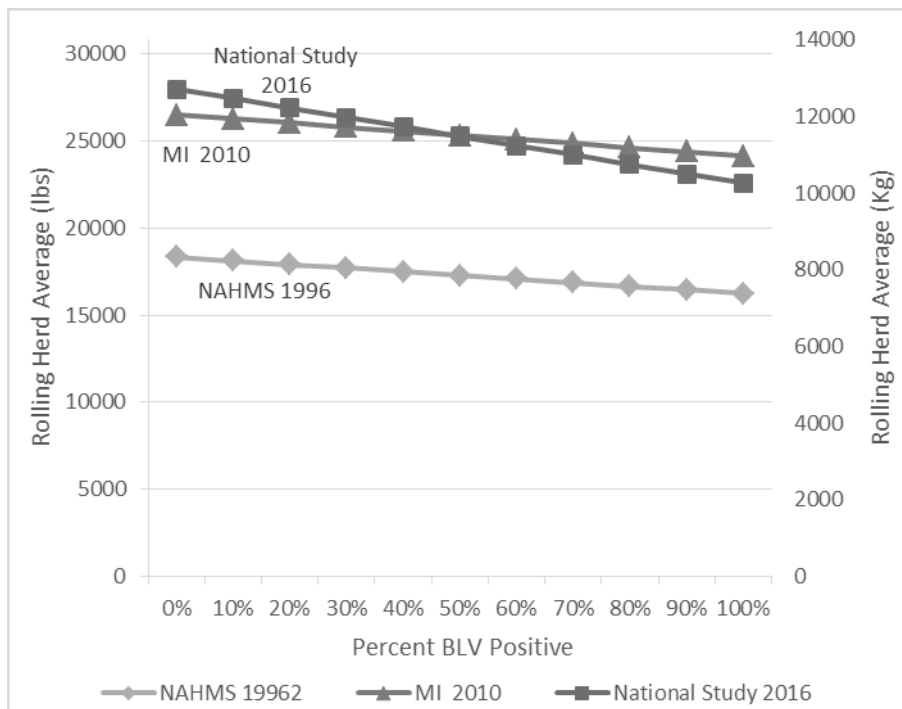


Figure 1. Association between herd prevalence of bovine leukemia virus and rolling herd average milk production (NAHMS USDA, 1997; Ott, 2003; Erskine, 2012; LaDronka, 2017)

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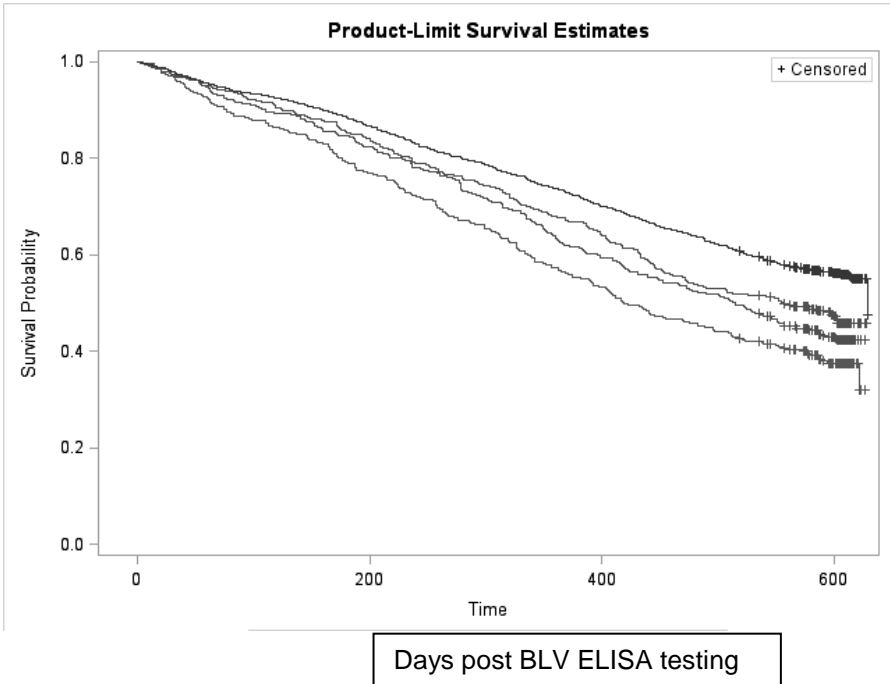


Figure 2: Days survival 3,849 dairy cattle in their herds (n=104) following BLV ELISA testing. Optical density was  $\leq 0.25$  (low),  $> 0.25$  &  $\leq 0.50$  (med) and  $> 0.50$  (high). Cows sold for dairy purposes were excluded.

**Decreased Milk Production:** The USDA's National Animal Health Monitoring System ([NAHMS, 1997](#)) determined that 95 kg (209 lbs) of milk (per cow/year) were lost for each ten percent increase in BLV-infected cows within a herd ([Ott, 2003](#)). Our study of Michigan dairy herds found nearly identical herd-level production losses ([Erskine, 2012c](#)) (Figure 1). Most recently our national study of 103 herds in 11 states found a 245 Kg (540 lb) loss in rolling herd average milk with each 10% increase in BLV prevalence (LaDronka, 2017).

Using a two-level hierarchical model with lactation number included, and herd as a random effect, we showed that BLV-status of individual cows was significantly negatively associated with milk production ([Norby, 2016](#)), thereby corroborating previous herd-level findings ([Erskine, 2012c](#); [Ott, 2003](#)).

Additionally, cow-level milk production was seen to decrease in a dose-response as milk BLV ELISA optical density (OD) increased. Recent large

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studies in China and Canada have confirmed the association between BLV infection and reduced milk production ([Nekouei, 2016](#); [Yang, 2016a](#)).

Determining the effect of BLV on milk production is complicated due to confounding and interactions with lactation number, milk production, and cow longevity. Older cows, which tend to make more milk, are also more likely to be infected with BLV ([Erskine, 2012a, b, c](#); [Pollari, 1992](#)).

To further complicate the issue, cattle with BLV may produce as much or more milk than their uninfected herd mates until the lactation in which their immune system is substantially altered, at which point they are quickly culled before their 305-day mature equivalent milk production is severely affected ([Erskine, 2012c](#); [Pollari, 1992](#)). Wu (1989) showed that BLV-infected cows with persistent lymphocytosis did not produce milk or fat according to predicted genetic values.

**Decreased Cow Longevity:** After ELISA milk testing for BLV, we followed the records of the 3,849 Holsteins in 112 Michigan dairy herds to see if (and when) they died or were culled. We compared BLV-positive cattle to their ELISA- negative herd mates. Cows sold for dairy purposes were excluded. Figure 2 shows the decreased ( $P < 0.0001$ ) survival of cattle with BLV infection as compared to their uninfected herd mates (Bartlett, 2013). Compared with age-matched herd mates, infected cattle were 23% more likely to be culled over the 19-month monitoring period, and cattle with the highest ELISA OD values ( $> 0.5$ ) were over 40% more likely to be culled. Last year, a large Canadian study corroborated our findings in reporting that BLV positive cattle had a greater probability of being culled or dying when compared to BLV-negative cows ([Nekouei, 2016](#)). Others reported similar BLV-associated decreases in cow longevity ([Da, 1993](#); [Pollari, 1993](#); [Pollari, 1992](#); [Thurmond, 1985](#); [Trainin, 1996](#)).

**Other impacts:** We are currently collecting data in a prospective study ( $n=248$  cows) to monitor disease rates in cows with persistent lymphocytosis and therefore presumed high PVL. The mastitis incidence was 27.3% in PL cows and 4.6% and 1.0% in BLV negative and BLV positive cows with normal lymphocyte counts, respectively ([Norby, 2016](#)). Thus, the cows with persistent lymphocytosis were five times ( $RR=5.01$ ;  $p=0.007$ ) more likely to develop mastitis as compared to the other two groups. Although not significant ( $p=0.18$ ), lameness was 2.6 times more likely to occur in cows with persistent lymphocytosis as compared to the other two groups.

BLV has been unrecognized for a long time as a risk factor for poor cow longevity and low milk production. Until recently, there was no way to identify the most immune disrupted animals. There is strong confounding with age, and it appears that neither the milk production effects nor the cow longevity effects occur until the second or greater lactation. Like its related retrovirus human immunodeficiency virus (HIV)/ acquired immune deficiency syndrome (AIDS) of humans and many other retroviral diseases, BLV's impact likely occurs indirectly through a predisposition to many common diseases and conditions. Important genetic factors of resistance and susceptibility further confound the association between BLV infection and economic loss.



**Public Health:** We are unaware of any epidemiologic evidence regarding adverse human health effects of BLV. Antibodies to BLV proteins are relatively common in people and BLV can be grown in human tissue culture cells (Buehring, 2014 and 2015). Two research teams have found conflicting evidence regarding whether genes of BLV origin are more often found in malignant or non-malignant human mammary cells obtained at biopsy (Buehring, 2014 and 2015; Giovanna, 2013). Clearly, further work is needed. Consumer perception of BLV infection is difficult to access because perception of a health issue can be quite separated from reality. Consumer reaction to BLV could seriously damage the sustainability of the U.S. dairy industry in a global market where many other nations have made BLV control a priority.

**Total Economic Impact:** Our studies between 2009 and 2015 were used to estimate the total economic impact of BLV for one of our study herds with a BLV prevalence of 62%. We estimated a loss of about \$380 per milking cow per year, largely from decreased milk production and reduced cow longevity. The analysis spreadsheet and discussion are available on our BLV website [www.blvusa.com](http://www.blvusa.com) on the right sidebar section called "Impact of BLV".

**Controlling BLV:** The 21 nations that have eradicated BLV did so by culling infected cattle as evidenced by BLV antibodies. This approach is not economically possible for many U.S. herds where prevalence is high. We recently completed a field trial in three herds with prevalence < 5% in which all milking cows were tested with milk ELISA so that ELISA-positive cattle could be culled. We were able to eradicate the disease from the milking herd after two consecutive whole-herd tests. However, eventually incoming the infected young stock re-introduced the virus. A third herd on the trial never eradicated the disease from their milking herd because their heifers, raised out-of-state, entered the milking herd with a very high level of BLV infection. The lessons learned are that a fully closed herd is necessary, and that BLV must also be eradicated from the young stock. Nevertheless, culling the antibody positive animals has been successful in many other nations and there is reason to believe that this method of control would be successful in the U.S. if the prevalence can be reduced to a level at which culling the antibody positive cattle is economically feasible.

**Proviral Load (PVL) and Infectivity:** PVL is a measure of the number of copies of provirus, typically reported per unit of blood, nasal secretion, semen, smegma, milk or other body fluid (Jaworski, 2016; Yuan, 2015). In collaboration with our Japanese colleagues, we now routinely perform the quantitative polymerase chain reaction (qPCR) CoCoMo PVL assay for several of our research projects (Jimba, 2010; Takeshima, 2015). For other retroviruses, such as human T-lymphotropic virus (HTLV) and HIV, it is widely accepted that viral load or proviral load is associated with infectivity (Lairmore, 2014; Lee et al., 2004; Li et al., 2016). Field data supports the idea that most natural BLV transmission is from high PVL cattle. Juliarena (2016) found no transmission in the subsequent 20 months after 20 low PVL cows were introduced into a herd of 105 BLV ELISA-negative cattle. The

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same paper also notes that the minimum BLV infective dose from low PVL cattle would require the transfer of such a large volume of blood between animals that this would rarely happen. Tracking genetically distinct proviral clones based on genomic insertion sites, Mekata (2015) reported that low PVL cattle rarely transmit BLV. They reported that cattle infected with less than three copies /100 cells (i.e. low PVL) did not transmit BLV to other cattle for more than 30 months, and that all observed transmission was from cattle with high PVL. This laboratory and field evidence strongly supports our working hypothesis that PVL is positively associated with infectiousness.

Advanced Animal Diagnostics is the maker of the QScout® system for on-farm determination of differential blood counts (ADD, 2017). The \$18,000 portable machine provides a differential blood count for ~\$5 per blood sample. It takes about 1.5 minutes to run each blood sample. We have found that blood lymphocyte count and PVL are correlated at  $r=0.77$  (Figure 3) and our industry collaborators report a correlation of  $r = 0.88$  (Takeshima, 2016). In the presence of a positive ELISA result and the absence of an infection that might be responsible for an elevated lymphocyte count, the lymphocyte count by itself without the PVL test might be a sufficient basis for a control program. However, less expensive scalable tests for infectiousness and/or PVL are being developed that could replace the laborious PVL test which we are now using for our research studies.

**Control of BLV through identification and removal of Super-shedders:** It has been suggested that the ~ 1/3 of ELISA positives with high lymphocyte counts and high PVL (super-shedders) should be prioritized for culling or segregation in order to reduce within-herd transmission (Alvarez, 2013; Gutiérrez, 2015). This disease control strategy has been yielding promising results in our ongoing field trial. For this intervention study, all milking cows in three herds are being milk tested by BLV ELISA every six months, and then all ELISA-positive cows are blood tested for lymphocyte count and PVL. Animals with the highest lymphocyte count (LC) and PVL are prioritized for culling or temporary segregation until their culling is more economically feasible.

The term Super Shedder is applied to animals that are at high risk of transmitting the virus to herd mates, but this term can be relative to the distribution of PVL values within a herd. For example, on our three pilot farms, every six months we provide producers with a list sorted in descending order of PVL combined with each cow's lymphocyte count and ELISA OD. The producers then prioritize the cows at the top of the list for culling or at least segregation. At each semi-annual visit, the cattle at the top of the list had progressively lower values for LC and PVL. Therefore, in application, the term "super-shedder" is defined as the cows with the highest PVL and LC relative to herd mates. It appears that the presence in the herd of super-shedders may be the best critical control point for the many and varied routes of transmission.

The results so far are shown in figure 4. Herd J that most aggressively culled high proviral load cows saw a reduction in prevalence from 64% to

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30% within the first 1.5 year. Herd K reduced prevalence from 58% to 44%. Herd H is small (~16% of the cows in the study) with no ability to segregate infected cattle. There were only a few new cases in herd H's milking herd, but an influx of infected heifers has prevented the overall herd prevalence from decreasing. The decrease in prevalence in the three herds together was significant at  $p < .0000001$  by the extended Mantel-Haenszel chi-square test for trend. The final analysis will also evaluate the impact on the rate of new infections and will adjust for herd and lactation effects.

**Vaccination:** The search for a BLV vaccine has been long and heretofore unsuccessful ([Gutierrz, 2015](#)). Retrovirus vaccines are notoriously difficult to develop. Genetically modified vaccines may face a difficult and lengthy approval process in the U.S. Should a BLV vaccine be developed, it would probably not have 100% efficacy, so detection of ELISA-positive and/or high PVL cattle may still be a necessary component of any future BLV control program.

**Host Genetics:** Genetic factors may be important in determining the degree of immune system degradation if and when an animal is infected by the virus. Cattle with particular alleles tend to be more resistant or susceptible to developing high PVL and high lymphocyte counts ([Miyasaka, 2013](#); [Takeshima, 2007](#)). However, some of these alleles appear to be associated with both susceptibility to persistent lymphocytosis and with high milk production potential (Da, 1993).

**Medical hygiene:** Management interventions to control BLV may not always be successful due to the multiple routes of direct and indirect transmission. The role of hypodermic needles and obstetrical sleeves in transmission is being investigated. Pre-trial anecdotal evidence was not encouraging in that several herds reported no reduced BLV prevalence after adopting single-use needles and sleeves. For our trial, ELISA-negative cows in three herds were randomly assigned to a control group (n=244) to share needles and sleeves with their ELISA-positive herdmates, or they were clearly tagged as members of the intervention group (n=262) to always receive single-use needles and sleeves. The rate of new infections was slightly higher in the intervention group, although the results were not statistically significant ([Ruggiero, 2017](#)). We concluded that other routes of transmission must be more common on these particular farms. Nevertheless, medical hygiene is still important as veterinarians need to be "above reproach" to assure that they are not responsible for any disease transmission.

In addition, our two extension participatory field trials of 77 herds found no management interventions to be statistically significant in reducing BLV prevalence after one year ([Durst, 2016](#)). While extension agents, educators and dairy specialists are educating producers about the recently realized economic impact of BLV in reducing milk production and cow longevity, they currently have little to recommend when the herd's prevalence is so high that culling all antibody-positive cattle would be economically impossible.

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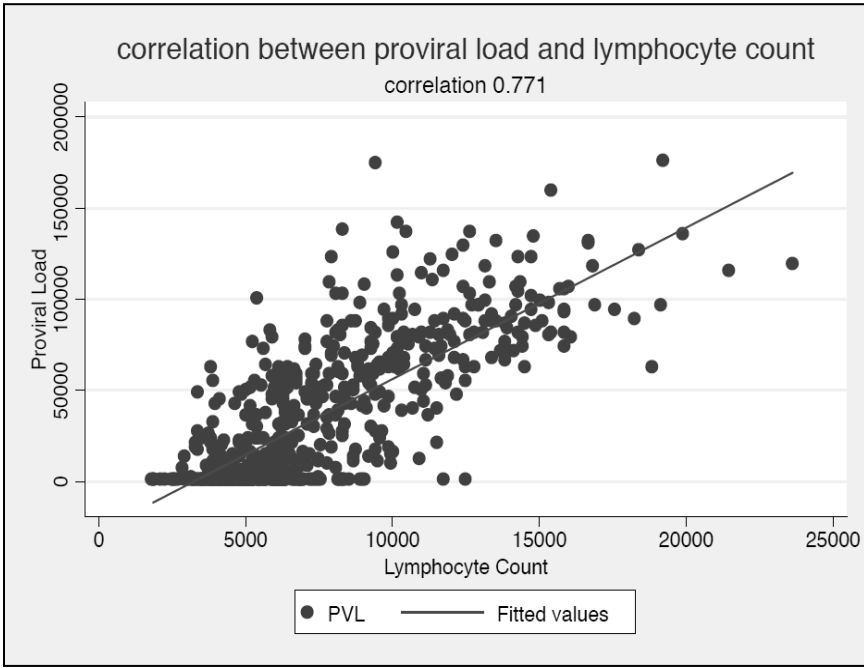
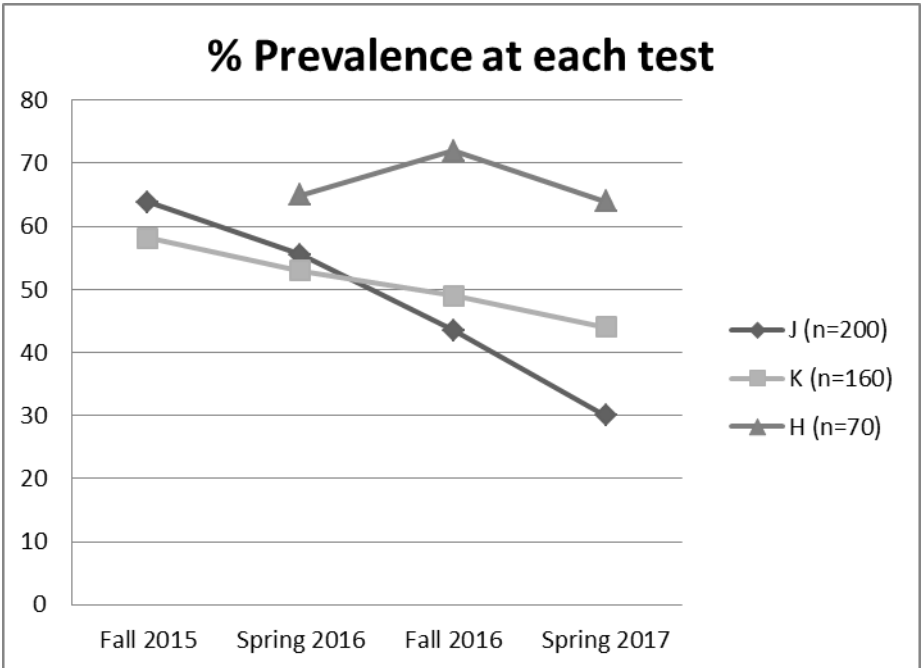


Figure 3: The correlation between proviral load and blood lymphocyte count was 0.77. , Takeshima (2016) showed a correlation of 0.88 based on 610 samples.



**Figure 4:** Pilot test of BLV intervention study to reduce BLV prevalence through culling and segregating ELISA-positive cattle with the highest lymphocyte counts and high proviral loads.

Producers should consider conducting a BLV Herd Profile as a first step to determine their BLV status. A milk or serum BLV Herd Profile tests the ten most recently calved cows from each of four lactation groups (1, 2, 3 and  $\geq 4$ ). The BLV Profile is independent of the age distribution of the herd, so comparisons can be fairly made among herds and over time within the same herd. The BLV Herd Profile is almost perfectly correlated ( $r=.99$ ) with the prevalence you would obtain by testing every cow in the herd (Erskine, 2012). The ten most recently-fresh first lactation cows usually represent transmission that occurred before entering the milking herd and can help focus management interventions accordingly. See [www.blvusa.com](http://www.blvusa.com) for more information.

**Beef Cattle:** Other than causing lymphoma tumors, it is unknown what other economic impacts may occur in beef cattle. We have tested 3,325 blood samples from cows on 28 beef cow-calf herds in Michigan, Ohio, Indiana, Illinois, Iowa and Montana. Forty percent were BLV ELISA positive. In 2018 we will do a survival analysis to measure any association between ELISA results and survival in the breeding cow-calf herds (Benitez-Rojas, 2017).

During beef bull breeding soundness examinations, we ran the BLV-ELISA test on 121 bulls from 39 herds and found that 45% of the bulls were

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ELISA positive. Proviral DNA was identified in the smegma of 7.4% (4/54) of the BLV ELISA-seropositive bulls (Benitez-Rojas, 2017).

**What should USAHA do about BLV?** Recent recognition of the multiple and previously hidden economic impacts of BLV warrants a reconsideration of our dairy industry's decision from the 1960's that BLV did not need to be controlled. However, a U.S. national control program for BLV seems unlikely at this time. In our 2016 survey of 103 producers, only ten percent thought that BLV was a significant problem (LaDronka, unpublished data). USDA is unlikely to undertake a national control program without significant industry support. Our high U.S. prevalence makes the culling of ELISA positives too costly of an undertaking for herds with high prevalence. Nations that eradicated BLV were generally started when their prevalence was low (CABI, 2017).

Three large studies found that BLV-negative dairy herds exist in areas where most neighboring herds are infected (NAHMS USDA, 1997; Ott, 2003; Erskine, 2012; LaDronka, 2017). Therefore, it appears that closed herds that have eradicated BLV should be able to remain free of the disease if they practice reasonable biosecurity measures. Perhaps the best role for the USAHA at this time would be to help certify BLV-free herds as a way of encouraging individual producers to eradicate this disease from their herds.

Most BLV certification programs have used periodic antibody testing to show that BLV has been eradicated, and thereafter require periodic re-testing to document that BLV has not been reintroduced. Bulk tank ELISA testing has been useful in this regard. A USAHA BLV-free certification program was described in "Standards for Certification of Cattle Herds as Bovine Leukosis Virus Free" published by the Bovine Retrovirus Committee of the United States Animal Health Association (Miller and Lyle, 1998). This was a voluntary certification program that required producers to use an accredited veterinarian to collect and submit laboratory specimens for analysis at a laboratory approved by USDA Animal and Plant Health Inspection Service (APHIS). Perhaps it is time to rejuvenate this certification program if producer interest increases.

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### Overview of the Upcoming NAHMS 2017 Beef Cow-calf Study

Chuck Fossler, USDA-APHIS-VS-CEAH

The USDA's National Animal Health Monitoring System (NAHMS) launched its Beef Cow-Calf 2017 study in early October 2017. This will be the fourth national study of U.S. beef cow-calf operations. This study will take an in-depth look at U.S. beef cow-calf operations and provide new and valuable information regarding animal health and management practices in the U.S. beef cow-calf industry. Approximately 4,000 beef cow-calf producers from 24 States will be asked to participate in the study, which will take an in-depth look at priority issues facing U.S. beef cow-calf operations.

The Beef Cow-Calf study is designed to provide individual participants and stakeholders with valuable information on this segment of the U.S. beef industry. The objectives of the study are as follows:

1. Describe trends in beef cow-calf health and management practices regarding cow health and longevity, calf health, reproductive efficiency, selection methods for herd improvement, and biosecurity practices.
2. Describe management practices and producer beliefs related to animal welfare, emergency preparedness, environmental stewardship, record-keeping, and animal identification practices.
3. Describe antimicrobial-use practices (stewardship) and determine the prevalence and antimicrobial resistance patterns of potential food-safety pathogens such as *Salmonella*.

Participation in all NAHMS studies is voluntary. If producers are selected to participate in Beef Cow-Calf 2017 and decide to do so, representatives from USDA's National Agricultural Statistics Service (NASS) will administer an in-person questionnaire. If producers are eligible and choose to continue in the study, USDA veterinarians or animal health technicians (AHTs) will administer another in-person questionnaire and offer additional testing. NASS will administer questionnaires from October through November 2017, and USDA veterinarians or AHTs will administer questionnaires and collect biologic samples from January through April 2018.

For producers who complete both questionnaires, incentives include free nutrient analysis of a forage sample as well as free testing of their entire spring calf crop for persistent infection with bovine viral diarrhea virus.

NAHMS was established to collect accurate and valuable information on animal health and management in the United States. Since its creation, NAHMS has developed national estimates on disease prevalence and other factors related to the health of U.S. dairy cattle, swine, beef cattle, equids, bison, captive cervids, goats, poultry, and aquaculture. The science-based results produced by NAHMS have proven to be of considerable value to U.S. livestock, poultry, and aquaculture industries, as well as other animal health stakeholders. NAHMS studies are national in scope, science based, statistically valid, collaborative, voluntary, and anonymous.

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Because NAHMS studies rely on voluntary participation, the privacy of every participant is protected. Only those collecting the data know the identity of respondents. No name or contact information will be associated with individual data, and no data will be reported in a way that could reveal the identity of a participant. Data are presented only in an aggregate manner.

## **USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT**

Chair: Gary Anderson, KS  
Vice Chair: Valerie Ragan, VA

Gary Anderson, KS; Justin Bergeron, ME; John Clifford, DC; Karen Conyngham, TX; Andeliene Croce, NC; S. Peder Cuneo, AZ; Rebecca Davies, MN; Ron DeHaven, CA; James England, ID; Katie Flynn, CA; Richard French, NH; Francis Galey, WY; Tam Garland, TX; Joseph Garvin, VA; Michael Gilsdorf, MD; Thomas Gomez, GA; Timothy Hanosh, NM; Kristi Henderson, IL; Karl Hochstein, IA; Pamela Hullinger, CA; Elizabeth Lautner, IA; Randall Levings, IA; Gina Luke, DC; Bret Marsh, IN; Barbara Martin, IA; Grant Maxie, ON; Linda Meola, AR; Stacy Morris, TX; Eileen Ostlund, IA; Donal O'Toole, WY; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Barbara Powers, CO; Valerie Ragan, VA; Willie Reed, IN; M. Gatz Riddell, AL; Cassidy Rist, VA; Jennifer Rudd, VA; Marc Schwabenlander, MN; Kathryn Simmons, DC; David Steffen, NE; Jessica Watson, DC; Richard Willer, HI; William Wilson, KS; David Zeman, SD.

The Committee met on October 14, 2017 at the Town and Country Hotel in San Diego, California from 3:00-5:00 p.m. Attendees were welcomed and a brief overview of the committee purpose was provided. There were 12 members and 10 guests present at various times during the meeting.

### **Career Transitioning and Veterinary Workforce Needs**

Valerie Ragan, Virginia-Maryland College of Veterinary Medicine

- Subject lines on emails received at the Center for Public and Corporate Veterinary Medicine (CPCVM) from veterinarians: Career Change, Cross Roads in Life, Career Transition, Reaching Out for Advice, Help, Seeking Alternative to Private Practice, Regulatory Medicine Careers, etc. . . .practicing veterinarians are searching for alternatives!
- 2013-14 American Veterinary Medical Association (AVMA) survey indicated approximately 30% of veterinarians are considering a transition.
- The CPCVM is being inundated and has established Career Transition Workshops to handle the quantity of inquiries.
- In 2017, the CPCVM conducted a nationwide survey of veterinarians seeking to change careers, and preliminary findings were presented. Responses included every U.S. Center for Veterinary Medicine (CVM) and 12 countries; the largest population wanting to transition were out of school 5-10 years; burnout/stress is the primary reason for desiring change but not the only reason (curiosity); challenges to career changes include not knowing how to transition, not knowing suitable work environments, not knowing where to start, and many more.

## DIAGNOSTIC AND VETERINARY WORKFORCE DEVELOPMENT

- There is an increased recognition of the veterinarian's role in society, but the AVMA should promote it more actively, as has been evidenced by numerous veterinary workforce studies in recent years.
  - Over 40% of the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) veterinary workforce is eligible for retirements – a growing national shortage!
  - One Health must be viewed as an opportunity to expand societal understanding/need, to build veterinary workforce and to advance the profession's role in public and environmental health across the globe.
  - Failure to engage will ensure that the dearth of jobs will remain and subsumed by less qualified personnel.
  - There are solutions. . . we must work together to find/create them.
- This presentation is available on the Committee web page.

### **Workforce Perspectives Relative to the New Administration**

Valerie Ragan, Virginia-Maryland College of Veterinary Medicine

Dr. Ragan summarized a presentation prepared by the National Association of Federal Veterinarians (NAFV).

- There is proposed legislation that could negatively affect retirement benefits of federal veterinarians, which NAFV opposes and there is effectively no support in Congress for the changes.
- Current NAFV concerns: using attrition to reduce the Federal workforce, replacing veterinarians with other job series, filling staffing ceilings with job series other than veterinarians, shifting professional titles and attitudes by management, and budget priorities.
- Current challenges in Food Safety and Inspection Service (FSIS) (food safety threat): FSIS has proposed changes to remove veterinarians from direct roles in food safety; placing lay inspectors into primary decision-making roles.
- To resolve the critical FSIS veterinary shortages, NAFV has proposed a Supervisory Public Health Veterinary (SPHV) Staffing Plan: all slaughter plants must be under direct in-plant supervision of SPHV, remuneration and incentives must be immediately improved, and providing continuing education (CE) and training is essential. NAFV has garnered support for these components with possible inclusion in Farm Bill.

There was much discussion regarding ideas for communicating the breadth of opportunities for veterinarians who might want to transition in their careers, particularly how to most effectively reach those searching for options. It appears that social media would be a very viable mechanism(s) that is currently being investigated and activated. A meeting attendee, Dr. Melanie Barham, University of Guelph has activated a website that has a growing contact list; she will interact with Dr. Ragan and others to further

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investigate the potential for assisting veterinarians interested in career transitioning.

The transition of Plum Island Animal Disease Center to the National Bio and Agro-Defense Facility (NBAF) presents tremendous challenges and opportunities in regard to workforce need and development. A workforce education and training strategy and plan must be established, which could include a workshop bringing together the various stakeholders. It is necessary to implement a plan that will accomplish the full range of expertise necessary to conduct research and operate the facilities.

This presentation is available on the Committee web page.

### **Committee Business:**

The resolution from 2016 was thoroughly reviewed and modified during the session, with the intent of forwarding a revised resolution to American Association of Veterinary Laboratory Diagnosticians (AAVLD) and USAHA. The new/modified resolution was forwarded to both organizations.



## **COMMITTEE ON EQUINE**

Chair: Andy Schwartz, TX

Vice Chair: Katie Flynn, CA

Helen Acland, PA; Sara Ahola, CO; Joyce Bowling-Heyward, MD; Becky Brewer-Walker, AR; Charlie Broaddus, VA; William Brown, KS; Craig Carter, KY; Rachel Cezar, MD; Duane Chappell, KY; Stephen Crawford, NH; Wendy Cuevas-Espelid, GA; Brandon Doss, AR; Edward Dubovi, NY; Roger Dudley, NE; Dee Ellis, TX; William Fisch, FL; Katie Flynn, CA; Rusty Ford, KY; Kent Fowler, CA; Tolani Francisco, NM; Nancy Frank, MI; Tony Frazier, AL; Robert Gerlach, AK; Paul Gibbs, FL; Kristin Haas, VT; Rod Hall, OK; Steven Halstead, MI; Timothy Hanosh, NM; Greg Hawkins, TX; Carl Heckendorf, CO; Michael Herrin, OK; Linda Hickam, MO; Siddra Hines, WA; Pamela Hullinger, CA; Russell Iselt, TX; Beth Johnson, KY; Bruce King, UT; Don Knowles, WA; T.R. Lansford, TX; Donald Lein, NY; Mary Lis, CT; Karen Lopez, DE; Kevin Maher, IA; Scott Marshall, RI; Patrick McDonough, NY; Sara McReynolds, KS; Barry Meade, NC; Linda Mittel, NY; Kenton Morgan, MO; Peter Mundschenk, AZ; Lee Myers, GA; Alecia Naugle, MD; Cheryl Nelson, KY; Jeffrey Nelson, IA; Sandra Norman, IN; Eileen Ostlund, IA; Boyd Parr, SC; Angela Pelzel-McCluskey, CO; Jeanne Rankin, MT; Grant Rezabek, OK; Jonathan Roberts, LA; Keith Roehr, CO; Abby Sage, VA; Dennis Schmitt, MO; Andy Schwartz, TX; Michael Short, FL; David Smith, NY; Justin Smith, KS; Diane Stacy, LA; Robert Stout, KY; Tracy Sturgill, IA; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Peter Timoney, KY; Josie Traub-Dargatz, CO; Susan Trock, GA; Jeff Turner, TX; Alex Turner, CO; Charles Vail, CO; James Watson, MS; Cliff Williamson, DC; Ernest Zirkle, NJ.

The Committee met on October 16, 2017 at the Town and Country Hotel in San Diego, California, from 1:00-6:00 p.m. There were 35 members and 23 guests present. The meeting was chaired by Dr. Andy Schwartz and vice chair Dr. Katie Flynn. Responses to the committee's 2016 resolutions and recommendations were discussed.

### **Subcommittee Reports**

The Report of the Subcommittee on Equine Piroplasmiasis and Equine Infectious Anemia and the Report of the Subcommittee on Equine Herpesvirus-1 were provided to the Committee. They are included following the Committee report.

### **Time Specific Paper**

Peter Timoney, University of Kentucky, Veterinary Diagnostic Laboratory presented a time-specific paper on Equine Viral Arteritis: How Significant a Threat does the Disease Represent Today? The paper, in its entirety, is included at the end of this report.

### **Presentations and Reports**

## **Equine Passport Discussion**

Thach Winslow, Wyoming Department of Agriculture

Marty Zaluski, Montana Department of Livestock

A proposal for extended equine certificate of veterinary inspection (EECVI) was presented. Historically, many states are already using the equine passport or extended equine CVIs. However, it is recognized that the current system has numerous shortcomings such as poor itinerary reporting, lack of real-time reporting and a resource intensive system. This new proposal addresses the current challenges by allowing reporting of movement prior to movement and sharing of digital data of the equine movement. The proposal allows for three possible forms of identification specifically, microchip, the Coggins form which includes horse description and accession number and a lifetime brand inspection. Eleven Western States have signed on as a support of the proposal with discussions of acceptance by the South Eastern states. Key components of the system include:

- Veterinarian examining the horse for a CVI and Coggins within the six months.
- Veterinarian confirming presence of required identification.
- Veterinarian educates the owner of temperature taking and general signs of disease.
- Veterinarian creates official record for the horse and establishes owner access to the system.
- Prior to movement, owner signs into the online system to document origin/destination, date of movement, purpose of movement and affirms the horse has not shown sickness in past seven days and has been cleared for movement.
- The web portal determines if permit to move can be issued. If disease outbreak or owner deemed not in compliance permit will not be issued.
- The EECVI will be issued with a unique number if all parameters are met and will be able to be printed or downloaded.

The proposal is for the system to send the EECVI to the state of origin and destination in the form of an extensible markup language (xml) file (USAHA CVI approved standardized data schema). In this proposed system there is no labor requirements for the states other than processing the xml files. Additionally, there will be no charge to the state. The charge will be to the owner per horse that is billed through the veterinarian at the time the EECVI issued. Each permit will potentially have a Quick Response (QR) code that can be scanned by animal health officials or show officials to collect pertinent information into their own data systems. The proposal is moving forward with vendor discussions.

## **USDA Import Export Updates**

Rachel Cezar, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

### **Contagious Equine Metritis**

APHIS works with 15 states to ensure that horses imported to Contagious Equine Metritis (CEM) countries undergo the proper quarantine measures prior to being fully introduced into the country.

For, FY2016, 239 stallions, 1,633 mares, and 164 test mares were tested. Subsequently, up to the end of quarter three for FY2017, 213 stallions, 1,629 mares, and 124 test mares were tested.

APHIS conducted a CEM training for the state coordinators this past spring in conjunction with University of California, Davis and state coordinators. There are plans to have a training next spring in Kentucky or Virginia to show the differences in biosecurity measures from other quarantine facilities.

The Veterinary Services (VS) guidance document *13406.1 CEM Testing for Imported Horses at Approved Quarantine Facilities* is currently being revised and the draft is being reviewed by the state coordinators.

Communication and data tracking has increased between APHIS and the state coordinators on a quarterly basis and will enhance with the Animal Import Centers and Ports.

### **Equine Imports**

Over the past three years, equine imports have continued to average around 30,000 for live horses however has doubled from 2016 to 2017 for semen shipments to 20,000. Majority of the equine imports enter from the northern land border ports averaging about 16,000 a year while the southern border ports enter about 4,000 horses per year. The three animal import centers in Los Angeles, Miami, and New York support the quarantine of approximately 8,000 horses per year.

### **Upcoming World Equestrian Games**

The World Equestrian Games (WEG) are scheduled for September 10-23, 2018, at Tryon International Equestrian Center (TIEC) in Mill Spring, North Carolina. The importation of approximately 500, of the 700-800 horses competing in the Games, will be overseen by VS personnel in conjunction with personnel from North Carolina Department of Agriculture and Consumer Services (NCDA) and North Carolina State University, College of Veterinary Medicine (NCSSU-CVM). VS is working with TIEC to establish an approved on-site temporary quarantine import center where majority of the imported horses will be quarantined prior to competing in the Games.

There will also be horses imported from countries endemic with Equine Piroplasmiasis (EP). EP is a tick-borne disease and can be heavily transmissible depending on the environment. VS has advised TIEC that a piroplasmiasis tick survey assessment will need to be completed prior to the Games in order for these horses to be imported into the U.S. TIEC is currently working with Southeastern Cooperative Wildlife Disease Study Group (SCWD) from University of Georgia to conduct the survey which

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should be finalized in the late fall of 2017. VS epidemiology staff along with USDA Agricultural Research Services (ARS) scientists will evaluate the data collected to provide a biosecurity and tick mitigation control plan in order for EP horses to compete in the Games.

We look forward to working with the surrounding states and industry for this major equine event within our country.

### **Equine Glanders and Import Testing Protocol Working Group**

Glanders is a highly contagious bacterial disease impacting equidae, including horses, donkeys, mules and zebras. Glanders is a zoonotic disease that is reportable to the World Organization for Animal Health (OIE), and the causative agent, *Burkholderia mallei*, is a tier 1 Select Agent. The last equine case of glanders in the U.S. was in 1942. The U.S. maintains its disease-free status through a stringent policy of serologically testing all equines entering the U.S., with exceptions of horses from recognized glanders-free countries (Iceland, Canada, Australia and New Zealand).

APHIS tests import horses for glanders using the official glanders assay (complement fixation test, CFT). APHIS policy requires that an imported horse must test negative in order for APHIS to release the horse from quarantine and allow it entry into the U.S. Very rarely, APHIS has experienced low positive results on initial import testing, but after the horse has been held in quarantine, the CFT results are negative. This causes horse owners and importers to incur additional costs and can render animal import center space unavailable that would be available for other imports.

VS has established a working group (WG) to address the issue of glanders tests as well as other diseases of equidae including dourine, equine infectious anemia, and equine piroplasmiasis. VS lists these four diseases in VS Memorandum 591.58, *Testing of Equidae for Import*, which establishes policy and guidelines for VS testing of quarantined equine to determine their import eligibility.

VS intends to include the Western blot assay, as a supplemental assay, in new guidance documents for equine import testing. The CFT will continue to be the official glanders assay. The VS WG has developed a pilot testing algorithm that VS is currently using.

### **Equine Import Regulatory and Policy Changes**

CEM exemptions from specific countries and increasing the time horses are allowed to be temporarily exported to CEM regions from 60 days to 90 days are of considerable importance to importers.

Canada is an important trading partner with the U.S. We are attempting to look at streamlining the requirements for importing horses from Canada however having discussion about reciprocity.

Data tracking and better individual electronic identification is important for APHIS as well. We will be looking to see how we can work closer with the states to ensure that they have access to Veterinary Services Process Streamlining (VSPS) database and COGNOS records as well as appropriate training to utilize this important information that is available to them.

**USDA Equine Health Updates**

Angela M. Pelzel-McCluskey, USDA, Animal and Plant Inspection Service (APHIS), Veterinary Services (VS)

**Equine Piroplasmosis**

Since November 2009, more than 342,000 domestic U.S. horses have been tested for equine piroplasmosis (EP) through active surveillance and movement testing. To date, 387 EP-positive horses (377 *Theileria equi*-positive, 10 *Babesia caballi*-positive) have been identified through this surveillance. These positive horses are unrelated to the 2009-2010 *T. equi* outbreak on a Texas ranch where 413 positive horses were identified in connection with the outbreak and natural tick-borne transmission on the ranch was documented to have occurred over at least 20 years. The Texas ranch outbreak of *T. equi* was successfully eradicated through strategic culling, tick mitigation, and chemotherapeutic treatment of infected horses. Of the 387 positive horses identified through active surveillance, 333 were Quarter Horse racehorses, 14 were Thoroughbred racehorses, and 33 were horses previously imported to the United States before August 2005 under the complement fixation test. The remaining seven positive horses were classified as originating from "other" high-risk groups with 6 of the 7 having a history of illegal movement from Mexico. The epidemiological investigations conducted in all of these cases have indicated no evidence of tick-borne transmission and the cases in racehorses specifically have involved iatrogenic transmission as the method of spread.

So far in 2017, 23,202 domestic U.S. horses were tested for EP with the identification of 48 horses positive for *T. equi*. Forty-five (45) were Quarter Horse racehorses, two horses had a history of illegal movement from Mexico (one Quarter Horse racehorse and one Andalusian stallion), and one horse was an Arabian mare previously imported from Brazil in 2001 using the complement fixation test for entry. The Quarter Horse racehorses were participating in sanctioned racing, unsanctioned racing, or both and one of these horses was found to be dually infected with both *T. equi* and equine infectious anemia (EIA). The majority of these horses were found as clusters of positives associated with the same trainer and/or owner and epidemiological investigations conducted have implicated iatrogenic transmission (needle/syringe/IV equipment reuse, blood transfusions, contamination of multi-use drug vials, etc.) as the primary method of transmission in all Quarter Horse racehorse cases identified in 2017.

All EP-positive horses are placed under State quarantine and the horse owners are offered four options for long-term management under state/federal regulatory oversight: 1) life-time quarantine, 2) euthanasia, 3) export from the country, or 4) long-term quarantine with enrollment in the APHIS-VS and Agricultural Research Service (ARS) treatment research program. In February 2013, APHIS-VS established a policy to release horses previously infected with *T. equi* which had completed the official treatment program, been proven cleared of the organism by a series of methods over time and were test negative on all available diagnostics. Of the 387 positive

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horses identified, 200 have either died or been euthanized, 19 have been exported, and 135 have been enrolled in the treatment program. Sixty-four (64) of the horses enrolled in the treatment program have met all of the test-negative requirements and have been released from quarantine. From the 2009-2010 Texas ranch outbreak, 163 horses were enrolled in the treatment research program and have completed treatment with more than 150 horses having met all test-negative requirements and are eligible for release. Successful results from the treatment research program were previously reported by Ueti et al. in *Re-emergence of the Apicomplexan Theileria equi in the U.S.: Elimination of Persistent Infection and Transmission Risk* published in *PLoS One*, September 2012.

Given that the primary high-risk population for EP over the past several years has been determined to be limited to Quarter Horse racehorses, targeted surveillance in this population is critical to identifying positive cases quickly and mitigating further iatrogenic spread of the disease. While annual surveillance for EP was previously conducted at levels of approximately 75,000 horses per year in 2010 and 2011, surveillance numbers since that time have been dropping annually and now hover around 20,000 horses tested per year. Additionally, while there were once 11 states with EP test requirements to enter sanctioned racetracks in 2010, that number had dropped in recent years to only four states with an EP test requirement to enter tracks. This decline in surveillance testing in the high-risk population hinders the goal of early detection and is likely to lead to further disease spread over time. Due to continued findings of cases in sanctioned Quarter Horse racehorses, racing commissions and tracks were strongly encouraged to implement or re-establish EP-test requirements and currently there are at least nine states who have responded to this call with new requirements. Additional industry support and involvement is needed at this juncture to: 1) increase EP surveillance in Quarter Horse racehorses and, 2) assist in educational outreach to prevent the poor biosecurity practices which have led to continued spread by iatrogenic means in this population.

### **Equine Infectious Anemia**

An update of the 2016 and 2017 case counts for equine infectious anemia (EIA) in the United States was presented. In 2016, there were at least 1,279,579 horses tested for EIA in the U.S. Of these horses tested, 52 EIA-positive horses were identified on 34 premises in 17 states. A full report of the 2016 EIA cases is available on the USDA-APHIS website.

So far in 2017, there have been at least 39 EIA-positive horses identified in eight states (CO-6, FL-1, IL-8, KS-10, NC-1, OK-2, TN-1, and TX-10). Thirty-two (32) of the 39 EIA-positives were in Quarter Horse racehorses with iatrogenic transmission and/or illegal movement from Mexico either suspected or confirmed. Twenty-five (25) of these cases were found in horses participating in unsanctioned (bushtrack) racing including one case of EIA/EP dual infection and seven of the cases were in horses participating primarily in sanctioned racing. The majority of these cases were identified as infected clusters of horses epidemiologically-linked to the same owner or

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trainer. Of the additional seven EIA cases that were not in Quarter Horse racehorses, four were a cluster of older, previously untested horses on the same premises, one was a middle-aged horse with unknown history, one was a mule, and one was a case of new transmission at a permanent EIA quarantine facility. There may be additional EIA-positives that have been confirmed at the state-level and not yet reported federally, but will eventually be included in the national-level EIA report scheduled to be compiled in early 2018.

Although the current prevalence of EIA in the U.S. equine population remains very low at 0.004%, changes in the epidemiology of cases have shifted in recent years. While EIA cases were previously identified as primarily natural transmission by biting fly vectors in untested and under-tested populations, an increase in cases of iatrogenic transmission mainly in Quarter Horse racehorses has begun to be recognized more frequently. In 2017, already a significant increase in EIA cases in Quarter Horse racehorses (32 of 39 cases) is observed as compared to 2016 where only 11 of the 53 EIA cases were in Quarter Horse racehorses. New education and outreach in this emerging high-risk population is needed to mitigate the spread of these types of cases.

### **EP and EIA Testing at the Southern Border Ports**

Horses presented for import into the U.S. at the southern border ports located in Texas, New Mexico, and Arizona along the U.S. border with Mexico are required to be tested negative by the National Veterinary Services Laboratories (NVSL) in Ames, Iowa, for dourine, glanders, EIA and EP to qualify for entry. A small number of importers from Mexico also routinely conduct pre-import testing of horses at NVSL for these diseases. The EIA/EP subcommittee of the USAHA Committee on Equine requested recent data on the results of this testing for EP and EIA over the past few years. The results of this testing are presented in the tables below and include the small amount of pre-import testing.

**Table 1. Equine Piroplasmosis Testing at Southern Border Ports**

Year	2014	2015	2016	Total
# Horses Tested	2273	2827	3595	8695
# Horses Positive	52	79	117	248
% Positive	2.29%	2.79%	3.25%	2.85%

**Table 2. Equine Infectious Anemia Test at Southern Border Ports**

Year	2014	2015	2016	Total
# Horses Tested	2273	2827	3595	8695
# Horses Positive	12	26	8	46

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% Positive	0.53%	0.92%	0.22%	0.53%
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### Update on the National Animal Health Monitoring System's (NAHMS) Equine 2015 Study

USDA-APHIS-VS, Center for Epidemiology and Animal Health

#### Study Objectives:

- Describe trends in equine care and health management for study years 1998, 2005, and 2015.
- Estimate the occurrence of owner-reported lameness and describe practices associated with the management of lameness.
- Describe health and management practices associated with important equine infectious diseases.
- Describe animal health related costs of equine ownership.
- Evaluate control practices for gastrointestinal parasites.
- Evaluate equines for presence of ticks and describe tick-control practices used on equine operations.
- Create a serum bank for future studies

*Study objectives for the NAHMS Equine 2015 study were developed based on the results of a needs assessment survey conducted in 2014.*

The full reports from the NAHMS Equine 2015 study can be found on the NAHMS website:

[https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/nahms\\_equine\\_studies](https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/nahms_equine_studies)

#### Selected Highlights from Equine 2015

**The U.S. equine population is aging:** From 1998 to 2015, the percentage of resident equids 20 years of age or older increased while the percentage of equids less than five (5) years of age decreased.

**Equine infectious anemia:** The prevalence of equine infectious anemia has declined dramatically since the initiation of control efforts in 1972. In 2015, 1.35 million EIA tests were performed, and the prevalence of positive equids was 0.005 percent. The percentage of operations that tested at least one equid for EIA decreased from 1998 (58.7%) to 2015 (47.1%); however, the overall percentage of equids tested was similar across all three study years (36.8% in 2015). The average cost per EIA test increased from \$22.95 in 1998 to \$40.77 in 2015.

**Vaccination:** The percentage of operations that vaccinated any resident equids during the previous 12 months decreased from 1998 (75.1%) to 2015 (66.7%). In particular, less than half of respondents vaccinated against rabies. The most common reason respondents gave for not vaccinating against specific diseases was no perceived risk despite the fact that American Association of Equine Practitioners (AAEP) guidelines suggest that all U.S. equids are at risk of exposure to Eastern/Western equine



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encephalitis, West Nile virus, rabies, and tetanus. AAEP guidelines suggest that all equids receive core vaccines at least once annually.

**Deworming:** Over 93 percent of all operations dewormed any resident equids in the previous 12 months. The majority of operations that dewormed resident equids used a deworming program that included rotating the deworming product. The current AAEP recommendation is to use fecal egg testing to determine which equids need frequent deworming and the effectiveness of the dewormer used; however very few operations are using this method.

**Ticks:** Approximately one-half of operations observed ticks on their equids in the previous 12 months. A higher percentage of operations found ticks on resident equids from March through August than from December through February and from September through November. Although a lower percentage of operations in the West region observed ticks, a lower percentage of operations in the West region checked for ticks and were therefore less likely to find them. Operations were offered the opportunity to have their equids checked for ticks and to have ticks identified. Analysis of tick data is underway and will be available in a future report.

**Veterinary Services:** Overall, 59.8 percent of operations had a farm call by a veterinarian in the previous 12 months, and 28.6 percent had an emergency call. Approximately half of operations used a veterinarian for routine dental treatment, to provide or administer vaccines, and/or to treat sick or injured animals. Overall, 12.2 percent of operations spent no money for veterinary services for resident equids in the previous 12 months. The majority of operations spent from \$50 to \$350 on veterinary services.

**Study Methods:** A stratified random sample of operations with five or more equids was selected from the National Agriculture Statistics Service (NASS) list of farms in 28 states. Questionnaires were administered via in-person interviews. The first interview was conducted by NASS enumerators from April through July 2015 (n= 1920). Start of phase II of the NAHMS Equine 2015 study was delayed due to Veterinary Services' response to the highly pathogenic avian influenza (HPAI) outbreak that occurred in 2015. Phase II visits to equine operations were from May 1 through October 15, 2016 (n = 329). This interview was conducted by APHIS veterinary medical officers (VMOs) and animal health technicians (AHTs). Participation in the study was voluntary and individual respondents' data were kept confidential. Data were weighted to reflect the population from which they were selected.

### **American Association of Equine Practitioners (AAEP) Update** Grant Rezabek, Oklahoma State University

The AAEP Infectious Disease Committee (IDC) was re-instituted as a standing committee by AAEP Executive Committee in 2016. The basic scope of the committee was to strengthen dialogue and communication between AAEP members with respect to equine infectious diseases, foster and support the creation of the Equine Disease Communication Center (EDCC) and establish a working area in Biosecurity. There has been one official face-

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to-face meeting and three subsequent conference calls and based on its wide scope the committee was subdivided into three subcommittees, namely the Biosecurity Subcommittee, the Equine Disease Communication Subcommittee, and the Disease Guidelines Subcommittee.

The 2017, Biosecurity Subcommittee members include Dr. Stephanie Brault (chair), Dr. Katie Flynn, Dr. Ryan Ferris, Dr. Barbara Jones, and Dr. Kerry Pride. This group has completed a document on Biosecurity on the AAEP Website with links embedded to direct users to help with specific problems or disease questions. This information will also be developed for use by the EDCC and in collaboration with the U.S. Equestrian Federation (USEF) Isolation Plan Guidance. On-going work will be to develop a similar, but smaller check-list document for use by Show Management and Arena/Stable Management. There is also discussion regarding creating an AAEP Based “accreditation” or “certification” process for Biosecurity competency for private practitioners.

The 2017, Disease Guidelines Subcommittee members include Dr. Peter Morresey (chair), Dr. Ben Buchanan, Dr. Martha Mallicote, Dr. Bob Mealey (resigned), Dr. Tracey Norman, Dr. Ashley Whitehead, Dr. Angela Pelzel-McCluskey, and Dr. Katie Flynn. This subcommittee has completed revision and new formatting for the following guidance document topics: Arboviruses, Botulism, Clostridial Diarrhea, EHV 1 and 4, Equine Influenza, Pigeon Fever, Rabies, Salmonellosis, Vesicular Stomatitis, West Nile Virus, Nasopharyngeal or nasal swab collection, Rhodococcus equi and Equine Viral Arteritis. These new documents will be reviewed and approved at AAEP Convention 2017 and will be published to the AAEP website soon after. Pending work for this subcommittee in 2017/18 include guidance documents on Equine Infectious Anemia, Equine Piroplasmiasis, Equine Rota virus and the “Diagnostic Guidelines” for diarrhea disease, respiratory disease, vesicular disease and neurologic disease. In addition, the AAEP Vaccination Guidelines will be re-written and updated during the next year (2017/18).

AAEP Convention is November 17 – 22, 2017 in San Antonio, Texas and the IDC will meet Friday November 17 from 1:00-3:00 p.m., followed by the Infectious Disease Rounds from 3:00-6:00 p.m. All are welcome and more members from State Animal Health, Diagnostic Laboratory or Association/Regulatory groups is appreciated.

### **Equine Disease Communication Center (EDCC)**

Nathaniel A. White, Equine Disease Communication Center

The EDCC was started as one of the objectives of an American Association of Equine Practitioners (AAEP) task force which recommended developing a communication system as part of the National Equine Health Plan. The EDCC was created through cooperation with USDA, State Animal Health Officials (SAHOs) and American Horse Council (AHC) member organizations. EDCC staff include a Communication Manager, Bailey McCallum and Director Nat White. Keith Kleine (AAEP Director of Industry Relations) oversees office activity at AAEP where the EDCC office is housed.

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Funding for operations comes from 55 sponsors made up of horse specific organizations and companies as well as individual donors. USDA provided start-up funding of \$150,000.00 during the first two years. The complete list of sponsors is listed on the EDCC website ([equinediseasecc.org](http://equinediseasecc.org)). The United States Equestrian Federation (USEF) Internet Technology department maintains the EDCC website and the USEF call center answers inquiries for the EDCC.

Official posting of alerts started in April of 2015 with full operations initiated in April 2016. Alerts have come from 43 states and three Canadian provinces. SAHO's in Alaska, Arkansas, Connecticut, Maine, Mississippi, New Hampshire, and Vermont have not sent reports to be posted on the EDCC website and are encouraged to do so. Most alerts are from SAHO's but some veterinarians and owners have notified EDCC with information about disease outbreaks. EDCC investigates alert information that does not come from SAHO's and corroborates it before posting the information.

From April 2015 to August 2017, EDCC has posted 542 alerts, with 47 alerts in just August 2017. Email blasts are delivered to 3,006 addresses and currently there are 3,742 following on Facebook. Additions during the last year include a submission template which can be filled out and submitted to EDCC directly from the website; a listing of reportable diseases in each state; reports sent from Canada; eight owner fact sheets; biosecurity recommendations specific for events and travel; and a connection to GlobalVetLink for updated horse movement requirements and reportable diseases for each participating state. While alerts are posted as soon as they are received and approved, a daily digest for email alerts for diseases not requiring a quarantine or isolation was initiated in September to decrease the number of emails sent to the email blast list.

As part of the EDCC educational mission, infographics are created and distributed monthly to show the number of alerts for each disease in each state. Additional infographics have highlighted vector-borne diseases and recommendations for vaccination. Expected additions in the future include an EDCC news page, links to the AAEP infectious disease guidelines and a mobile app. Suggestions to improve the usefulness of the EDCC to the horse industry are encouraged and should be sent to [edcc@aaep.org](mailto:edcc@aaep.org).

### **National Equine Health Plan-Update**

Nathaniel A. White, Equine Disease Commination Center (EDCC)

A draft of the National Equine Health Plan (NEHP) was started in 2011 by the USDA and the American Horse Council (AHC). The draft was not finished and renewed activity in 2014 created a document listing the "Roles and Responsibilities" for the equine industry stakeholders including eleven components considered essential for communication and coordination of actions needed to prevent and mitigate infectious disease. Each topic in the "Roles and Responsibilities" has a subheading with specific responsibilities and regulations for USDA, SAHOs, practicing veterinarians and other industry stakeholders (horse owners, agents and owner organizations).

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Subsequently the original NEHP outline was modified and a draft document written by Rory Carolan, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS); Cliff Williamson, American Horse Council (AHC); and Nat White (EDCC) and American Association of Equine Practitioners (AAEP). The final draft was edited by Peter Timoney, Katie Flynn and Craig Barnett with the final version edited by Nat White and Bailey McCallum. The final NEHP has nine chapters including 1) Prevent the Introduction of Foreign Animal Disease (FAD); 2) Prevent, Control and Respond to Disease or Other Threats; 3) Disease and Health Monitoring and Surveillance; 4) Communication, Education and Outreach; 5) Research; 6) Diagnostics; 7) Biosecurity; 8) Drugs, Vaccines and Biologics; and 9) AHC Welfare Code of Practice. The plan describes the regulations and protocols of the different stakeholders and refers to the “Roles and Responsibilities” document for specific actions to be completed by each stakeholder organization for disease identification, mitigation and prevention. There are numerous links to federal entities, EDCC and AAEP which and already have established protocols, plans and guidelines. The NEHP and NEHP Roles and Responsibilities are posted on the EDCC website ([equinediseasecc.org](http://equinediseasecc.org)). The NEHP is considered a living document which will be updated annually or as needed as part of the EDCC. Federal and state animal health officials are encouraged to examine the NEHP and direct owners and practicing veterinarians to use it as a resource when dealing with infectious diseases and specifically reportable diseases.

### **2017 Efforts of the American Horse Council (AHC)**

Cliff Williamson, American Horse Council

The AHC is a Washington, D.C. based association that represents over 120 equine organizations before Congress and the federal regulatory agencies. AHC member organizations include breed registries, national and state equine associations, state horse councils, recreational associations, and organizations representing race tracks, horsemen, horse shows, veterinarians, farriers, rodeos, and other equine-related stakeholders.

The AHC also includes individual horse owners and breeders, veterinarians, farriers, trainers, professional, amateur, and recreational riders, and commercial suppliers. Individually, and through our organizational members, the AHC represents several hundred thousand horse owners and others involved in all sectors of the horse industry.

Obviously, a healthy horse population is critical to the economic viability of the horse industry and the sporting, recreational, and social benefits it provides to the country. The AHC takes its role in providing education for the equine industry seriously. This ranges from providing news and legislative updates, to industry wide health initiatives such as the National Equine Health Plan (NEHP) and the development of new educational webinars. An important aspect of our efforts is our annual meeting, held in Washington D.C. June 10-13, 2018.

**Equine Microchip Adoption**

After the USAHA/ National Institute for Animal Agriculture (NIAA) Equine Identification Forum in Denver, Colorado, AHC staff was tasked with investigating the potential need and the level of interest in developing an equine specific microchip number lookup tool. While discussing the logistical concerns of the development and maintenance of an online lookup tool, the public's potential usefulness of the tool was brought into question. While there is a potential use for a single comprehensive search engine for Federal traceback of infected horses, the cost of development and maintenance would place a tremendous long-term burden on the limited resources of the American Horse Council. A burden that would not be offset by the perceived usefulness of the membership at this time. The perception was that the creation of the lookup tool would be akin to put the cart before the horse. The lack of an immediate plan for development of an online lookup tool does not imply that the AHC is uninterested in the permanent ID issue. It is the position of the AHC that microchip identification is an important part of the future of the equine industry. For instance, the AHC has noticed a recent groundswell of regional support for effective animal identification in areas affected by the wild fires in the western states and hurricanes in the south. Also, the Unwanted Horse Coalition (UHC), an initiative of the AHC, has taken steps to secure funding for a microchipping effort in conjunction with their very successful "Operation Gelding" Program. Looking towards additional efforts to promote the concept of microchipping and lay the groundwork needed to necessitate the creation of an industry led lookup tool, the AHC will be collecting and posting information on the Equine Disease Communication Center webpage. We invite Federal, State and Industry partners to utilize this platform as a means of filling the informational gaps the public may still have, and also to reflect on the potential added benefits that horse owners may experience by permanently identifying, and subsequently recording, the unique identity of animals on their farm or being used in their operation. These benefits will be critical to both the widespread stakeholder adoption of microchipping and the potential industry development of a lookup tool.

**2017 Economic Impact Study**

Another important effort underway at the American Horse Council is the completion of the 2017 Economic Impact Study of the U.S. equine industry. This study is the most comprehensive of its kind since the previous study conducted by the AHC in 2005. The current study, being conducted by The Innovation Group, will provide much needed information regarding the overall health of the equine industry and the bounce back since the recession of 2008. This study will continue the efforts of the previous study and have expanded to include increased visibility for youth participation, equine assisted therapy operations, horse rescues, show management, and racing. Equine organization members were contacted by those organizations with direct links to online surveys beginning in June, with a general public rollout in July, and over 20,000 surveys returned by September. We hope to have

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results from our National survey available by the end of this year, with the individual smaller surveys being released to the groups who requested them shortly thereafter. In total 14 states and three breed groups ordered specific breakdowns of the study. This release of that information will be dependent on the wishes of the groups who funded the surveys. The AHC plans to host informational events to release the surveys and provide context for the information contained within. One event will be held in Washington D.C., and subsequent events will be held in conjunction with appropriate equine events throughout the U.S. We also plan to host several panels at the 2018 AHC annual conference where the economic impact study can be discussed in relation to other similar studies, such as the 2018 USDA agricultural census and the 2017 American Veterinary Medical Association (AVMA) Pet Survey.

### **Operation Gelding**

The Operation Gelding program provides materials, guidance, and support to organizations nationwide to host no- and low-cost gelding clinics for owners who may not otherwise be able to afford to have their stallion castrated. Unintentional breeding contributes to the unwanted horse population, with costs of more than \$2,000 per horse to rescue facilities for the annual care of unwanted foals. Since August 2010, 155 clinics, run by more than 350 volunteers, have been hosted in 31 states and resulted in 1,810 stallions gelded. In January 2017, the UHC introduced its voucher program for individual horse owners which has resulted in 250 stallions being gelded in just nine months.

I reported last year that the UHC received a \$100,000 grant from the DeWitt Fund of the Community Foundation for Monterey County (CFMC) to support Operation Gelding. As a result of this grant, along with continued support from the National Horsemen's Benevolent and Protective Association and the American Association of Equine Practitioners (AAEP), the total number of stallions gelded have more than doubled.

The UHC will be seeking veterinarians who are willing to partner with organizations in their local areas to host a gelding clinic before September 2018. Guidelines for 2018 clinics will be available soon, and organizations can apply now for clinics to be held in 2017.

### **National Equine Health Plan**

Of final note, AHC staff have collaborated with USDA personnel and Dr. Nat White to complete the National Equine Health Plan. The NEHP will be a living document that details the roles and responsibilities incumbent on all those involved in the equine industry in regards to preserving the health of the U.S. horse population. We hope to discuss this document at greater length with stakeholders during the AAEP conference in November. The NEHP will in effect codify the biosecurity expectations of the industry and provide a foundational framework for future efforts by both the industry and regulatory agencies alike. Please visit the AHC website at [www.horsecouncil.org](http://www.horsecouncil.org) or the EDCC at [www.equinediseasecc.com](http://www.equinediseasecc.com) to view the National Equine Health Plan.

### **Other AHC Activities**

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In addition to its work important to the health and welfare of the industries' horses the AHC continues its work on wide range of legislative and regulatory issues including taxation, immigration, public lands and agricultural policy that are important to the economic health of the industry and the communities that support it.

### **Equine ID Forum Summary**

Katie Flynn, California Department of Food and Agriculture

The Equine Identification Forum, "*Advancing Identification, Technology and Electronic Health Records*", conducted January 17-18, 2017, in Denver, Colorado, was the second equine industry forum hosted by National Institute of Animal Agriculture (NIAA) and the U.S. Animal Health Association (USAHA). The forum brought together one-hundred and four (104) equine industry professionals, to include equine organization leaders, veterinarians, representatives of equine identification technology companies, and regulatory animal health officials, to gain a better understanding of equine identification and traceability. The goal was to obtain industry thoughts on the need for a national equine identification program, the ideal method of equine identification, the concept of centralized database versus various industry databases and use of search tool for equine microchips, and recommendations for advancing equine traceability and electronic health records.

Subject-matter expert presentations on identification and traceability resulted in robust dialogue and exchange of information. The forum highlighted and brought forth the following issues:

1. Current equine identification and traceability measures are inadequate. Advancing equine identification and traceability will require new methodologies, enhanced communications, and collaboration.
2. Advancing equine identification must be industry-driven with limited government involvement. Equine enthusiasts trust local industry leaders, their trainers, and their mentors; the personal connection is important. The value-added benefits of improved equine identification will drive adaptation.
3. Reasons to promote the use of unique, permanent, unalterable identification include that it provides verifiable identification of exposed or infected horses in a disease incident and verifiable animal identification reuniting horses with owners after theft or a natural disaster.
4. Advances in equine microchip technology make microchips an ideal industry choice for unique, permanent, individual identification of horses. Ultimately, the goal is to get microchips in horses. However, the industry should ensure that microchips meet the minimum standards of International Organization for Standardization (ISO) 11784/11785 and be ICAR-certified (International Committee for Animal Recording). The international integration of equine

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identification technologies is critical to the industry due to the ever-increasing global market.

5. Science has disproven myths of microchips. Science has demonstrated that a properly implanted microchip may result in mild, transient soreness and localized inflammation, which resolve in three (3) days or less. Currently available microchips on the market remain in the site of implantation and can only be surgically removed under anesthesia leaving a visible scar.
6. The biothermal microchip has tremendous benefit as a temperature surveillance tool for the industry. The ability to rapidly scan multiple horses during a disease outbreak could ensure stress-free temperature monitoring at intervals for easy detection of elevations in temperatures and prompt isolation of horses demonstrating fever.
7. One deterrent to use of microchips is the cost of the microchip. Opposition to microchip use may be raised by those engaged in fraudulent business practices. Industry initiatives, such as chip-a-thon events, can decrease overall cost and will encourage participation.
8. The success in traceability of horses, during natural disaster, disease outbreaks or incidents of theft, are currently stymied by multiple data “silos” of equine microchip numbers, a lack of data sharing, and a lack of a centralized microchip database or microchip search mechanism. The American Animal Hospital Association (AAHA) has the Pet Microchip Lookup tool (<http://www.petmicrochiplookup.org/>), a solution for small animal microchips searching. This microchip lookup tool directs users to the microchip manufacturer, which has additional information on the animal with the chip. This technology and system would be extremely useful for the equine industry and should be given consideration.
9. The Jockey Club had 66% of the 23,000 2016 foals voluntarily microchipped by owners associated with an option to request a microchip when obtaining foal registration materials. Learning from historical efforts, advancing equine identification should focus on voluntary participation and not regulatory requirements.
10. The future of equine identification relies on ensuring convenience and leveraging microchip value. For disease traceability, a key will be to ensure recording of microchips on electronic records, not recorded on paper-based documents as this will eliminate the benefits of speed of information retrieval.

While the forum brought together equine industry professionals, equine identification and traceability companies, veterinarians and regulatory animal health officials to gain a better understanding of equine identification and traceability efforts, the current status requires further dialogue and cooperative efforts to advance the mission. An industry working group was formed to establish a platform to collaborate and ensure advancement.



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Highlighted below are the potential areas for future exploration in the advancing of equine identification and traceability:

1. Development of a National Equine Identification Plan, which outlines goals, objectives, timelines.
2. Development of Microchip Search system that meets the needs of the equine industry.
3. Surveys to industry and regulatory officials to identify gaps and needs related to equine identification and traceability. Industry survey to determine what data or information they are willing and able to share. Regulatory Official survey to determine what data they need and how they would like to access it.
4. Set goals and targets for horse identification and determine strategies for meeting these goals. Explore the idea of chip-a-thons and other incentive programs to get participation.
5. Define and demonstrate value: Identify owner benefits and value-added services associated with the microchip. Wallet cards for horse identification information. Develop incentives for the right behavior. Identify owner motivators. Collaborate with allied industries to link benefits such as insurance companies or identify potential tax deductions available.
6. Identify collaboration opportunities with equine practitioners. Identify added benefits for practitioner, such as links to electronic record keeping.
7. Outreach and educational strategy development to educate industry on the subjects of identification, traceability and electronic health records. Share the story and the facts. Identify the channels of outreach.

A special thanks to the planning committee members: Dr. Bill Brown, Kansas Department of Agriculture; Dr. Ellen Buck, USDA-APHIS-VS; Dr. Rory Carolan, USDA-APHIS-VS; Dr. Katie Flynn, California Department of Food and Agriculture; Dr. Joe Fisch, Florida Department of Agriculture and Consumer Services; Dr. Carl C. Heckendorf, Colorado Department of Agriculture; Dr. Marta Luz LaColla, Allflex USA Inc.; Dr. Tom Lenz, Zoetis Animal Health; Mr. Kevin Maher, VetMeasure, LLC; Dr. Kenton Morgan, Zoetis Animal Health; Dr. Lucas Pantaleon, Ogena Solutions; Dr. Angela Pelzel-McCluskey, USDA-APHIS-VS; Dr. Grant Rezabek, Oklahoma Animal Disease Diagnostic Laboratory; Mr. Ben Richey, United States Animal Health Association; Dr. Peter Timoney, Gluck Equine Research Center; Ms. Jill Wagner, GlobalVetLINK; and Mr. Cliff Williamson, American Horse Council.

The 2017 *Equine Identification Forum* was funded in part by the USDA, Zoetis, AKC ReUnite, Boehringer Ingelheim, Destron Fearing, Electronic Vet, Merck Animal Health, Computer Aid Inc., Datamars, GlobalVetLINK, Microchip ID Equine, and the Arabian Horse Association.

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### **Committee Business:**

Committee Business session included discussions on mission statement, subcommittee needs, national equine conference call and two proposed resolutions. The mission statement was reviewed and the Committee made one minor edit, substituting the term “equine” for the term “horse”. During the business session, the committee voted to add two subcommittees, namely National Equine Health Plan Review Subcommittee and the Equine Viral Arteritis (EVA) Subcommittee. The National Equine Health Plan Review committee will review the currently posted National Equine Health Plan to ensure state animal health official equine concerns are addressed. The mission of the of the EVA Subcommittee will be to evaluate the current EVA situation in the United States specific to carrier stallions and affected semen to make recommendations related to potential regulatory actions to be taken and to identify outreach and education gaps related to EVA. The committee concluded with a motion to continue endorsement of the monthly National Equine Conference Call. The two resolutions proposed were “EIA Testing for Horses Imported Through Southern Border Ports,” and “Microchip Identification of Imported Horses.” Both resolutions were passed by the committee and have been submitted separately from this report.

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### REPORT OF THE SUBCOMMITTEE ON EQUINE PIROPLASMOSIS AND EQUINE INFECTIOUS ANEMIA

Co-chairs: Joe Fisch and Michael Short, FL

Both equine piroplasmosis (EP) and equine infectious anemia (EIA) continue to pose a significant threat for the equine population of the United States. The combined EIA/EP subcommittee convened this year to further discuss concerns related to these diseases and potential future regulatory actions. Via conference calls over the past year, the EP and EIA Subcommittee has primarily focused its efforts of diagnostic testing, analyzing the EIA/EP risk associated with horses being imported through the southern border ports and the identification of horses through the southern border ports.

Dr. Chuck Issel led a discussion regarding the diagnostic testing for EIA. Issel indicated that Agar Gel Immunodiffusion (AGID) testing has been successful for a naïve population of the horses. However, with less pathogenic strains or strains with a low immunogenic response, the AGID testing has been less successful. Furthermore, the strain type impacts when a horse would be determined to be positive on a diagnostic test. Other diagnostic challenges occur when testing mules, as they don't respond to the core protein like horses. Specifically, they are known to have a low reactivity to the p26 protein, allowing them to remain negative to the AGID. Research presented indicated that 17% of true positives are currently missed with routine AGID testing. Thus, a combined three tier system is ideal but could prove time and cost prohibitive. Additionally, discussion and exploration of diagnostic testing is warranted. However, at this time the gold standard internationally for diagnosis of EIA is the AGID test.

The subcommittee discussed prevalence of these vector borne diseases in the United States and Mexico. In the United States, the current prevalence rates for EIA and EP are: 0.004 percent and 0.003 percent, respectively<sup>1</sup>. Due to these diseases being commonly transmitted through vectors, their prevalence is increased in regions with warm temperate climates, such as Mexico. In western Mexico alone, for example, the prevalence of *Theileria equi* (*T. equi*) is close to 20 percent<sup>2</sup>. Additionally, in 2016, two percent of equines who were tested for pre-import requirements from Mexico had a positive test rate for EIA. The group discussed regulatory challenges associated with detection of EIA at the Southern Border port specifically, the identification and tracking of positive animals, determination of exposed horses and handling of exposed horses which have been released from the port.

Based on the discussions, the subcommittee focused its efforts on drafting resolutions to address the identified concerns related to EIA at the southern border stations. The two draft resolutions specifically proposed are the "EIA Testing for Horses Imported Through Southern Border Ports," and "Microchip Identification of Imported Horses."

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The resolution entitled “Equine Infectious Anemia Testing for Horses Imported Through Southern Border Ports” urges the United States Department of Agriculture (USDA), Animal Plant Health Inspection Services (APHIS), and Veterinary Services (VS) to take specific actions regarding horses entering the United States through southern border ports. These recommended actions stem from the recognition of several deficiencies in the current system, such as vector control at the border, a lack of tracking and/or monitoring of infected or exposed equids, and the questionable efficacy of the AGID test to identify early, under 60 days, incubation of EIA. Given these concerns, the recent recommended actions include:

- Implementing a 45-90 day pre-import negative EIA AGID test requirement for all horses entering the United States through any southern border port. The test must be completed by a laboratory approved by the National Government Animal Health Authority.
- Requiring a written statement on the Official Certificate of Veterinary Inspection (OCVI) stating and certifying that the equine has not been exposed to another equine or premises testing positive for EIA. (For example: “Between the time of the EIA test and export, the horse has not been on any premises infected by EIA, nor has it been exposed to any EIA positive horses.”)
- Requiring all EIA-positive equines who are detected at southern border ports be hot iron branded with an “A” (at least two inches high) on the left shoulder or neck.
- Requiring all equines exposed to EIA reactor animals be microchipped. The microchip number should be recorded in a searchable database to flag exposed horses for 30 days.

To further safeguard the United States equine population from imported contagious and/or infectious diseases, the committee composed a resolution entitled “Microchip Identification of Imported Horses.” This recommendation urges the USDA, APHIS, and VS to revise the Code of Federal Regulations (CFR) to require that all equids imported to, or returning to, the United States be identified with an implanted radio frequency identification (RFID) microchip, thereby assisting in the traceability of equines affected by infectious and/or contagious disease.

To ensure a reliable, traceable, and permanent identification system, these microchips should comply with the International Organization for Standardization’s (ISO) 11784 and 11785 unless the animal is already implanted with a readable 125 kHz microchip. Universal RFID readers should be present at all import centers and border stations to read both 125 and 134.2 kHz microchips. Additionally, it is recommended that all microchips of imported horses be entered into a searchable, electronic database that will remain accessible to animal health officials during disease investigation.

As the rate of livestock transport continues to expand globally, so does the risk of propagating transmissible diseases, such as EP and EIA. The

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Subcommittee, along with the equine industry, recognizes this dilemma and has convened to propose these policy changes. If adhered to properly, these changes are expected to greatly assist in reducing the introduction of disease at U.S. borders and provide a reliable method of tracing diseases in imported equines.

In the future, the subcommittee will continue to pursue an EIA federal rule, further evaluate USDA guidance documents and explore how to address high risk EIA and EP populations.

<sup>1</sup> Angela Pelzel-McCluskey, personal communication via the EIA EP Subcommittee conference call, June 21, 2017.

<sup>2</sup> M. Ayala-Valdovinos, C. Lemus-Flores, J. Galindo-Garcia, J. Banuelos-Pineda, J. Rodriguez-Carpena, D. Sanchez-Chipres, T. Duifhuis-Rivera, Diagnosis and prevalence of *Theileria equi* horses in western Mexico by nested PCR, *Parasitology International* 66 (2017) 821-824.

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### REPORT OF THE SUBCOMMITTEE EQUINE HERPESVIRUS-1

Kenton Morgan, MO

A subcommittee was convened to review and update the *equine* herpesvirus myeloencephalopathy (EHM) Incident Guidance Document which was last revised in September 2015. The group was largely composed of the original committee which authored this document with the addition of a few new members. Based upon experiences and lessons learned from outbreaks since the last revision it was determined that a new document was needed to reflect this information.

Significant changes which may be of interest:

1. Definition/terminology changes:

- a. The committee expanded the list of definitions as well as making changes to some of the current terms in the definition section
- b. Some of the most notable changes:
  - i. **Confirmed EHM case:** A horse which is positive for any strain of Equine Herpesvirus -1 by virus isolation and /or polymerase chain reaction (PCR) testing of nasopharyngeal/nasal swab or blood (buffy coat) specimens along with the presence of clinical signs consistent with EHM. If the horse dies or is euthanized, the presence of histological lesions and/or demonstration of EHV-1 in the central nervous system (CNS) tissues collected at necropsy is confirmatory of a diagnosis.
  - ii. **Non-clinical test positive case:** An exposed horse that is not exhibiting clinical signs (afebrile, non-neurologic) but tests positive for any strain of EHV-1 by virus isolation and/or PCR testing of nasopharyngeal/nasal swab or blood (buffy coat) specimens. *Note: during any given incident some horses may start in this category before developing neurologic signs and subsequently being confirmed as an EHM case after they develop neurologic signs.*
  - iii. **EHM Premises:** A premises where a confirmed or suspect case of EHM currently resides or a premises where an EHM case resided within the preceding 14 days.
  - iv. **Monitored horse:** A horse that is being evaluated for any evidence of clinical signs consistent with EHV-1 infection. A monitored horse should have the body temperature determined at least twice a day e.g. morning and evening in order to detect a fever and it should be examined for any neurologic signs.

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A horse cannot be considered to be truly monitored for EHV1 induced fever if it has been treated with a non-steroidal anti-inflammatory drug within the previous 24 hours.

- v. **Fever:** Body temperature of 101.5 F or greater.
  - vi. **ORF:** Open Reading Frame
  - vii. **SNP:** Single nucleotide polymorphism
  - viii. **PPE (Personal Protective Equipment):** Any protective clothing, garment, footwear or equipment designed to protect the wearer from direct exposure to infectious agents. Proper use and disposal of these garments will reduce the spread of infectious agents.
  - ix. **EHV1 “A” strain:** Any strain of EHV1 having the SNP genetic marker ORF 30 A2254 genotype. (Previously referred to as wild strain or non-neuropathogenic strain).
  - x. **EHV1 “G” strain:** Any strain of EHV1 having the SNP genetic marker ORF G2254 genotype. (Previously referred to as mutated or neuropathogenic strain).
2. Change in terminology of EHV1 “strains” rationale:
- a. The group felt that based upon the fact both strains are capable of producing EHM and in some recent outbreaks the “non-neuropathogenic” strain was responsible for significant morbidity and mortality that this terminology was no longer accurate.
  - b. In reporting disease occurrence, stating there has been an outbreak of the neurologic form of EHV1 caused by the “non-neuropathogenic” strain was confusing to horse owners and in some cases to veterinarians as well.
  - c. The term “mutated” is also inaccurate in that both strain types have been circulating in the equine population for many decades and it is unknown which strain was first to establish itself within that population.
  - d. In a disease outbreak situation, the mitigation and control strategies will not differ regardless of which EHV1 “strain” is identified.

The committee recommends that when communicating information regarding an EHM outbreak, the general term EHV1 be used in reference to the pathogen. When specific “strain” information is requested or necessary, the following terminology be employed:

- EHV1 “G” strain: Any strain of EHV1 having the SNP genetic marker ORF G2254 genotype. (Previously referred to as mutated or neuropathogenic strain).

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- EHV1 “A” strain: Any strain of EHV1 having the SNP genetic marker ORF 30 A2254 genotype. (Previously referred to as wild strain or non-neuropathogenic strain).
3. Diagnostic testing:
    - a. Appropriate timing of sample collection - In some recent outbreaks, initial testing was negative for EHV-1 but horses retested 2-4 days later were positive.
    - b. Interpretation of the quantitative viral loads or cycle threshold (CT) values was discussed but due to the lack of published data on the risk posed by low viral load or High CT value test results.
    - c. Testing of non-clinical animals - A decision to test these horses for disease investigation or quarantine release must be carefully considered. If the decision is made to test non-clinical animals, a planned response for test positives should be established prior to such testing.
  4. Expansion of Biosecurity Recommendations:
    - a. Initial recommendations were expanded to include information on the use of PPE for isolated horses, restriction of human, pet and vehicle traffic from exposed horse areas, elimination of sharing of personnel and equipment and handling of soiled bedding. In addition, biosecurity supplies and source table were added to provide guidance on where to purchase biosecurity equipment such as disposable boot covers, gloves and Tyveks.
  5. Outbreak Data Collection:
    - a. The committee also identified the need to gather more epidemiological and disease information from outbreak experiences and investigations. We have reached out to the equine disease communication center with a request to, whenever possible, obtain information from EHM outbreaks as it relates to:
      - Exposed Horses Numbers
      - Suspect EHV-1 Cases
      - Confirmed EHV-1 Cases
      - Suspect EHM Cases
      - Confirmed EHM Cases
      - Number of premises
      - Quarantine start date
      - Quarantine release date
      - Vaccination history (if available)
      - Number of non-clinical test positive cases
      - Case fatality data



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The EDCC has agreed to help gather this information with a basic template which the committee has constructed.

Sections still to be reviewed by the committee are the vaccination and appendix sections. The goal is for the document to be finalized in early 2018. Committee members will be provided the finalized document which will also be posted to the USAHA website.

## **EQUINE VIRAL ARTERITIS: HOW SIGNIFICANT A THREAT DOES THE DISEASE REPRESENT TODAY?**

Peter J. Timoney

Maxwell H. Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky

Ever since 1984, few equine diseases have stimulated more interest or gained greater international notoriety than equine viral arteritis (EVA). EVA has long been recognized as a contagious disease of equids with the potential to cause economically damaging outbreaks especially in breeding populations in which it may give rise to widespread abortion and illness and death in young foals (Doll et al., 1957; Golnik et al., 1981). For those seeking additional information about the virus, clinical features of EVA and factors pertinent to the epidemiology of the disease, please consult the following comprehensive review on the subject (Timoney, 2009). Much is currently known about the biology of the causal agent, EAV and the epidemiology of the disease. This has led to the development of strategies for the effective prevention and control of the disease including the availability of an attenuated modified live virus vaccine that has been shown to be safe and protective for immunizing stallions and non-pregnant mares (McCollum, 1969; Timoney and McCollum, 1993).

### **National Awareness of EVA**

Despite what is known and has been extensively reported on over the years, EVA remains a disease about which there continues to be considerable lack of awareness in certain sectors of the horse industry. In part, this may be reflective of the relative lack of significance that is attached to this disease. This in turn may well be a consequence of the infrequency with which the disease has been reported in the past.

### **Clinical and Economic Significance of EVA**

Historically, outbreaks of EVA have largely been recorded in breeding populations, although the virus has on occasion been responsible for significant outbreaks at horse shows and at racetracks (Timoney, 2005). Infection subsequently spread from a number of these events to breeding farms with resultant outbreaks of abortion and exposure of stallions to the virus, some of which later became long-term carriers of EAV (Clayton, 1987).

The last 20-30 years has seen three landmark occurrences of EVA; these include: the widespread disease event in central Kentucky in 1984 that involved an estimated 41 Thoroughbred breeding farms (Timoney, 1984); the very extensive outbreak at Arlington Park Racetrack, Chicago, Illinois in 1993 with spread to a number of other racetracks as well as several breeding farms both in-state and out-of-state (Scollay and Foreman, 1993); the third and final event was the multistate occurrence of EVA that originated in New Mexico in 2006 and spread to a total of 18 states and two Provinces in

Canada (Timoney et al., 2007). The virus was responsible for outbreaks of abortion, neonatal foal deaths and establishment of the carrier state in a significant number of stallions on affected premises. Each of the foregoing occurrences was associated with rapid, widespread dissemination of EAV either by the respiratory or venereal route or a combination of both depending on the prevailing circumstances. Each event underscored the ability of this virus to cause extensive outbreaks of disease with considerable economic consequences.

### **1984: Watershed Year**

The 1984 EVA incident in Kentucky was a “game changer” in how the equine industry elsewhere in the USA and around the world perceived the significance not only of the event but more specifically, the disease in question. It had the immediate consequence of the Tripartite Group of countries of France, Ireland and the United Kingdom imposing a total embargo on the importation of horses from the entire USA for a month. Although lifting of the embargo followed, this action was succeeded by some of the severest restrictions ever imposed on the movement of U.S. horses to other horse breeding countries in the world. The lesson to be learned from this experience is that irrespective of whether the domestic equine industry considers EVA to be a disease of significance or not, the rest of the global breeding industry attaches considerable importance to it as reflected in their respective import control policies that still remain an obstacle to trade to the present day.

### **Unpredictability of EVA Outbreaks**

In the absence of any notable outbreaks of equine viral arteritis (EVA) since the multistate occurrence in 2006, some might contend that the disease no longer represents a significant threat to the horse breeding industry and not deserving of continuing concern. Nothing could be further from the truth! What is frequently overlooked by those unfamiliar with the disease is the unpredictability and infrequency of occurrences of EVA. This is in sharp contrast to the situation with the other three major equine viral respiratory pathogens, equine influenza virus and equine herpesviruses 1 & 4, that are responsible for outbreaks of disease on an annually recurring basis in countries in which they are endemic.

### **Variability in Virus Pathogenicity**

When considering EVA and the unpredictability of outbreaks of the disease, it is important to realize that not all field strains of EAV behave the same. They can vary significantly in their ability to cause disease. Based on their level of pathogenicity, strains have been categorized as lento-, meso-, or vologenic, reflecting their ability to cause mild to severe forms of the disease (McCullum and Timoney, 1999). Experience over the years has shown that many horses exposed to EAV for the first time do not develop clinical signs of EVA but rather an asymptomatic infection. On the other

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hand, certain strains such as the one responsible for the 1984 event in Kentucky, have been shown to cause disease of moderate to significant severity in the majority of infected horses (Timoney, 1984; McCollum and Timoney, 1984). In seeking an explanation to account for the variation in pathogenicity among strains, it should be noted that EAV is a ribonucleic acid (RNA) virus taxonomically classified in the family *Arteriviridae* (Cavanagh, 1997). Like all RNA viruses it possesses quasispecies structure and has the potential for spontaneous mutation at a much higher rate than any DNA virus. One might well question the relevance of this observation in furthering an understanding of the epidemiology of EVA. It is widely accepted that the stallion persistently infected with EAV is the primary reservoir of the virus, ensuring its perpetuation in horse populations from year to year (Timoney and McCollum, 1993). Aside from the importance of its role in the epidemiology of EVA, there is also evidence that the carrier stallion is the source of genetic divergence of EAV resulting over time in the emergence of novel phenotypic variants of the virus, some of which may be more or less pathogenic than the strain that originally infected the stallion (Hedges et al., 1999). It is postulated that strains of EAV of enhanced pathogenicity that are responsible for outbreaks of EVA very likely originate in the course of long-term persistence and genomic modulation in the reproductive tract of the carrier stallion.

### **The Carrier Stallion**

In any discussion of the potential threat posed by EAV, consideration must be given to the pivotal role the carrier stallion plays in the epidemiology of the disease (Timoney and McCollum, 1993). It is widely recognized that much of the international spread of the virus that has taken place over the years can be attributed to the shipment of carrier stallions or infective semen (Timoney, 2013). Changing trends in the breeding industry has resulted in an ever-expanding global trade in cryopreserved semen, greatly enhancing the risk of dissemination of EAV. Time and again, outbreaks of EVA in the USA have been traced back to imported carrier stallions or virus-infective semen. On occasion, these have been economically punitive for the horse owners involved. Ironically, the USA is the only country that still does not have any restrictions on the importation of carrier stallions nor any testing requirements on imported semen. The argument that has been put forward in support of the existing zero-testing import policy for this disease is that the USA does not have a national control program for EVA even though the causal virus is known to circulate in the domestic equine population. The prevalence of infection can vary across a range of horse breeds, with highest levels demonstrated in Standardbred and Warmblood breeds (Hullinger, et al., 2001). These are the same breeds in which the highest frequency of the carrier state has been encountered. Even the Thoroughbred breed is not "immune" from exposure to infection. Based on serological testing of all horses sold at the Breeding Stock Sales in Kentucky since 1984, the annual

prevalence of EAV infection has remained at less than 1%, with no evidence of clinical disease being reported (unpublished data).

### **Control Programs for EVA**

What is not frequently realized by many in the horse industry is that EVA is a very controllable disease (Timoney and McCollum, 1993). Experience gained from past occurrences of EVA has served to emphasize the importance of sound management practices in conjunction with a targeted program of vaccination in achieving effective control of the disease. Preventing its spread is predicated on eliminating or at very least minimizing direct or indirect contact of susceptible horses with the secretions, excretions, or tissues of infected individuals. A limited number of industry groups have developed effective programs for the prevention and control of the disease. Essential to the success of such programs has been the availability of a safe and protective vaccine (ARVAC®, Zoetis) against EVA. Current control programs are aimed at preventing the spread of EAV to breeding horse populations and prevent abortion and establishment of the carrier state in stallions. In 1997, the American Horse Council released an industry-driven set of guidelines to assist breeders in preventing the spread of EVA. These were widely endorsed at the time and are available on the Council's website: <http://www.horsecouncil.org> (Mann, 1997). A few years later, the USDA, APHIS, VS produced a video/DVD on all aspects of the disease with the aim of increasing awareness of EVA and providing guidance on how best to prevent and control it. It was made available gratis to all who requested a copy. Furthermore, the AAEP put out a brochure summarizing the salient features of EVA for the benefit of its members. In April 2004, the USDA released the publication "Equine Viral Arteritis: Uniform Methods and Rules" which it was hoped would be used as a framework for creating a domestic EVA control program and a blueprint for state animal health officials to follow in dealing with this disease. The American Association of Equine Practitioners (AAEP) developed two sets of guidelines, the first entitled "Guidelines to Breeding a Mare to an Equine Arteritis Virus Shedding Stallion" was revised in 2008. The second AAEP guidance document, "Biosecurity Guidelines for Control of Venereally Transmitted Diseases" was released in 2012 and revised in 2015. It included a comprehensive section on the prevention and control of EVA. These guidelines are available on the AAEP's website: <https://aaep.org/guidelines/infectious-disease-control/biosecurity-guidelines-control-venereally-transmitted-diseases>

Notwithstanding the collective efforts of the American Horse Council (AHC), the USDA and the AAEP in the late 1990s and the early 2000s to increase national awareness of EVA and the economic impact that can result from outbreaks of the disease, the equine industry has shown little interest in promoting much less pursuing greater control of this infection. Repeated efforts directed at emphasizing the key role of the carrier stallion in the epidemiology of this disease and how easy it would be to eliminate this threat from the breeding industry, have been largely unsuccessful. Details of how

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this can be accomplished are detailed in the "Equine Viral Arteritis: Uniform Methods and Rules." Only Kentucky and New York introduced legislation requiring that all Thoroughbred breeding stallions be screened for presence of the carrier state; furthermore, that the Thoroughbred breeding stallion population be vaccinated annually against EVA (Timoney and McCollum, 1993).

Similar to the control of most other infectious diseases, the equine industry needs to take the initiative and avail itself of the wealth of information on the prevention and control of EVA, hopefully aided and supported by each state's animal health officials, state horse councils in states in which they exist, the AHC, USDA and the AAEP. The unrestricted importation of carrier stallions and the lack of any testing requirement on imported semen are significant loopholes that need to be addressed at a federal level if there is to be any hope of achieving greater national control of EVA. Whether there is enough equine industry interest and support in pursuing such an initiative will remain to be seen. Regrettably, as long as the equine industry remains ambivalent or indifferent to this need, the risk or threat of future outbreaks of EVA will continue, some of which may well be as economically damaging as those experienced in 1984, 1993 or 2006.

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## EQUINE

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## COMMITTEE ON FARMED CERVIDAE

Chair: Bret Marsh, IN

Vice Chair: Charly Seale, TX

Bill Barton, ID; Shelly Chavis, IN; Walter Cook, TX; Donald Davis, TX; Jacques deMoss, MO; Bob Dittmar, TX; Roger Dudley, NE; John Fischer, GA; Tam Garland, TX; Robert Gerlach, AK; Colin Gillin, OR; Michael Greenlee, WA; Rod Hall, OK; Noel Harrington, ON; Kristi Henderson, IL; Gabe Jenkins, KY; Anne Justice-Allen, AZ; Patrice Klein, DC; Terry Klick, OH; Todd Landt, IA; Rick Linscott, ME; Mitch Lockwood, TX; Lindsey Long, WI; Karen Lopez, DE; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN; Bob Meyer, CO; Mendel Miller, SD; Eric Mohlman, NE; Alecia Naugle, MD; Tommy Oates, TX; Dustin Oedekoven, SD; Gary Olson, MN; Mitchell Palmer, IA; Janet Payeur, IA; Justin Roach, OK; Jonathan Roberts, LA; Mark Ruder, GA; Shawn Schaefer, OH; David Schmitt, IA; Krysten Schuler, NY; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Iga Stasiak, KY; Kelly Straka, MI; Tahnee Szymanski, MT; Patrick Tarlton, TX; Beth Thompson, MN; Tracy Tomascik, TX; Skip West, OK; Margaret Wild, CO; Kyle Wilson, TN; Peregrine Wolff, NV; Mary Wood, WY; Alan Young, SD; Glen Zebarth, MN.

The Committee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00 a.m. to 12:00 p.m. There were 36 members and 40 guests present.

### **Subcommittee on Tuberculosis-Report**

Beth Thompson, Minnesota Board of Animal Health

*Working Group (WG) members: Beth Thompson, Bob Meyer, Boyd Parr, Chuck Massengill, Tony Forshey, Kathy Orloski, Laurie Seale, Suelee Robbe-Austerman, Travis Lowe, Scott Wells, Shawn Schaefer*

The Cervid TB WG was formed at the direction of Dr. Dustin Odekoven, chair of the USAHA TB Committee. The charge of the WG was to review and discuss the potential for reducing the cost of TB testing to the cervid industry. The WG addressed:

1. The potential to advance state status in an effort to recognize minimal risk for transmission of TB by farmed cervids in interstate movement.
2. The potential to reduce the frequency of official herd testing intervals for TB-Accredited herds.

The WG met via conference calls. The following analysis of state data from four states, (Colorado, Minnesota, Oklahoma, Wisconsin) was completed by Drs. Wells and Orloski, and will be presented at the TB Subcommittee meeting:

- TB testing information from accredited herds was analyzed, the herd data was summarized for two 3-year testing cycles, 2011-2013 and 2014 – 2016.



## FARMED CERVIDAE

- About 30% of farmed cervid herds and 50% of farmed cervids have been represented in each 3 year cycle of *M. bovis* testing in the 4 states that provided testing data.
- During 2014-2016, there were 13,302 TB tests performed from 325 TB-accredited herds in the 4 states.
- The estimated true prevalence upper bound is 0.03% (95% confidence interval) using 2014-2016 test data\*.
  - *\*This estimate represents the tested farmed cervid population (TB-accredited herds) and should not be extrapolated to untested populations*

Additionally, a request to USDA-APHIS was made for information and analysis; this ongoing information sharing is being directed and coordinated by Dr. Alecia Naugle. Information sharing from states will be part of the ongoing analysis.

The WG members collaborated on a Resolution addressing #2 above. The majority of WG members support said Resolution, which will be presented for consideration to the Subcommittee by Mr. Travis Lowe.

During the business section of the subcommittee meeting, a resolution was proposed titled "Cervid TB Herd Certification Testing Intervals." The resolution was approved by the majority of the subcommittee on voice vote. The resolution will be presented to the Committee on Farmed Cervidae for consideration. (See business section).

### **Subcommittee on Brucellosis-Report**

Eric Liska, Montana Department of Livestock

Dr. Liska stated the Subcommittee on Brucellosis met on Monday, October 16, 2017, and received several informative presentations. During the business section of the subcommittee meeting, a resolution was proposed titled "Brucellosis Testing in Farmed Cervidae." The resolution was approved by the majority of the subcommittee on voice vote. This resolution will be presented to the Committee on Farmed Cervidae for consideration. (See business section). The full report can be found under the Committee on Cattle and Bison.

### **Update on CWD Ante-mortem Testing-Texas and Wisconsin**

Scott Bugai, Private Practitioner

Dr. Bugai's presentation explained there are four ante-mortem diagnostic tests for transmissible spongiform encephalopathies (TSEs) prion diseases: 1) Nictitating membrane, or "third eyelid," biopsy; 2) Palatine tonsillar lymphoid tissue biopsy (tonsil biopsy); 3) Rectoanal mucosa-associated lymphoid tissue (RAMALT) biopsy (rectal biopsy) and 4) Medial Retropharyngeal Lymph Node Biopsy.

IHC in tonsillar lymphoid tissue. Sensitivity = 97.3% and Specificity = 100%

Total CWD Testing in Texas Since Finding CWD in 2012:

## REPORT OF THE COMMITTEE

- TPWD Tests: 36,215 and Other/Private Tests: 82,222= Total Tests: 118,437 (This includes postmortem and live testing).
- Total Live Testing in Texas Since Rule Implementation: TPWD Live Tests: 178 and Other/Private Tests: 24,255= Total Tests: 24,433

Total CWD Positives in Texas: Free Range: 18 and Captive Cervid: 33= Total Positives: 51

- Total CWD Tests Since Finding Disease: Total Tests: 118,437
- Estimated CWD Prevalence: .04%

### **Cervid Health Update-Status of Updated CWD Standards, TB/Bruceellosis Rule**

#### **Presentation of Pilot Project-Ante-Mortem Testing-Ohio**

Alecia Naugle and Dr. Randy Pritchard, USDA-APHIS

Dr. Pritchard provided an overview of the voluntary Chronic Wasting Disease Herd Certification Program. A summary of CWD detections was provided for FY 2017 that noted the states of Iowa, Minnesota, Michigan, Pennsylvania and Texas. Revisions to the CWD Program Standards are under clearance within USDA. A guidance document has been released for oversight on interstate movement of wild caught cervids. Updates were provided on live animal testing for Chronic Wasting Disease and Cervid TB testing. In FY 2017, 12,588 cervids were tested serologically for bovine TB using the DPP VET TB Assay. A total of 55,205 cervids have been tested since the introduction of the serological tests in 2013.

### **Advances in Identification of Mycoplasma Bovis in Cervids-Vaccine Advancement**

Douglas Wagner, Newport Laboratories

Dr. Wagner stated *Mycoplasma bovis* is a growing concern for the cervid industry. The presentation covered disease transmission, lifespan in the environment, diagnostics and gene targets. Results were presented on a vaccination study. Veterinarians should consider this disease when dealing with cervid death and sickness.

### **Management of CWD in Ranched Elk and the Future of Cervid Farming in CWD-endemic Areas**

Nicholas Haley, Midwestern University Department of Basic Sciences

Objectives of the study includes Antemortem testing possible/useful via e.g. rectal biopsy, antemortem/postmortem testing improved using e.g. RT-QulC and genetic resistance should be considered as a management tool. For Deer and elk, there is lower prevalence in "resistant" animals (96SS, 132LL), prolonged incubation times.

## FARMED CERVIDAE

### **Epizootic Hemorrhagic Disease in Captive Cervids of Florida**

Samantha Wisely, University of Florida

Dr. Wisely noted the Florida Cervidae Health Research (CHeRI) Initiative's service in support of animal health includes listing causes of death 2016, Florida HD surveillance and focal farm epidemiology. Hemorrhagic Disease is not always correctly identified. CHeRI identified two additional viral outbreaks of Mammalian Orthoreovirus-3 and Cervidpox virus. Findings of Hemorrhagic Disease in Florida Farmed White-tailed Deer in 2016 and 2017 include EHDV-2, EHDV-6 and BTV. Dr. Wisely also illustrated patterns of exposure.

### **Committee Business:**

#### **Resolution 1**

Dr. Beth Thompson, Subcommittee on Tuberculosis Chairwoman, Minnesota Board of Animal Health presented the Subcommittee on Tuberculosis' proposed resolution titled "Cervid TB Herd Certification Testing Intervals." Dr. Thompson yielded to Travis Lowe to explain the resolution. A motion was made from the floor by Dr. Bob Meyer, second by Skip West, to approve the resolution. After discussion, the motion was approved by voice vote.

#### **Resolution 2**

Dr. Eric Liska, Subcommittee on Brucellosis, Chairman, Montana Department of Livestock presented the Subcommittee on Brucellosis' proposed resolution titled "Brucellosis Testing in Farmed Cervidae." Dr. Liska yielded to Travis Lowe to explain the resolution. A motion was made from the floor by Eric Mohlman, second by Kyle Wilson, to approve the resolution. After discussion, the motion was approved by voice vote.

With no other business, the meeting was adjourned.

## **USAHA/AAVLD COMMITTEE ON FOOD AND FEED SAFETY**

Chair: Patrick McDonough, NY

Robin Anderson, TX; Chris Ashworth, AR; James Averill, MI; Deanna Baldwin, MD; Richard Benton, MS; Karyn Bischoff, NY; Richard Breitmeyer, CA; Deborah Brennan, MS; Beverly Byrum, OH; Wendy Cuevas-Espelid, GA; Ignacio dela Cruz, MP; Dubraska Diaz-Campos, WA; Kathy Finnerty, NY; Tam Garland, TX; Robert Gerlach, AK; Laura Goodman, NY; Jerry Heidel, OR; Joseph Hill, SC; Susanne Hinkley, NE; Christine Hoang, IL; Donald Hoenig, ME; Danny Hughes, AR; John Huntley, AZ; Jarra Jagne, NY; Sandra James-Yi, IL; Ghazala Jawad, NC; Annette Jones, CA; Ellen Kasari, CO; Susan Keller, ND; Donna Kelly, PA; Joe Kendall, AB; Hailu Kinde, CA; Daniel Kovich, DC; T.R. Lansford, TX; Dale Lauer, MN; Elizabeth Lautner, IA; Bill Layton, MT; Gene Lollis, FL; Bret Marsh, IN; David Marshall, NC; Patrick McDonough, NY; Katherine McNamara, VT; David Meeker, VA; Shelley Mehlenbacher, VT; Brenda Morningstar-Shaw, IA; Nicole Neeser, MN; Gene Niles, CO; Sandra Norman, IN; Ogi Okwumabua, WI; Kenneth Olson, IL; Stephanie Ostrowski, AL; Lanny Pace, MS; Elizabeth Parker, TX; Amar Patil, NJ; David Pyburn, IA; John Ragan, VA; Shelley Rankin, PA; Renate Reimschuessel, MD; Grant Rezabek, OK; M. Gatz Riddell, AL; Roxana Sanchez-Ingunza, KS; John Sanders, WV; Joni Scheftel, MN; David Schmitt, IA; John Shaw, DC; Richard Sibbel, IA; Kathryn Simmons, DC; Harry Snelson, NC; Stan Stromberg, OK; Anil Thachil, NY; Larry Thompson, MO; Bob Tully, KS; Shauna Voss, MN; Liz Wagstrom, DC; Doug Waltman, GA; Robert Wills, MS; Ross Wilson, TX; Nora Wineland, MO; Raquel Wong, HI.

The Committee met on October 15, 2017 at the Town and Country Hotel in San Diego, California from 1:30-5:30 p.m. There were 23 members and 33 guests present. At the beginning of the meeting, Dr. McDonough welcomed any students that may be attendance for the meeting and encouraged them to participate in the discussions during the afternoon; he briefly reviewed the afternoon's agenda and reviewed the mission statement of the Food and Feed Safety Committee.

### **Presentations and Reports**

#### **Vet-LIRN Update: Recent recalls and the 2017 Vet-LIRN's Pilot AMR Project**

Renate Reimschuessel, Department of Health and Human Services (DHHS), Food and Drug Administration (FDA)

Dr. Reimschuessel reviewed the creation and activities of the FDA's Veterinary Laboratory Investigation and Response Network (Vet-LIRN), and then reviewed a few of the recent recalls that the Vet-LIRN has been involved with.

The Vet-LIRN: In late 2010, the Center for Veterinary Medicine's (CVM) Office of Research initiated a project, the Vet-LIRN, to collaborate with veterinary diagnostic laboratories to exchange scientific information, build laboratory capacity for routine and emergency response and train scientists.

The overall goal for CVM is for participating laboratories to be ready, willing, and able to help investigate potential problems with animal feed and animal drugs providing a rapid response to reports of animal injury. The Vet-LIRN network is comprised of 40 laboratories and conducts between 30-50 in-depth case investigations per year. Recent cases include pet food recalls due to pentobarbital and excess thyroid hormone. Vet-LIRN is also collaborating with CDC on a *Campylobacter* outbreak in progress. Vet-LIRN also conducts method development/validation projects and proficiency testing. A new project for Vet-LIRN in 2017 is a pilot study in which twenty Vet-LIRN laboratories are conducting antibiotic susceptibility testing of select veterinary pathogens isolated from clinical specimens; this project stems from the fact that Vet-LIRN was named, along with NAHLN, as a partner in the president's "Combating Antibiotic Resistant Bacteria" initiative. Additionally, four Vet-LIRN laboratories will be obtaining whole genome sequences of a subset of these isolates. Sequence data will be used to compare phenotypic antimicrobial susceptibility with predicted susceptibility based on resistance genes. This data will provide a good foundation for tracking the patterns of susceptibility in clinical veterinary pathogens over time to facilitate prudent and appropriate antimicrobial use.

Vet-LIRN has leveraged the resources of state-of-the-art veterinary diagnostic laboratories in a remarkably cost-effective way to provide FDA with rapid information regarding potential animal feed related contamination events.

Also, Reimschuessel provided an update of the investigation of jerky treats associated with Fanconi Syndrome in dogs; while new dog cases have dropped off, they still do not have a cause for this problem. It was noted that jerky manufacturers have been making manufacturing process changes that might have had the effect of reducing the case load.

### **Recent Multistate Foodborne Outbreaks and the Growing Impact of Whole Genome Sequencing**

Matthew Wise, Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC)

Dr. Wise presented an overview of foodborne diseases in the United States as a "Changing Landscape;" he reviewed how CDC detects outbreaks with the PulseNet network of surveillance and laboratory testing. This activity leads to the generating of hypotheses about the source of an outbreak of foodborne disease. He then described the process of testing the hypotheses to determine if a food is the cause of an outbreak. Next Wise showed how the CDC group was transitioning to Whole Genome Sequencing (WGS) for outbreak investigation by showing the conceptual framework for the current approach of pulsed field gel electrophoresis (PFGE) subtyping of bacterial isolates cultured from investigations, i.e., the strengths and limitations of PFGE-based subtyping. He presented an example of the 2010 outbreak of *Salmonella* Enteritidis Infections linked to shell eggs. He showed how WGS

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provides a higher resolution view of the bacterial genome thus strengthening the lines of evidence used to link outbreaks to a food source.

Using a series of investigations, Wise illustrated how the CDC was implementing WGS:

- *Listeria monocytogenes*
  - Transitioned to routine sequencing of all isolates in 2013
  - Outbreak detection is now largely based on WGS
- *Salmonella* and Shiga toxin-producing *E. coli* (STEC)
  - Outbreak detection still based on PFGE, WGS used for further subtyping
  - Moving to routine sequencing of *Salmonella* and STEC in the coming years

WGS is already having a major impact on outbreak investigations on a day-to-day basis. Wise presented a hypothetical scenario of closely related *Salmonella* identified throughout the production chain

Wise presented details of recent foodborne outbreaks to the committee:

- Outbreak of *Salmonella* Infections Linked to Imported Maradol Payayas
- Outbreak of *Salmonella* Infections Linked to Imported Maradol Payayas: Role of WGS
- Outbreak of Listeriosis Linked to Soft Raw Milk Cheese
- STEC O157 Infections Linked to Soynut Butter
- Outbreak of *Salmonella* 1,4,[5],12:i- Infections Linked to Chicken, 2016-2017
- Outbreak of *Salmonella* Newport Infections Linked to Ground B beef, 2016-2017

Final thoughts on WGS:

- WGS is not black and white
  - PFGE was “binary” but sequencing data are “continuous”
  - How close is close? What constitutes “closely related” bacterial strains?
- Interpretation can vary by the organism or outbreak vehicle
- WGS is already improving our ability to detect, triage, investigate, and solve foodborne (and zoonotic) outbreaks
- Although sequencing has been a great new tool, epidemiologic data has become even more important in maximizing the impact of these new subtyping methods such as WGS.

### **Multistate Outbreaks Linked to Animal Contact and Raw Milk Consumption—United States, 2017**

Megin Nichols, Department of Health and Human Services (HHS), Centers for Disease Control and Prevention (CDC)

Dr. Nichols reviewed several multistate outbreaks linked to animal contact and focused on the *Salmonella* Heidelberg infections linked to

contact with calves. CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) are reopening the investigation of a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections. Since 2015, 46 people infected with the outbreak strains of *Salmonella* Heidelberg have been reported from 14 states. Fourteen (30%) people have been hospitalized. No deaths have been reported. Illnesses started on dates ranging from January 27, 2015 to July 11, 2017. Fifteen (33%) people in this outbreak are children under the age of 5 years. Epidemiologic and laboratory investigations linked ill people in this outbreak to contact with calves, including dairy bull calves. Additional information can be found at: <https://www.cdc.gov/salmonella/heidelberg-11-16/index.html>

CDC and multiple states are investigating a multistate outbreak of human *Salmonella* infections linked to contact with pet turtles. Thirty-seven people infected with the outbreak strain of *Salmonella* Agbeni have been reported from 13 states. Illnesses started on dates ranging from March 1, 2017 to August 3, 2017. Of 33 people with available information, 16 have been hospitalized. No deaths have been reported. Twelve (32%) ill people are children five years of age or younger. Epidemiologic and laboratory findings link the outbreak of human *Salmonella* Agbeni infections to contact with turtles or their environments, such as water from a turtle habitat.

CDC and multiple states are investigating ten separate multistate outbreaks of *Salmonella* infections in people who had contact with live poultry in backyard flocks. These outbreaks are caused by several DNA fingerprints of different *Salmonella* bacteria: *Salmonella* Braenderup, *Salmonella* Enteritidis, *Salmonella* Hadar, *Salmonella* I 4,[5],12:i-, *Salmonella* Indiana, *Salmonella* Infantis, *Salmonella* Litchfield, *Salmonella* Mbandaka, *Salmonella* Muenchen, and *Salmonella* Typhimurium. The outbreak strains of *Salmonella* have infected over 1,000 people in 48 states and the District of Columbia. Illnesses started on dates ranging from January 4, 2017 to July 31, 2017; 215 ill people have been hospitalized. One death has been reported. Epidemiologic, traceback, and laboratory findings link the ten outbreaks to contact with live poultry, such as chicks and ducklings, from multiple hatcheries. In interviews, 498 (74%) of 672 ill people reported contact with live poultry in the week before illness started. Contact with live poultry or their environment can make people sick with *Salmonella* infections. Live poultry can be carrying *Salmonella* bacteria but appear healthy and clean, with no sign of illness.

Nichols then discussed outbreaks linked to nonpasteurized milk consumption in the United States first reviewing outbreaks occurring from 2007–2012. The number of outbreaks linked to drinking nonpasteurized milk is increasing, i.e., there were 30 in 2007–2009, and 51 in 2010–2012. These outbreaks sickened nearly 1,000 people and 73 people were hospitalized. More than 80% of outbreaks occurred in states where selling nonpasteurized milk was legal.

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Despite risks of infection, raw milk consumption continues. Thus, Nichols reviewed the perceived health benefits of drinking raw milk by reviewing claims made about lactose intolerance, allergies and asthma, that there were fewer estrogenic hormones, the concentrations of vitamins/nutrients, and finally the public's misperception of risk of drinking unpasteurized milk. Likely also involved in the choice to drink raw milk are individual taste and texture preferences, and concerns for animal welfare. The findings from the scientific literature have shown that there is no scientific evidence to support statements that benefits of consuming raw milk outweigh health risks; moreover, pregnant women, young children, older adults, people with weakened immune systems are more susceptible to severe outcomes of infection that may be acquired via the consumption of raw milk. Pasteurization reduces the risk of disease. Also, additional studies regarding the biologic mechanisms behind raw milk and reduced allergies are needed, this is not a causal relationship.

Nichols spoke about the Nonpasteurized Milk Regulation, and how in states in which sale of nonpasteurized milk is illegal, milk often obtained through other means such as the internet sale of raw milk. She then reviewed the cases of infection in Texas this year with *Brucella* RB51 that are linked to the consumption of raw milk from a Texas dairy.

In closing Nichols outline the essential components for the response to illness and outbreaks resulting from food or animal contact are as follows:

- On-going relationships with animal agencies
- Have access to integrated human, food and animal surveillance
- Protocols for conducting joint response investigations
- Agreements for sharing biological samples and lab results
- Established lines of communication with animal and food industry
- Plans for unified communication messaging
- Need to build linkages and TRUST before an outbreak, disaster or pandemic occurs.

### **One Health at Cornell: New Master of Public Health (MPH) program - An Innovative, Trans-disciplinary Professional Training Program in Public Health and One Health**

Karyn A. Havas, Cornell University

Dr. Havas presented an overview of Cornell University's new Master of Public Health (MPH) program. Cornell University accepted their inaugural Master of Public Health class in the fall of 2017. The initiation of this program recognizes Cornell's strengths in providing education drawing on a wide array of expertise and experience, which ranges from farm-to-fork in the Food Systems for Health concentration and across the human and animal realm for the Infectious Disease Epidemiology concentration. The purpose of this new academic program is to promote the sustainable and equitable health and well-being of people in New York State, the United States, and around the world through education, research and practice. The program was established to ensure students applied core public health competencies



throughout the education process. Her presentation provided an overview of this new Public Health program at a premiere U.S. academic institution. Details of the MPH program may be found at <https://www2.vet.cornell.edu/education/graduate-studies/master-public-health/mph-overview>

### **Modeling the Transboundary Survival of Foreign Animal Disease Pathogens in Contaminated Feed Ingredients**

Scott Dee, Pipestone Applied Research

Dr. Scott Dee presented the results of a research project whose goal was to model and evaluate virus survival in feed ingredients under conditions simulating importation to the U.S. from China and Europe. Where necessary due to biosafety constraints, his research group chose surrogate viruses for some of the viral classes that were being evaluated. The abstract of his presentation is provided at the end of this report, "Evaluation of the survival of viral pathogens in contaminated feed ingredients using transboundary shipment models."

### **Plastic Pollution**

Karyn Bischoff, Cornell University

Dr. Bischoff presented the many problems that our world faces from the sheer amount of plastic that is manufactured and used/discarded yearly around the globe. More than three million metric tons of plastic are manufactured annually, and between a third and a half of that is used in disposable packaging and containers. Up to 13 million tons end up in the ocean each year, and of that it's estimated that only 0.3 million tons are visible on the surface. Plastic entrapment and ingestion by wildlife is common, and the presence of additives like bisphenol A and phthalates, as well as lipid-soluble contaminants like persistent organic pollutants and mercury compounds, can contribute to the toxicity of ingested plastic. Extensive weathering leads to partial breakdown of plastic and the formation of microplastics (< 5mm) and nanoplastics (< 100 nm). Particles of microplastic have become ubiquitous across the globe, where they can be detected in sea water, fresh water, soils, and dust. They are present in seafood, in particular, and there is concern for the effect that the high surface area of these particles on the bioavailability of the associated lipophilic contaminants.

### **PL 115-43: Securing our Agriculture and Food Act**

John P. Sanders, Jr., Department of Homeland Security (DHS)

Dr. Sanders provided the committee with an overview of the Act (<https://www.congress.gov/congressional-report/115th-congress/house-report/42/1>), and related that the law tasks the DHS Assistant Secretary for Health Affairs with:

## REPORT OF THE COMMITTEE

- 1) Providing oversight and management of the Department's responsibilities pursuant to Homeland Security Presidential Directive 9–Defense of United States Agriculture and Food [HSPD-9].
- 2) Providing oversight and integration of the Department's activities related to veterinary public health, food defense, and agricultural security.
- 3) Leading the Department's policy initiatives relating to food, animal, and agricultural incidents, and the impact of such incidents on animal and public health.
- 4) Leading the Department's policy initiatives relating to overall domestic preparedness for and collective response to agricultural terrorism.
- 5) Coordinating with other Department components, including U.S. Customs and Border Protection, as appropriate, on activities related to food and agriculture security and screening procedures for domestic and imported products.
- 6) Coordinating with appropriate Federal departments and agencies.
- 7) Other activities as determined necessary by the Secretary.

The Strategic Vision of the Food, Agriculture and Veterinary Defense Branch is to advance the defense of the U.S. food, agriculture, and veterinary systems against terrorism and other high-consequence events that pose a high risk to homeland security. The Branch serves as DHS's principal agent for all food, agriculture, and veterinary matters and endeavors to ensure the security of our Nation's food, agriculture, and human and animal health in the face of all hazards through cooperation and collaboration with DHS offices, and components; other federal departments and agencies; state, local, territorial, and tribal governments; the academic community; and the private sector.

The Strategic Goals of the Branch are to provide oversight and management of DHS responsibilities under HSPD-9; to provide oversight and integration of DHS activities relating to veterinary public health, food defense, and agricultural security; to lead DHS policy initiatives related to food, animal, and agricultural incidents and evaluate the impact of such incidents on animal and public health. Also, it leads DHS policy initiatives related to overall domestic preparedness for and collective response to agricultural terrorism; it coordinates with DHS components on activities relating to food and agriculture security and screening procedures for domestic and imported products; and it coordinates with appropriate federal departments and agencies with responsibilities for protecting the health and security of the Nation's animals, plants, and food systems.

### **Committee Business:**

During the business meeting Dr. McDonough discussed the mission statement for the committee and requested additional feedback about the statement and whether any changes were needed.

## FOOD AND FEED SAFETY

The current mission statement is as follows as provided on record from the USAHA office:

“The purpose of the joint USAHA, American Association of Veterinary Laboratory Diagnosticians (AAVLD) Committee on Food and Feed Safety (FFS) is to provide a national forum to *discuss current and emerging issues and information* pertaining to *all* aspects of food and feed safety and related veterinary diagnostic testing of foods of animal origin. The Committee should recommend food and feed safety policies to protect animal and human health.”

This is the statement currently on the website; this version perhaps portrays the Committee as two separate committees:

“The purpose of the Committee on Food Safety is to serve as a focal point for consideration of food safety issues within USAHA, to recommend food safety policies and promote resolutions that will better protect the health and welfare of the consuming public, and to be active in all areas of risk assessment associated with food safety issues concerning food products of mammalian and avian origin.

The purpose on the Committee on Feed Safety is to provide a national forum for debate on the means to minimize chemical, microbiological and physical contamination in the feed of food producing animals. It is essential that all affected groups and industry be involved in these deliberations. It is the goal of the Committee to provide specific procedures using the latest available knowledge for the reduction and enhancement of animal foods.”

Here is one attempt to combine the above two statements and present it as one committee:

“The purpose of the joint USAHA/AAVLD Committee on Food and Feed Safety (FFS) is to provide a national forum to discuss current and emerging issues and information pertaining to all aspects of food and feed safety and related veterinary diagnostic testing of foods of animal origin. The FFS group should recommend food safety policies and promote resolutions that will better protect the health and welfare of the consuming public, and should be active in all areas of risk assessment associated with food safety issues concerning food products of mammalian and avian origin. Also, the FFS group should provide a national forum for debate on the means to minimize chemical, microbiological and physical contamination in the feed of food producing animals ultimately seeking to provide specific procedures for the reduction of contaminants to enhance foods of animal foods.”

McDonough then encouraged the members of the Committee to review the Strategic Plans of the USAHA and the AAVLD to have a continual review of how well we are meeting the goals of the two organizations with our Committee activities.

Lastly before adjourning the meeting at 5:30 p.m., he brought an idea to the membership to do have teleconferences at some interval during the year to keep everyone engaged and more active in conducting the activities of the Committee and to meet the mission of the Committee.

**Evaluation of the Survival of Viral Pathogens in Contaminated Feed Ingredients Using Transboundary Shipment Models**

Scott Dee<sup>1\*</sup>, Fernando V. Bauermann<sup>2</sup>, Megan C. Niederwerder<sup>6</sup>, Aaron Singrey<sup>2</sup>, Travis Clement<sup>2</sup>, Marcelo de Lima<sup>2,3</sup>, Gilbert Patterson<sup>4</sup>, Steve Dritz<sup>5</sup>, Mike Tokach<sup>7</sup>, Jason Woodworth<sup>7</sup>, Cassandra Jones<sup>7</sup>, Jon DeJong<sup>1</sup>, Gordon Spronk<sup>1</sup>, Jane Christopher-Hennings<sup>2</sup>, Bob Rowland<sup>5</sup>, Eric Nelson<sup>2</sup>, Diego Diel<sup>2</sup>

1. Pipestone Applied Research
2. Animal Disease Research and Diagnostic Laboratory, South Dakota State University
3. Universidade Federal de Pelotas, RS, Brazil
4. Center for Animal Health in Appalachia, Lincoln Memorial University
5. Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University
6. Kansas State University Veterinary Diagnostic Laboratory, Kansas State University
7. Department of Animal Sciences and Industry, College of Agriculture, Kansas State University

**Abstract**

This study evaluated survival of important viral pathogens of swine or their surrogates in contaminated feed ingredients during simulated transboundary transportation. Based on global significance, 11 viruses were selected, including Foot and Mouth Disease Virus (FMDV), Classical Swine Fever Virus (CSFV), African Swine Fever Virus (ASFV), Influenza A Virus of Swine (IAV-S), Pseudorabies virus (PRV), Nipah Virus (NiV), Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Swine Vesicular Disease Virus (SVDV), Vesicular Stomatitis Virus (VSV), Porcine Circovirus type 2 (PCV2) and Vesicular Exanthema of Swine Virus (VESV). To model the survival of FMDV, CSFV, PRV, NiV, SVDV and VESV, surrogate viruses with similar physical properties and stability were used, and those consisted of Senecavirus A (SVA) for FMDV, Bovine Viral Diarrhea Virus (BVDV) for CSFV, Bovine Herpesvirus Type 1 (BHV-1) for PRV, Canine Distemper Virus (CDV) for NiV, Porcine Sapelovirus (PSV) for SVDV and Feline Calicivirus (FCV) for VESV. Remaining assessments involved the actual pathogen. Controls included complete feed (positive and negative controls) and stock virus positive controls (virus only, no feed matrix). Virus survival was evaluated using either a Trans-Pacific or Trans-Atlantic transboundary model, involving representative feed ingredients, transport times and environmental conditions, with samples tested by PCR, VI and/or swine bioassay. Select viruses (SVA, FCV, BHV-1, PRRSV, PSV and PCV) maintained infectivity during transport, while others (BVDV, VSV, CDV and IAV-S) did not. Survival was maximized in conventional soybean meal, lysine hydrochloride, and vitamin D. The ASFV survival phase is currently underway and results will be presented at the conference. These results demonstrate survival of certain viruses in specific feed ingredients ("high-risk

## FOOD AND FEED SAFETY

combinations”) under conditions simulating transport between countries. This work supports previously published data on the survival of Porcine Epidemic Diarrhea Virus in feed and provides further evidence indicating that contaminated feed ingredients may serve as risk factors for foreign animal and endemic diseases.

## **COMMITTEE ON FOREIGN AND EMERGING DISEASES**

Chair: Tammy Beckham, KS  
Vice Chair: Alfonso Clavijo, MB

Helen Acland, PA; Bobby Acord, NC; Bruce Akey, TX; Gary Anderson, KS; Celia Maria Antognoli, CO; James Averill, MI; Lyndon Badcoe, WA; Jamie Barnabei, MD; Mohit Baxi, ON; Karen Beck, NC; Tammy Beckham, KS; Lisa Becton, IA; Peter Belinsky, RI; Bob Bokma, MD; Bethany Bradford, VI; Philip Bradshaw, IL; Richard Breitmeyer, CA; Deborah Brennan, MS; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Charles Brown, WI; Kenneth Burton, KS; Bruce Carter, IA; Michael Carter, MD; Gregory Christy, FL; Alfonso Clavijo, MB; Matt Cochran, TX; Dana Cole, CO; Joseph Corn, GA; Paula Cowen, CO; Stephen Crawford, NH; Wendy Cuevas-Espelid, GA; S. Peder Cuneo, AZ; Donald Davis, TX; Ignacio dela Cruz, MP; Thomas DeLiberto, CO; Leah Dorman, OH; Brandon Doss, AR; Edward Dubovi, NY; Anita Edmondson, CA; Brigid Elchos, MS; Dee Ellis, TX; Larry Elsken, IA; François Elvinger, NY; Conrad Estrada, VA; Anna Claire Fagre, CO; Katie Flynn, CA; Patricia Foley, IA; Kent Fowler, CA; Richard French, NH; Susan Gale, AZ; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Paul Gibbs, FL; Colin Gillin, OR; Michael Gilsdorf, MD; Timothy Goldsmith, MN; Percy Hawkes, UT; Greg Hawkins, TX; Bill Hawks, DC; Melinda Hergert, TX; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Thomas Holt, FL; Richard Horwitz, CO; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; John Huntley, AZ; Carla Huston, MS; Wei Jia, NY; Annette Jones, CA; Ellen Kasari, CO; Calvin Keeler, DE; Darlene Konkle, WI; Charlotte Krugler, SC; T.R. Lansford, TX; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Linda Logan, TX; Pat Long, NE; Lindsey Long, WI; Margie Lyness, GA; Janet Maass, CO; Bret Marsh, IN; David Marshall, NC; Scott Marshall, RI; Barbara Martin, IA; Michael Martin, SC; Beatriz Martinez Lopez, CA; Rose Massengill, MO; James Maxwell, WV; Thomas McKenna, MA; Sara McReynolds, KS; Scott McVey, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Gay Miller, IL; Janice Mogan, IA; Igor Morozov, KS; Thomas Myers, MD; Lee Myers, GA; Sherrie Nash, MT; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Kenneth Olson, IL; Kristy Pablonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; William (Steve) Parker, GA; Roger Parker, TX; Boyd Parr, SC; William Pittenger, MO; David Pyburn, IA; Jeanne Rankin, MT; M. Gatz Riddell, AL; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; John Sanders, WV; Michael Sanderson, KS; Shawn Schafer, OH; Jack Schlater, IA; David Schmitt, IA; John Shaw, DC; Russell Shoberg, ME; Kathryn Simmons, DC; Rebecca Smith, IL; Julie Smith, VT; Harry Snelson, NC; Diane Stacy, LA; Iga Stasiak, KY; Nick Striegel, CO; Darrel Styles, MD; Sabrina Swenson, IA; Manoel Tamassia, NJ; Belinda Thompson, NY; Beth Thompson, MN; Brad Thurston, IN; Peter Timoney, KY; Sarah Tomlinson, CO; Mia Torchetti, IA; Susan Trock, GA; Jeff Turner, TX; Kathleen Turner, FL; Paul Ugstad, NC; Liz Wagstrom, DC; Sherrilyn Wainwright, CO; Mark Walter, PA; James Watson, MS; Patrick Webb, IA; Margaret Wild, CO; Richard Willer, HI; Michelle Willette, MN; Brad Williams, TX; John Williams,

## FOREIGN AND EMERGING DISEASES

MD; William Wilson, KS; Ross Wilson, TX; Richard Winters, Jr., TX; Raquel Wong, HI.

The Committee met on October 16, 2017 at the Town and Country Hotel in San Diego, California from 1:00 to 6:00 p.m. There were 37 members and 51 guests present. At the beginning of the meeting the Chair and Vice Chair reviewed the mission of the committee and membership. There were no previous resolutions to review.

### **Presentations and Reports**

#### **Transboundary Diseases: The Challenges Faced by the EU (AI, ASF, and LSD)**

Francisco Javier Reviriego Gordejo, European Union Commission

An overview of disease status, control and policies of the EU with regards to avian influenza (AI), African swine fever (ASF) and lumpy skin disease (LSD). In this talk, various control measures for each of the diseases were discussed along with the regionalization.

#### **New World Screwworm in National Key Deer Refuge in Big Pine Key, Florida**

Gregory Christy, Florida Department of Agriculture and Consumer Services (FDACS)

On September 29, 2016, the National Key Deer Refuge in Big Pine Key, Florida contacted the FDACS regarding cases of suspicious myiasis in their Key Deer population. The USDA National Veterinary Services Laboratories (NVSL) confirmed New World screwworm (NWS) on September 30, 2016. Over the following seven months, an unusual response unfolded that involved multiple state, federal and local agencies, impacted an endangered species, included air, land and marine operations, and evoked a strong emotional response from local citizenry. This presentation will provide an overview of this response and the successful eradication of NWS in Florida.

#### **Report on the South American Commission for the Fight Against Foot-and-Mouth Disease: Regional FMD Status, Brazil Plans to Phase-out the FMD Vaccination, and the FMD Outbreak in Colombia**

Celia Antognoli, USDA-APHIS Centers for Epidemiology and Animal Health

An update on the FMD disease status in South America was provided. More specifically, the recent outbreaks of foot and mouth disease in Columbia were discussed.

#### **A New Bat-HKU2-like Coronavirus in Swine, China, 2017**

QiuHong Wang, The Ohio State University

A review of the current status of the new Bat-HKU2 like coronavirus was provided to the committee. The situation of the virus in China and the diagnosis and characterization of this virus was discussed.

**Secure Pork Supply Update-Pork Industry Efforts to Support Business Continuity in an FAD Outbreak**

Patrick Webb, National Pork Board

An update of the status of the Secure Pork Supply Plan was provided to the committee.

**U.S. FMD Outbreak Scenarios and Corresponding Economic Impact Analysis**

Stephanie Shwiff, USDA National Wildlife Research Center

An update on CEAHs modeling efforts for FMD was provided. Economic impacts were explored with regards to strategy utilized to control a FMD outbreak.

**Foreign Animal Disease Diagnostician Continuing Education**

Liz Clark, USDA-APHIS-VS

In 2015, a USDA Foreign Animal Disease (FAD) working group was formed to discuss training options for continuing education for our Foreign Animal Disease Diagnosticians (FADDs). This group was tasked with developing online foreign animal disease scenarios to be used as a training tool for state and federal FADDs to keep their skills up-to-date. The online scenarios will provide additional resources for continuing education to meet the FADDs continuing education (CE) requirements.

The working group consisted of Foreign Animal Disease Diagnostic Laboratory (FADDL) staff, state and federal FADDs, National Center for Animal Health representatives, Texas A & M Center for Educational Technologies at the College of Veterinary Medicine & Biomedical Sciences staff and a representative from the Professional Development Services who managed the project. A sale barn, backyard avian and a slaughter plant scenario have been produced and rolled out during this presentation. Through a project in the Veterinary Services National Training and Exercise Plan (VS TEP), additional foreign animal disease drills for dairy, feedlot and swine drills have been developed to provide an additional resource for continuing education for FADDs. The FADD drill process will be explained through this presentation.

**Center for Animal Disease Modeling and Surveillance: ongoing activities on risk assessment, surveillance and modeling of foreign animal diseases**

Beatriz Martinez Lopez, University of California, Davis

An update of the CADMS was provided along with ongoing projects and collaborations.



### **Risk assessment platform for evaluating the introduction of African and Classical swine fever into the United States**

Beatriz Martínez-López<sup>1</sup>, Kenneth Burton<sup>2,4</sup>, Lina Mur<sup>3</sup>

<sup>1</sup>Center of Animal Disease Modeling and Surveillance (CADMS), University of California, Davis

<sup>2</sup>National Agricultural Biosecurity Center, Kansas State University

<sup>3</sup>Department of Diagnosis Medicine/Pathobiology, Kansas State University

<sup>4</sup>Biosecurity Research Institute (BRI), Kansas State University

African swine fever (ASF) and classical swine fever (CSF) are arguably, two of the most devastating diseases affecting swine. The recent epidemiological developments of ASF in Europe, with the un-stoppable spread towards western countries affecting wild boar and domestic pigs, pose a serious risk to the swine industry worldwide. Similarly, CSF is still present in several islands of the Caribbean and some South American countries, at very close distance to the U.S.

In this work we developed six quantitative risk assessment models for estimating the risk of ASF and CSF being introduced into the U.S. by different pathways: legal imports of pigs, legal imports of pork products and illegal transportation by air passenger luggage. All these pathways were integrated in a common platform for the visualization of the results that will serve to identify the areas, periods and pathways at highest risk. In summary, CSF poses a higher risk for the U.S. than ASF, being the highest risk associated with the illegal introduction of products from the Caribbean. The structure of the assessments, data bases and the methodologies used here will serve as template to develop timely, science based, risk assessments to protect U.S. agriculture.

### **Update on the APHIS Veterinary Services (VS) Emerging Animal Disease Preparedness and Response Plan**

Julianna Lenocho, USDA-APHIS-CEAH

An update on the Emerging Disease Preparedness and Response Plan was provided.

### **Committee Business:**

The Committee on Foreign and Emerging Diseases (FED) discussed and voted on the resolution: **Adequate Funding for Prevention, Diagnosis, and Response for Foreign Animal Disease Outbreaks**. The Committee voted unanimously to move the resolution forward to the Committee on Nominations and Resolutions.

## **REPORT OF THE COMMITTEE ON GOVERNMENT RELATIONS**

Chair: Kristin Haas, VT

Barbara Determan, IA; Kristin Haas, VT; Timothy Hanosh, NM; Annette Jones, CA; Susan Keller, ND; Paul McGraw, WI; R. Douglas Meckes, NC; Boyd Parr, SC; David Schmitt, IA; David Smith, NY; Scott Stuart, CO; Marty Zaluski, MT.

The Committee on Government Relations met March 7-8 in Washington, D.C. There were approximately 30 participants in the meeting including committee chairs and American Association of Veterinary Laboratory Diagnosticians (AAVLD) representatives.

The Committee began meetings at the American Veterinary Medical Association (AVMA) office. The first meeting began with AVMA, Association of American Veterinary Medical Colleges (AAVMC), National Association of Federal Veterinarians (NAFV). An update on AVMA legislative priorities was provided.

The Committee next met with representatives of USDA Agricultural Marketing Service (AMS), represented by Betsy Flores and Jennifer Porter. They provided information regarding animal welfare initiatives at AMS.

### **CDC**

Michael Craig, Megin Nichols, Liz McLeun

Companion animal import issues:

- Dr. David Smith provided overview of concerns shared by many SAHOs and communicated results of State Animal Health Official (SAHO) survey, indicating that most SAHOs are concerned about disease risk associated with international imports of dogs/cats, do not have a clear understanding of which federal agency is in charge of the imports, and report poor communication between Federals and states regarding this activity so that imports can be adequately monitored post-import.
- Centers for Disease Control and Prevention (CDC) employees tasked with import inspections also have other responsibilities that often take priority since they involve public health risks (inspection of sick humans, food products). A point was made that companion animal imports have this same potential and should be prioritized accordingly.
- CDC employees are willing to participate in national and regional USAHA meetings in order to open lines of communication and strategize on possible improvements to the process – CDC supports increased collaboration on this issue
- Question – is CDC the correct federal agency to have oversight of this issue? No definitive answer offered.
- Border port risk assessments could be a good way to collaborate between agencies and improve communication.

## GOVERNMENT RELATIONS

- Animal welfare concerns also exist within framework of current practices; these issues are not within CDC's purview.

### CDC/Agriculture collaboration:

- Collaboration between CDC and Agricultural laboratories in dealing with zoonoses could be strengthened to better protect public health and safety.
- Dr. Akey - suggested that CDC work closely with AAVLD to coordinate antibiotic susceptibility data sharing between public health and agricultural sectors.
- There is currently ongoing communication/collaboration among LRN (Lab Response Network for bioterrorism) laboratories and CDC
- CDC would like to see improved data sharing between veterinary diagnostic laboratories.
- Dr. Snelson – stated that there have been successful collaboration efforts among Ag/public health that have been facilitated by CDC funding – this model should be duplicated/serve as the gold standard.

### S. Heidelberg outbreak update:

- 35 human cases in 10 states; Dec. 2017 was last human illness
- Important to maintain consistent messaging between Agriculture and public health on issues like this one.

## DHS

### John Sanders – Food and Agricultural Defense Branch

- Commented that pet imports are primarily CDC/local public health; not USDA or U.S. Customs and Border Protection (CBP)

### Jamie Johnson – National Bio and Agro-defense Facility (NBAF) Executive Officer and Office of Research Partnerships

- Plum Island – Facility drain issues resulted in temporary closure for animal wings; followed by waste water plant issues. Waste water plant being addressed but ARS has had to stop research. Hopefully commissioned in September of 2017 after which research can resume.
- DHS committed to funding Plum until NBAF online in 2022 as demonstrated by investment in waste water treatment. Will be needed for knowledge transfer as well as research.
- Vaccine bank going to NBAF2021 and 2022
- Annual operations budget - Plum \$27m to run; NBAF \$55m to run; will need to overlap during transfer
- Security clearance challenging for new staff but working on it
- Issue – operations and research mission not aligned. Should be 60 operations - 40 research – never been there for Plum nor NBAF

## REPORT OF THE COMMITTEE

- Starting to look at what the permit process from USDA Secretary will look like for FMD on mainland.
- Working to get mission critical components accredited and operational as soon as possible.

Michelle Colby (Chem Bio Division)

- Foot-and-mouth disease (FMD) Vaccine – challenges getting this to the top on list of Department of Homeland Security (DHS) development list – belt tightening refocusing to internal component customers (i.e. CDC); external customers like USDA deprioritized.
- FMD adenovirus vectored vaccine and dx minimal funding and winding down further. Master seeds transitioned to USDA.
- Ag-Connect and disease modelling – funded through 2018 and then will need to transition elsewhere.
- Brucella abortus delisting - concerns about Brucella moving via elk and yet research stifled due to select agent listing expressed.
  - agreed to reach out to DHS staff more closely associated with Select Agent decisions
- Group requested that DHS and USDA get together and set minimum standards for laboratories that run regulatory disease tests.
  - Select Agent Executive Committee may be best to help address STDs for testing regulated diseases.
- Question from group - Appropriations – Discretionary at risk; Looking for support for agriculture as an important component of defense
  - How does animal health infrastructure raise profile in terms of national defense?
- Likely defense is the only agency that will see increases. But defense priorities put animal agriculture spending at risk even within the defense line items.
- Centers of Excellence funding seems to be supported but may need to support funding for National Animal Health Laboratory Network (NAHLN) via USDA rather than DHS.
- Hiring freeze not going away.

### **ARS**

Dr. Steven Kappes introduced himself as new in his position as Associate Administrator of Agricultural Research Service (ARS)

Budget update:

- Rumored 24% cut in budget anticipated – President Trump planning on increasing defense budget – if this happens, additional funding for that line item will come from non-defense discretionary funding, which will directly impact ARS and USDA in general
- ARS budget priorities are NBAF and poultry disease research
- ARS expects to get FY17 budget figures in next several weeks – lots of unknowns and ARS preparing for cuts

## GOVERNMENT RELATIONS

- 70% of budget is devoted to employee salaries; remaining 30% that covers operational costs is subject to being stripped
- If there is a 10% or greater budget cut, ARS will be closing some locations and will reassign displaced employees to vacant positions

### Infrastructure updates:

- The Southeast Poultry Research Laboratory will be constructed, regardless of budget issues
- NBAF is a priority – there will be BSL4 capabilities in NBAF, and they will have zoonotic agents
- Existing facility infrastructure is horrible and in serious need of updating
- ARS has a standard method of evaluating facilities as per Congressional directive – this is what they follow
- Maintenance costs for ARS facilities are on average 10%/year of the construction cost

### Research projects/priorities:

- Projects are reviewed annually
- ARS makes decisions about which projects to continue based on current priorities of USDA
- ARS tries to protect the projects that no other agency is able to pick up
- Million-dollar question – how do we collaborate to make limited research budgets go further? No clear answer but need to work on getting one, given the budget climate
  - Unfortunate situation – many veterinary colleges now receive the majority of their grant funding from NIH, which means that public health is using agriculture/veterinary facilities to accomplish their research goals – Agriculture needs to be competitive in this arena

### Misc.:

- New Administration “gag order” – as long as information is technical in nature and not inclusive of hot button issues or policy comments, ARS can continue to share/present information related to their research

### **FDA-CVM**

Dr. Steve Solomon and Dr. Bill Flynn  
No summary was provided.

### **USDA-NIFA**

Dr. Robert Smith and Dr. Adele Turzillo

- 90 Day hiring freeze, very short-handed
- Veterinary Medicine Loan Repayment Program (VMLRP)

## REPORT OF THE COMMITTEE

- Nominations come to qualified panel to review, two panels, one approves shortage areas, then one panel decides on awards.
- Some have challenges with making practitioners angry for nominating areas.
- No clear metrics for animal health officials on what should be submitted.
- Best way to learn about the program is to serve on one of the panels.
- There have been issues in some states where several qualified applicants for one shortage area, but none for other shortage areas.
- Budget is anticipating continuing resolution which means level funding.
- Food and Agriculture Defense Initiative (FADI) budget is split - half to plant pests and half to NAHLN.
- There is a tactical sciences initiative that will provide tools and strategies to be deployed to protect the food supply.
- Recent meeting of experts, 70 people from commodity groups, land grant institutions and federal staff, gained overwhelming support to increase funding to protect all agricultural enterprises.
- Small Business Innovative Research Program provides awards of \$100,000 for phase one to develop a project and then \$600,000 for phase two. These projects could be to develop cow side tests, vaccine strategies, hybrid corn to replace antibiotics...

The committee adjourned for the day.

The next morning began at the National Cattlemen's Beef Association (NCBA) office, meeting with Food Safety and Inspection Service (FSIS) Leadership.

### **FSIS:**

Carmen Rottenberg, Dr. David Goldman

FSIS Strategic Plan:

- New 5-year plan just completed – streamlined and consolidated issues to make plan more readable/useful – reduced plan from eight goals to three goals:
  - Preventing illness/protecting public health
  - Modernizing technological and scientific systems such as species-specific inspection systems
  - Achieving operational and management excellence w/ focus on recruiting and retaining veterinary staff (internal-facing goal)
- Hard copy versions exist
- Complete plan available on FSIS website

Workforce Issues:

## GOVERNMENT RELATIONS

- FSIS generally expects to operate with a 10% Public Health Veterinarian (PHV) vacancy rate
- Current average vacancy rate is 11%, but much higher in some districts
- FSIS largest federal employer of veterinarians – approx. 1,100 currently
- FSIS employment demographic reflects changing veterinary demographic – increased numbers of female veterinarians looking for employment directly after completing Doctor of Veterinary Medicine (DVM) programs without going into private practice first
- FSIS obtained exemption from current federal hiring freeze

Workforce – veterinary retention

Public Health Veterinarians (PHV) - Younger workforce becoming more common

Working on retention through

- Mentoring
- Flexible schedules
- Providing feedback to DVMs on benefits
- Increased presence at universities
- Creating a career path for DVMs with advanced degrees
- Positions are either G11 or G12 (trying to make them all 12s)
- Bonuses and school loan repayment
- Malak Scholarship – previously not gone out early enough, however last year gone out earlier (in November).
  - Up to 50 students
  - 3-year service agreement – up to 30K / year in addition to salary that includes in school work as well as commitment after graduation
  - Public Service Loan Forgiveness Program (separate program)

State inspection programs:

- 27 states inspection programs at least equal to – up to 50% reimbursement (50M currently spent on this program).
- 1,600 small and very small establishments
- Cooperative interstate shipment programs (Dr. Boyd Parr has gotten feedback that this program is a subtly intended to funnel plants into federal inspection).
  - FSIS interested in more information on concerns

Dr. Kristin Haas – new establishments coming online

- Need significant guidance regarding design of facilities from state meat inspection program. Similar assistance does not seem to be available from federal inspection system.

## REPORT OF THE COMMITTEE

- Handled on federal side by regional office.

Barb Determan – pork modernization act?

- Incoming secretary will make decision on
- Significant support to move forward on rule that is pretty much complete

Mike Gilsdorf – staffing question

- Supervisory Consumer Safety Inspector (SCSI) in charge vs. PHV staffing (in Arkansas and likely Pennsylvania)
- Bill Smith will need to get back to Mike Gilsdorf and provide info
- 1 DVM for two plants that are in close proximity while 1 SCSI in each plant for efficiency

Public meeting on undeclared allergens on March 16.

Animal Ag Coalition was the next meeting. The coalition presented a unified front on initiatives for the next Farm Bill. More than 20 organizations were represented at this meeting, the largest in recent years.

### **NAHLN**

Bev Schmitt (NVSL Director), Sarah Tomlinson, and Beth Lautner met next for the NVSL Review.

- External review last year → 77 recommendations
- Report is helpful during budget reviews
- Identified ones that can be fixed right away, ones where activity has started, and long term
- Examples:
  - Improved hiring – i.e. one certificate for multiple hires; hiring freeze now having impacts; currently ended 2016 30 people more than 2015; working on freeze exemptions for critical positions; budget unknown so challenging to make hires
  - Reviewing NVSL catalogue
  - Reviewing turn-around times
  - Proficiency panel distribution
  - Scientific writing workshop and awards
- Report may be shared once internal management discussions complete; need to consider potential international trade impacts

### **Plum Island Status Update**

No FAD training due to pipe and waste treatment plant delays – on-line hopefully in Sept and then need select agent approval – likely start training again late next Fall

Using NVSL Aims for modified FADD training (one week) – just stop gap; will need to eventually go to Plum; 25 people per course/4 per year



## GOVERNMENT RELATIONS

Question about modernizing teaching approaches – Beth – there has been a degree of review but things like progression of lesions has been considered important; Agrees more can be done

### **Laboratory Standards**

- Standards published for comment to work on regulation
- Forming technical working groups now that will develop framework for USAHA/AAVLD recommended review working group
- USDA also reviewing and consolidating standard related regulations with intent of consolidating and improving uniformity; currently associated with program diseases
- Authority related to enforcing FAD testing at non-approved laboratories. This question has come up in the past – same answer – no authority
- Solutions:
  - Amend the Animal Health Protection act – rarely amended; heavy lift
  - New regulation – challenging now
  - Use Farm Bill as vehicle for new authorities

Aside- another authority gap relates to wildlife – domestic livestock interface.

### **APHIS – Veterinary Services (VS) and FSIS**

Dr. Jack Shere and executive staff

Dr. Pat Basu, FSIS Chief Public Health Officer

ADT (FSIS was also present and engaged in this part of the discussion):

- FSIS currently has 2 MOUs that it operates under that are pertinent to ADT-related issues
- FSIS Directives that are pertinent to ADT are:
  - 6100.2
  - 6100.6
  - 62.40
- FSIS acknowledged that the inconsistency with which ID is being collected at slaughter is not ideal and will prioritize this issue for PHV training
- Goal is to have a nationwide bookend ADT system, but in current framework, consistent retiring of official ID at slaughter probably will not be successful since US is heavily dependent on NUES ID
  - NUES tags are cumbersome and difficult to read w/in a time frame that does not interfere with plant operations
  - Manual recording of NUES tags is inaccurate – stats demonstrate that one of every six numbers is recorded inaccurately
- Trade drives much of the domestic ADT-related priorities; current expectation of most trading partner countries is that USDA can determine premises where animal was ID'd and where/when

## REPORT OF THE COMMITTEE

slaughtered. In the future, trading partners may demand that each movement of the animals can be traced, not just bookend; Dr. Shere made point that “everybody exports”. Even those who do not directly engage are impacted by those who do through the international policies that are developed that also have domestic impact.

- APHIS-VS ADT working group led by Dr. Novotny is making progress; ADT listening sessions slated for Spring 2017 will also inform next steps; will be true listening sessions – blank slate with no dictating by USDA; VS will be putting together agendas for sessions that can be shared with stakeholder groups in advance of the meetings.

### Wildlife Issues:

- VS would like to obtain clearer authority for disease issues for which the livestock/wildlife interface plays a role:
  - Avian Influenza (AI) – VS is concerned about low path AI, especially if it is H5 or H7; other LPAI outbreaks are not as much of a concern (LPAI in WI)/do not automatically require depopulation; other factor that determines depopulation is how close birds are to market
  - B. suis – Surveillance, Preparedness and Response (SPRS) has prioritized communication with non-traditional stakeholders on this issue (transitional swine); they have put together a 15 person group to continue discussions since the 2016 New York outbreak; this outbreak has highlighted recent concerns about slaughter of these animals – are slaughter facilities utilizing personal protective equipment (PPE); are they respiratory fit tested; what is the liability for facility owners when dealing with higher risk animals; what role do Occupational Safety and Health Administration (OSHA) and public health play in these scenarios?

### Budget:

- VS is being asked to submit various budget cut scenarios for current budget year – 2%, 5%, 7% - especially bothersome since almost half way through current budget year
- These budget cut scenarios impact salaries and benefits of VS employees and cooperative agreements
- VS discretionary budget is less than 5% of its total; not much to play with in order to make adjustments
- Term employees – some were converted to permanent positions, and some were extended as terms for one or more years; difficult to let terms go because this sends message to Congress that VS has adequate resources even though it doesn't
- Saul T. Wilson program will likely be cut significantly

## GOVERNMENT RELATIONS

- Even when/if Administration removes federal hiring freeze, VS can't hire because no budget funding for salaries

### Trade issues:

- Trading partners are somewhat fickle, but U.S. has good working relationship with Canada and Mexico
- Regarding AI, U.S. could potentially regionalize according to vaccination status

### TB/Brucellosis rule:

- Rule currently on hold – no rules moving forward since new Administration in place
- VS is aware of the fact that some states are opposed to the rule and want to revert back to state status model
- VS receiving numerous questions about TB/Brucellosis rule; possibly losing ground regarding public opinion about the rule
- Indemnity will be a challenge under Trump Administration
  - New Administration is of the mindset that “everyone pays their own way”
  - Will be more difficult in the future to indemnify farmers for lost livestock/poultry
  - There is a cross-commodity group that is evaluating indemnity issues within VS and Plant Protection and Quarantine (PPQ)

### Scrapie tags:

- Beginning in 2018, VS will provide metal scrapie tags rather than plastic ones and will d/c provision of applicators for both types of tags; producers can continue to use plastic tags, but they will pay for them. Initially, VS promised to pay for plastic tags for two years
  - In year one, \$1 million of Animal Disease Traceability (ADT) funding was used to pay for plastic scrapie tags
  - Currently in year two of the commitment, and VS has decided this will be last year of paying for plastic scrapie tags in order to avoid using general ADT funding to support only the sheep industry
- VS has asked scrapie program to find \$300,000 to fund metal scrapie eartags
- In the future, VS intends to provide the same level of support for small ruminant ID as it does for other species

### Horse rescue issues:

- Issues exist related to rescue organizations or individuals “rescuing” horses from slaughter pens/terminal markets, and is there a way to put protections in place to reduce associated disease risk?
- VS authority in these instances is limited to ADT-related violations

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- SAHOs and stakeholders would welcome a VS educational campaign on this issue
- The Government Accountability Office (GAO) recently completed a VS audit regarding issues associated with equine program management and slaughter; VS will be obligated to share those results when finalized.

### Companion animal international imports:

- Dr. Smith requested that communication between federal agencies regarding this issue be improved in order to ensure imported dogs/cats do not pose unnecessary disease risk.
- VS should probably be training Customs and Border Protection (CBP) but not under their purview to do so.
- Dr. Shere requested that SAHOs and other stakeholders inform Animal Care when issues arise with shipments because if dogs/cats coming into U.S. for resale, adoption, etc., then an import permit is required
  - Import permit requirement was established in 2014
  - Animal Care (AC) is preparing outreach to CDC and CBP regarding this requirement and associated issues
- One Health office calls among APHIS and CDC occur monthly; Brian McCluskey will bring this issue to their attention for discussion on those calls
  - Dr. Shere will bring the issue up with AC

## COMMITTEE ON INTERSTATE AND INTERNATIONAL COMMERCE

Chair: Linda Glaser, MN

Vice Chair: Charles Broaddus, VA

Bobby Acord, NC; Sara Ahola, CO; Gary Anderson, KS; Joseph Anelli, MD; Celia Maria Antognoli, CO; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Bill Barton, ID; Mohit Baxi, ON; Karen Beck, NC; Justin Bergeron, ME; Bob Bokma, MD; Joyce Bowling-Heyward, MD; Richard Breitmeyer, CA; Paul Brennan, IN; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Charles Brown, WI; Nancy Brown, KS; William Brown, KS; Bruce Carter, IA; Michael Carter, MD; Rod Chitty, IA; John Clifford, DC; Robert Cobb, GA; Michael Coe, KS; Francisco Collazo, FL; Karen Conyngham, TX; Michael Costin, IL; Stephen Crawford, NH; Michael David, MD; Ron DeHaven, CA; Ignacio dela Cruz, MP; Jacques deMoss, MO; Barbara Determan, IA; Adis Dijab, MD; Bud Dinges, TX; Brandon Doss, AR; Anita Edmondson, CA; Larry Elsken, IA; James England, ID; Conrad Estrada, VA; Donald Evans, KS; Anna Claire Fagre, CO; William Fales, MO; Kathy Finnerty, NY; John Fischer, GA; Katie Flynn, CA; Tony Forshey, OH; Robert Fourdraine, WI; Kent Fowler, CA; Kendra Frasier, KS; Tony Frazier, AL; Julie Gard, AL; Tam Garland, TX; Donna Gatewood, IA; Cyril Gay, MD; Sunny Geiser-Novotny, CO; Robert Gerlach, AK; Paul Gibbs, FL; Linda Glaser, MN; Gail Golab, IL; Chelsea Good, MO; Tony Good, OH; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Keith Haffer, SD; Rod Hall, OK; Steven Halstead, MI; Neil Hammerschmidt, MD; Nephi Harvey, UT; Charles Hatcher, TN; Percy Hawkes, UT; Greg Hawkins, TX; Bill Hawks, DC; Burke Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Kristi Henderson, IL; Linda Hickam, MO; Bob Hillman, ID; Robert Hilsenroth, FL; Siddra Hines, WA; Donald Hoenig, ME; Dudley Hoskins, VA; Joseph Huff, CO; Dennis Hughes, NE; John Huntley, AZ; Russell Iselt, TX; Annette Jones, CA; Jamie Jonker, VA; Anne Justice-Allen, AZ; Susan Keller, ND; Bradley Keough, KY; Naree Ketusing, VA; Bruce King, UT; Diane Kitchen, FL; Eileen Kuhlmann, MN; Todd Landt, IA; T.R. Lansford, TX; Elizabeth Lautner, IA; James Leafstedt, SD; Brad LeaMaster, OR; Randall Levings, IA; Mary Lis, CT; Jim Logan, WY; Linda Logan, TX; Gene Lollis, FL; Travis Lowe, MN; Mark Luedtke, MN; Margie Lyness, GA; Kevin Maher, IA; Bret Marsh, IN; Stu Marsh, AZ; David Marshall, NC; Michael Martin, SC; Beatriz Martinez Lopez, CA; Beatriz Martinez Lopez, CA; Rose Massengill, MO; Jay Mattison, WI; Gretchen May, WI; Brittany McCauslin, NZ; Paul McGraw, WI; Thomas McKenna, MA; Shirley McKenzie, NC; Sara McReynolds, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Antone Mickelson, WA; Gay Miller, IL; Mendel Miller, SD; Eric Mohlman, NE; Peter Mundschen, AZ; Louis Neuder, MI; Sandra Norman, IN; Kristen Obbink, IA; Dustin Oedekoven, SD; Kenneth Olson, IL; Greg Onstott, MO; Elizabeth Parker, TX; William (Steve) Parker, GA; Boyd Parr, SC; William Pittenger, MO; Barry Pittman, UT; Barbara Porter-Spalding, NC; John Ragan, VA; Valerie Ragan, VA; Jeanne Rankin, MT; Tim Richards, HI; Justin Roach, OK; Paul Rodgers, WV; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; Larry Samples, PA; Bill Sauble, NM; Travis Schaal, IA; Shawn Schafer, OH; David Schmitt, IA; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale,

## REPORT OF THE COMMITTEE

TX; Laurie Seale, WI; John Shaw, DC; Richard Sibbel, IA; Rosemary Sifford, NC; Kathryn Simmons, DC; Allison Siu, AL; David Smith, NY; Julie Smith, VT; Justin Smith, KS; Fred Soltero, PR; Diane Stacy, LA; Robert Stout, KY; Nick Striegel, CO; Scott Stuart, CO; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Patrick Tarlton, TX; Jane Teichner, FL; Beth Thompson, MN; Peter Timoney, KY; Tracy Tomascik, TX; Alberto Torres, AR; Alex Turner, CO; Jeff Turner, TX; Paul Ugstad, NC; Charles Vail, CO; Michele Walsh, ME; Mark Walter, PA; John Walther, LA; James Watson, MS; Jessica Watson, DC; Patrick Webb, IA; Jennifer Wessel, CA; Richard Willer, HI; Brad Williams, TX; Mary Anne Williams, TX; Cliff Williamson, DC; Kyle Wilson, TN; William Wilson, KS; Ross Wilson, TX; Josh Winegarner, TX; Nora Wineland, MO; Thach Winslow, WY; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN; Mark Wood, GA; Marty Zaluski, MT; Glen Zebarth, MN; Ernest Zirkle, NJ.

The Committee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00 to 9:35 a.m. There were 24 members and nine guests present. The Committee agenda was limited to an explanation of the new Committee structure, a summary of the Subcommittee reports, and a reading and discussion of the resolutions approved in the Subcommittee on Livestock Identification. The two resolutions included the 'Microchip Identification of Imported Horses' and 'The Identification and Documentation of Cattle in Commerce'.

### **Committee Business:**

The business meeting began with the approval of the Subcommittee reports by consent. The vote to approve the Subcommittee reports were unanimous. Then the two resolutions were identified for approval by consent. A hold on the resolution on cattle identification was made by a member so the 'Microchip Identification of Imported Horses' was approved by consent. A discussion of the cattle identification resolution involved amending the resolution. The amendment to the resolution was accepted after a motion to approve by Scott Stuart with a second by Chelsea Good. The amended resolution was passed by the members with a motion to approve by Charles Brown and seconded by Larry Samples.

The chair presented a draft of the functions of the Committee and a draft Mission Statement for the Committee members to consider. These drafts will be refined by the Committee and Subcommittee leaders after the meeting and circulated to members again. The functions identified were:

- 1) Identify issues and then solutions with movement of animals or animal products across political boundaries (interstate or international).
- 2) Identify and present examples of solutions to problems of interstate or international commerce.
- 3) Provide education to members on topics that impact commerce across political borders (boundaries).

## INTERSTATE AND INTERNATIONAL COMMERCE

- 4) Work with other USAHA Committees to integrate information on animal disease affecting movement of animals or animal products across political boundaries.

### Draft Mission Statement

*The purpose of the Committee on Interstate and International Commerce is to identify critical issues associated with animal and animal product movement across political boundaries and through its members representing state, private sector, federal, academic, and international animal agriculture identify and present (communicate?) potential solutions.*

*To achieve this objective, the Committee will promote and foster an open exchange of ideas with multi-sector representation to address issues. The Committee will work with other USAHA Committees to communicate issues of animal health/disease that impact movement across political boundaries, promote improvements in livestock identification to enhance disease traceability and integrate knowledge and expertise from other Committees.*

The chair called for any questions or suggestion for topics for the committee to address and did get some discussion of issues for consideration at future meetings. The meeting was adjourned at 9:35 a.m. with a vote after a motion to adjourn by Charles Brown and a second by Susan Keller.

## REPORT OF THE COMMITTEE

### REPORT OF THE SUBCOMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE

Chair: Mo Salman, CO

The Subcommittee met on Sunday, October 15, 2017 from 12:30-5:30 p.m. There were 33 members and 19 non-committee members. Linda Glaser as the Chair of the parent Committee on Interstate and International Commerce was present during the entire meeting. The meeting was conducted without a designated vice-chair. Dr. Glaser presented the proposed new committee structure in which the Committee on Global Animal Health and Trade (GAHT) is a subcommittee under the Committee on Interstate and International Commerce. All members of the original subcommittee are by default members of the parent committee. She encouraged the members to share their either written or oral opinions of the new structure since this year is a trial to determine the best effective way to conduct business of the organization. Dr. Salman projected last year's approved mission statement of this subcommittee for review by the present members. It was noticed the mission statement indicated incorrectly that this subcommittee is a joint committee of AAVLD and USAHA. Thus, the mission statement should be corrected as below:

*"The purpose of this committee is to contribute to ~~both~~ the USAHA and AAVLD in international trade and its link to the health aspects of livestock and their production by: educating and creating an awareness among the membership of these organizations on key global, animal health and trade issues; proactively identifying critical issues in the international arena; enhancing the organization's understanding, response, and decision-making ability in these areas; and, enabling ~~both~~ the organizations to more effectively use this information to improve ~~their~~ its strategies, operation and, ultimately, improve global animal health and security. The ultimate goal from these activities is to foster dialogue and cooperation with and between members of the private sector of the livestock industries, U.S., and state government regulatory officials, and the scientific community, on the problems and opportunities in the global trade of livestock and their products."*

No further modifications were identified or discussed. Presentations and reports are summarized below; some of the presentations as per agreement with the speakers are included as attachments.

#### **Summary of 2016 OIE General Session:**

Michael David, USDA-APHIS-VS

Dr. David presented a short background and the role of the World Organization for Animal Health (OIE) in global animal health and the engagement of USDA-APHIS-VS in the various functions of OIE. The OIE is the international body recognized by the World Trade Organization (WTO) for developing animal health standards. The OIE develops and establishes the



## INTERSTATE AND INTERNATIONAL COMMERCE

health standards for the safe trade of animals and animal products and makes recommendations for the overall well-being of animals. He also presented the outcome from the 85th General Session of the OIE which was held May 21-26, 2017 in Paris, France. Below is a summary of the meeting's outcome:

Delegations from 134 of the 180 OIE Member countries and territories, as well as observers from 50 regional and international organizations attended the meeting. There were over 600 registered attendees. The President of the OIE World Assembly, Bothe Michael Modisane, welcomed the OIE delegates, invited ministers, representatives from international organizations and other guests to the 85<sup>th</sup> General Session. Dr. Modisane noted the continued work of the OIE helping guide countries on reducing biological threats, eradicating diseases of significant economic impact, and managing antimicrobial resistance (AMR). Two international organizations and Ministers of Agriculture and other high-level officials from seven Member countries (Pakistan, United Arab Emirates, Kenya, Mauritania, Mozambique, Panama and Brazil) were invited to attend the opening ceremonies and share some remarks. Two short pre-recorded video speeches were given – one presented by Dr. Margaret Chan, outgoing Director General of the World Health Organization (WHO), and one by Dr. Dame Sally Davis Chief Medical Officer of the United Kingdom. While both mentioned the challenges of AMR, Dr. Chan also stressed the importance of furthering the Tripartite Group (WHO, OIE and FAO) collaboration on activities related to One-Health.

### **The Delegation from the United States**

Members of the U.S. delegation attending the 85<sup>th</sup> General Session from USDA-APHIS were:

- Dr. Jack Shere, Chief Veterinary Officer, and Deputy Administrator, U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)
- Dr. John Clifford, Chief Trade Advisor, and U.S. OIE Delegate, USDA-APHIS-VS
- Dr. Michael David, National Director, National Import Export Services (NIES), International Animal Health Standards Services, USDA-APHIS-VS
- Dr. Beverly Schmitt, Director, National Veterinary Services Laboratories, USDA-APHIS-VS, and President of the OIE Biological Standards Commission
- Dr. Mark Davidson, Associate Deputy Administrator, NIES-USDA-APHIS-VS
- Dr. Donna Lalli, Science Advisor, USDA-APHIS
- Dr. Karen Sliter, Regional Manager, APHIS, International Services (IS), Brussels, Belgium

Representatives attending from other U.S. government agencies were:

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- Dr. Bettye Walters, Office of the Director, International Programs, Center for Veterinary Medicine, U.S. Food and Drug Administration (FDA)
- Dr. Craig Morris, Deputy Administrator, Agriculture Marketing Services (AMS)
- Dr. Jean Richards, Defense Threat Reduction Agency (DTRA), Department of Defense (DoD)
- Dr. Jaya Kannan, DTRA, DoD

Association and industry representatives who accompanied the U.S. delegation were:

- Dr. Steve Hooser, President-elect, American Association of Veterinary Laboratory Diagnosticians (AAVLD)
- Mrs. Barbara Determan, President-elect, U.S. Animal Health Association (USAHA)
- Dr. Paul Sundberg, Executive Director, Swine Health Information
- Dr. Elizabeth Parker, Chief Veterinarian, Institute for Infectious Animal Diseases (IIAD)
- Dr. Kathy Simmons, Chief Veterinarian, National Cattlemen's and Beef Association (NCBA)
- Dr. Liz Wagstrom, Chief Veterinarian, National Pork Producer's Council (NPPC)
- Dr. Gail Golab, Chief Advocacy and Public Policy Officer, American Veterinary Medical Association (AVMA)
- Dr. Jamie Jonker, Vice-President, Scientific and Regulatory Affairs, National Milk Producers Federation (NMPF)
- Ms. Emily Meredith, Chief of Staff, (NMPF)
- Mr. Jim Sumner, President, USA Poultry and Egg Export Council (USAPEEC)

### **Activities of the OIE During the Previous Calendar Year (2016):**

Dr. Monique Eloit, Director General (DG) of the OIE, highlighted both the administrative and technical activities of the organization during the 2016 calendar year. The OIE's organizational structure was modified to make it consistent with the strategic mission of the organization. Further, the OIE's 2016-2020 Strategic Plan served as the basis for further defining the activities of each unit within the OIE. Several processes and procedures have been updated for approval by the Assembly of Delegates including selecting candidates for election to the Specialist Commissions and evaluating Member Country dossiers for status recognition for certain diseases. Communication procedures, including the World Animal Health Information System (WAHIS), are also being updated, new web portals are being established, and relationships, especially with the Tripartite Alliance (OIE-WHO-FAO), have been re-affirmed by strengthening the capacity of

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Public Health and Animal Health Services, including the sharing of health and antimicrobial resistance information.

After over 12 years of providing support to the office of the Director General and to the Terrestrial Animal Health Standards Commission, the OIE is disbanding the Animal Welfare and the Food Production and Safety Working Groups. Future issues in these specialty areas will be addressed by convening specific ad hoc Groups of experts. Only the working groups (WG) on Diseases of Wildlife will be maintained to support the needs of the organization.

Two technical items were presented at this year's General Session. The first Technical Item presented was:

1. Global Action to Alleviate the Threat of Antimicrobial Resistance: Progress and Opportunities for Future Activities Under the 'One-Health' Initiative

*(Presented by Ms. Khadila Id Sidi Yahia)*

This presentation was based on the expertise and knowledge of the presenter, and on compiled responses to an OIE questionnaire/survey sent out to all the Member country delegates. The results of the survey indicated high interest by Member countries on the topic of Global Action to alleviate the threat of antimicrobial resistance (AMR). The survey results indicated significant variations between regions related to addressing AMR. The presenter suggested several recommendations including continuing to support inter-sectoral cooperation, continuing to support education and awareness efforts, encouraging the implementation of existing OIE standards on AMR, and using data to adjust policies for managing the use of antimicrobials.

The second Technical Item that was presented was:

2. Public-private partnerships: expectations of private sector partners for international animal health and livestock development programs

*(Presented by Dr. Samuel Thevasagayam)*

The presenter, a representative from the Gates Foundation, noted the critical importance of forging partnerships to better address the complexities of agricultural, environmental, and human health. The increased demand for animal protein, the expected doubling of the human population during the next several decades, the emergence of new diseases affecting human and animal health, and environmental pressures, are all exerting demands on the veterinary profession. As Dr. Thevasagayam has noted, OIE delegates need to "initiate effective Public-Private Partnerships (PPP) to meet the demands on the veterinary profession, thereby contributing to a better society for today and tomorrow". PPPs can be important contributors to the implementation of global programs in which Veterinary Services (VS) have a leading role, such as those addressing the prevention and control of animal diseases.

### **World Animal Health Situation:**

The OIE Animal Health Information Department reported on the most significant animal health events occurring during 2016. The Web-based system for disease notification — World Animal Health Information System (WAHIS) — provides the mechanism for reporting animal disease events. The Head of the Information Department noted some trends on the following terrestrial animal diseases:

- Avian Influenza (AI) – presented the distribution of avian influenza in poultry over the past decade, and used spacial analysis to look at spread models, particularly for certain serotypes such as H5N8, for predictive purposes.
- Rabies – showed the reported distribution of infection in 2016, with 57% of the countries reporting the disease in animals. 95% of human rabies cases are associated with dog bites. Dog rabies vaccination campaigns are critical in reducing human cases.
- Peste des petits ruminants (PPR) – this is a priority disease under the Global Framework for the Eradication of Transboundary Animal Diseases (GF-TAD). The disease does not occur in the Americas or in Oceania. The role of wildlife in the epidemiology of the disease needs to be further studied. The recent spread of PPR is not associated with the legal trade of animals, but more likely due to the illegal (unregulated) movement of animals.
- Foot-and-mouth disease (FMD) – showed the distribution of the various reported serotypes (A, O, Asia 1, SAT1, SAT2, and SAT3) across the globe in 2016. Occurrence rates since 2005 through 2016 show 0% in Oceania, 1% in Europe, 5% in the Americas, 57% in Africa, and 58% in Asia. (Note: the occurrence of serotype C has significantly decreased in the last 35 years and has not been reported to occur by any laboratory during the past ten years).
- Lumpy skin disease (LSD) – a large number of the notifications in 2016 were made by European countries. The virus is moving north – suggesting that environmental and climactic factors may be associated with its spread.

### **Specialist Commission Reports:**

- A. **Scientific Commission for Animal Diseases (SCAD)** – The SCAD addresses technical issues and makes science-based recommendations to the Terrestrial Animal Health Standards Commission for improving and updating the various Code Chapters. The President summarized the activities of the Commission during the previous year. These included:
  - a. Overseeing and directing the work of 17 different expert ad hoc groups;
  - b. Prioritizing the diseases for which vaccination could reduce the use of antibiotics in animals;
  - c. Amending, clarifying and/or developing draft chapters on:

## INTERSTATE AND INTERNATIONAL COMMERCE

- Infection with lumpy skin disease
  - Infection with foot-and-mouth disease
  - Infection with equine trypanosomiasis
  - Infection with Theileria
  - Vaccination
  - Infection with classical swine fever (CSF)
  - Middle East Corona virus
  - Chronic wasting disease (CWD) – considered the request by some Member countries to add CWD to the list of notifiable diseases. However, because there continues to be very little information on the epidemiology of the disease, and a lack of a reliable diagnostic test for live animals, the Commission did not recommend the disease for listing.
- d. Conducting missions (site visits) to Venezuela to assist that country with their program to control and eradicate FMD.

### B. Terrestrial Animal Health Standards Commission (**Code**

**Commission**) – The President of the *Code* Commission reviewed the procedures and processes for updating chapters, collaborating with the other specialist commissions, and the future work plan of activities.

Following his summary, several countries made interventions including:

- a. **Chile:** as the delegate from Chile did last year, he asked the OIE to develop and encourage OIE Members to use electronic certification for the export and import of animals and animal products.
- b. **Brazil (on behalf of the 29 countries of the Americas):** the delegate of Brazil recognized that the OIE is working on updating the Code Chapter on Glanders and that, due to pending work on the diagnostic tools for this disease, the chapter was postponed for future adoption, but nevertheless, encouraged the OIE to give this chapter high priority.
- c. **The Netherlands (on behalf of the 28 European countries of the European Union):** asked the Code Commission to better align its work with that of the Scientific Commission. The amount of work that is being produced by both Commissions is getting to be unmanageable; therefore, better coordination between the two commissions would alleviate some of this volume. The E.U. also requested that the Code Commission give priority to reviewing and updating the chapters on Bovine spongiform encephalopathy (BSE) (to address surveillance needs and atypical forms), on Avian Influenza (to update the definition of poultry, clarify zoning requirements, and to be more specific about trade restrictions when reporting highly pathogenic strains compared to reporting strains of low pathogenicity), and on Scrapie (to align country

## REPORT OF THE COMMITTEE

status with risk instead of freedom, and to take into account the genetic resistance of certain sheep).

The President of Commission presented various *Code* chapters for adoption. *Code* chapters are sent to Member delegates on at least two separate occasions during the course of the year for review and comment. This year, 16 Terrestrial Animal *Code* chapters were amended and/or rewritten and presented to the World Assembly of Delegates for adoption. Most of the chapters were adopted with little discussion. However, there were a few *Code* chapters which stimulated some discussion before being adopted – the points of contention are included for those chapters where such discussion ensued.

- a. **Glossary** – several definitions, including the definitions for infection, infestation, and animal health were updated and adopted.
- b. **Chapter on criteria applied by the OIE on assessing the safety of commodities** – the United States, (on behalf of the 29 countries of the Americas), while supporting the chapter, asked the Code Commission to add language to the general provisions section to make it consistent with Article 2.X.2 of the chapter. In addition, the United States asked the Code Commission to delete the reference to Good Manufacturing Practices (GMP) because such reference addresses the quality of the product and not the actual safety of that product. The President of the Code Commission explained that the reason for including the GMP recommendations was to further assure countries that good treatment processes should be followed. However, the President did acknowledge that GMPs referred to quality and not safety of a product, and so the Code Commission would consider the Americas comments during their next meeting in September 2017.
- c. **Chapter on the prevention and control of *Salmonella* in bovines.**
- d. **Chapter on the prevention and control of *Salmonella* in pig** – while the United States supported the adoption of this and the previous new chapter on *Salmonella* control in bovines, Costa Rica made an intervention noting that for some groups of pigs (specifically those raised in backyard settings or for home use), several of the recommendations in the chapter would be difficult if not impossible to implement. Therefore, Costa Rica, on behalf of the 29 countries of the Americas, requested that the OIE modify the definition of “domestic production” pigs to specifically exclude those raised in backyard or family type settings. The chapter was approved as presented, but the Code Commission agreed to consider the definition proposed by the Americas when it meets in September 2017.

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- e. **Animal welfare and dairy cattle production systems** – this chapter was adopted in 2015. During the 83<sup>rd</sup> and 84<sup>th</sup> General Sessions, the United States intervened to remind the OIE that, when developing recommendations for any welfare chapters, such recommendations should be “outcome based” rather than prescriptive. During those previous iterations of the chapter, the text related to space requirements continued to be too prescriptive. The Code Commission reviewed the “space” language and provided some alternative text which allowed for some flexibility to the requirement on space and resting needs.
- f. **Welfare of working equids** – this chapter was adopted in 2016. During that General Session, the United States intervened to note that the requirement for resting was too prescriptive and should be removed to allow for outcome based results. This very prescriptive text continues to appear in the chapter, and so, Uruguay, on behalf of the 29 countries of the Americas, intervened to request that the existing prescriptive language be removed and replaced with outcome based text. Suggested outcome-based text was provided to the OIE. The Code Commission President, however, acknowledged that while that specific language on resting was prescriptive, he noted that in certain cases where the research supports certain prescriptiveness, as in the case of ensuring that animals receive a certain amount of rest, then, such prescriptive language will be included in the chapter. The Chapter modifications were adopted as presented.
- g. **Infection with *Mycobacterium tuberculosis* complex.**
- h. **Infection with avian influenza viruses** – the updated heat treatment parameters for inactivating the virus in certain egg products were accepted and adopted.
- i. **Infection with lumpy skin disease** – Australia intervened to ask the OIE to continue to seek further research on the safety of trading certain commodities, because the evidence on the safety remains equivocal.
- j. **Infection with African swine fever virus** – the United States, on behalf of the 29 countries of the Americas, intervened to note the continued concern with this chapter (as well as with the porcine reproductive and respiratory syndrome virus (PRRS) and classical swine fever (CSF) chapters) over combining wild captive swine with domestic swine as a single epidemiological unit, and considering these two populations as having the same risk for swine diseases. The United States, on behalf of the Americas, then suggested the OIE modify its definition of commercial pigs, as suggested by Costa Rica, when it intervened on the chapter on the control of *Salmonella* in pigs. Captive wild pigs and domestic production pigs cannot be considered as equivalent

## REPORT OF THE COMMITTEE

epidemiologically because domestic production pigs do not share the same risk of pathogen exposure as captive wild pigs. Although the chapter was adopted as presented, the Code Commission agreed to review the proposed definition to better define these two populations of pigs. China and Korea also intervened because they expressed concern about the sentence which read "Commodities of domestic or captive wild pigs can be traded safely in accordance with the relevant articles of the chapter, even if exporting countries inform the OIE of the presence of infection with PRRS virus in wild or feral pigs." The Chinese and Koreans argued that this statement was too permissive and posed importing countries unnecessary risk of disease exposure. The President of the Code Commission explained that this was standard language which appears in all of the newer chapters and will appear as existing chapters are revised. He tried to explain that the statement in-and-of itself was not the actual recommendation for trade, but that the actual Articles in the chapter specify the import health conditions. The chapter was adopted, but China and Korea voted against adopting it.

- k. **Chapter on infection with porcine reproductive and respiratory syndrome virus:** the OIE General Assembly of Delegates voted to adopt the new Chapter on PRRS, but not after some debate. Four countries intervened to say they would not support the chapter because they did not believe the chapter addressed the risk of PRRS in meat. The President of the Code Commission noted that all the science and sound risk assessments conducted to date supported meat as a commodity that only needed to have pre-and postmortem inspection as conditions for trade. He further stated that the chapter was five years in the making, has been circulated multiple times to the Member countries, and so would hold back the chapter because of the concern of only a few countries. He also noted that the opposing countries, under the Secure Poultry Supply (SPS) Agreement, had the right to place additional measures on meat as long as they were supported by a proper risk assessment. As expected, Australia, Argentina, South Africa voted against adopting the chapter. The other country opposing its adoption was New Caledonia. Another country (Switzerland), a country that is free from PRRS, also supported adopting the chapter, but wanted the OIE to review the recommendations for importing pig semen. The Swiss delegate pointed to the fact that PRRS is transmitted by semen and given the intermittent shedding of the virus through semen, the testing recommendations of boars, needed to be strengthened. The President of the Code Commission agreed to review the additional material provided by



## INTERSTATE AND INTERNATIONAL COMMERCE

Switzerland during the September 2017 meeting. All other countries supported the adoption. The Chapter was adopted as presented.

- C. **Biological Standards (Laboratory) Commission** – The President of the Laboratory Commission reported on the Commission's activities for 2016. The Commission has concentrated on monitoring the activities of current OIE Reference Laboratories worldwide, reviewing applications for additional disease-specific reference laboratories and topic specific collaborating centers, coordinating and approving specific twinning projects, reviewing and updating various chapters in the *Manual of Diagnostic Tests and Vaccines* (21 *Manual* chapters were updated this year), and providing technical expertise and guidance to the Terrestrial Animal Health Standards Commission. The Commission has strengthened the processes for ensuring the maintenance of the quality of its Reference Laboratory management systems (progressing towards ISO 17025 or equivalent accreditation), updated the application requirements to request to become a Reference Laboratory, and developed clear performance criteria to assess existing Reference Laboratories.

**Regional Commission Meeting for the Americas:** Curacao received endorsement by the Region for the Americas as a future OIE Member. Full approval was made by vote during the closed session of the World Assembly of Delegates. The OIE, now has 181 Member Countries and Territories. The Caribbean Community (CARICOM), the Permanent Veterinary Committee of the Southern Cone (CVP), and the International Regional Organization for Plant Protection and Animal Health (OIRSA), provided brief summaries of their recent activities. In addition, the Pan American Health Organization summarized the current status of foot-and-mouth disease in the region. Suriname will be submitting documentation to the OIE for recognition as a country free of FMD without vaccination in 2018. The next bi-annual Regional Commission Conference for the Americas will be hosted by the Dominican Republic in 2018.

**Technical Items for the 86<sup>th</sup> General Session (May 2018):**

*Implementation of OIE Standards by OIE Member Countries – state of play and specific capacity-building needs.*

**Technical Items for the 87<sup>th</sup> General Session (May 2019):** *How external factors (e.g. climate change, conflicts, socio-economics, trading patterns) will impact Veterinary Services (VS), and the adaptations required.*

**Dates for the 86<sup>th</sup> General Session of the OIE World Assembly:**

Sunday, May 20 to Friday, May 25, 2018.

### **Transboundary Risk of Disease Spread by Feed Ingredients- A Proposed Model**

Scott Dee, Pipestone Applied Research (PAR)

Dr. Dee presented a progress report and update of the model that was presented last year. The model is used for assessing the risk of transboundary diseases through feed ingredients. This study evaluated survival of important viral pathogens of swine or their surrogates in contaminated feed ingredients during simulated transboundary transportation. Based on global significance, 11 viruses were selected, including foot and mouth disease virus (FMDV), classical swine fever virus (CSFV), African swine fever virus (ASFV), Influenza A virus of swine (IAV-S), pseudorabies virus (PRV), nipah virus (NiV), porcine reproductive and respiratory syndrome virus (PRRSV), swine vesicular disease virus (SVDV), vesicular stomatitis virus (VSV), porcine circovirus type 2 (PCV2) and vesicular exanthema of swine virus (VESV). To model the survival of FMDV, CSFV, PRV, NiV, SVDV and VESV, surrogate viruses with similar physical properties and stability were used, and those consisted of senecavirus A (SVA) for FMDV, bovine viral diarrhea virus (BVDV) for CSFV, bovine herpesvirus type 1 (BHV-1) for PRV, canine distemper virus (CDV) for NiV, porcine sapelovirus (PSV) for SVDV and feline calicivirus (FCV) for vesicular exanthema of swine virus (VESV). Remaining assessments involved the actual pathogen. Controls included complete feed (positive and negative controls) and stock virus positive controls (virus only, no feed matrix). Virus survival was evaluated using either a Trans-Pacific or Trans-Atlantic transboundary model, involving representative feed ingredients, transport times and environmental conditions, with samples tested by PCR, virus isolation (VI) and/or swine bioassay. Select viruses (SVA, FCV, Bovine herpesvirus 1 (BHV-1), PRRSV, PSV and PCV) maintained infectivity during transport, while others (BVDV, VSV, CDV and Influenza A virus in swine (IAV-S) did not. Survival was maximized in conventional soybean meal, lysine hydrochloride, and vitamin D. The ASFV survival phase is currently underway and results will be presented at the conference. These results demonstrate survival of certain viruses in specific feed ingredients (“high-risk combinations”) under conditions simulating transport between countries. This work supports previously published data on the survival of porcine epidemic diarrhea virus in feed and provides further evidence indicating that contaminated feed ingredients may serve as risk factors for foreign animal and endemic diseases.

### **APHIS - Evaluation of Regionalization Services and its Impact on Import and Export of Animals and Animal Products**

Joyce Bowling-Heyward, USDA-APHIS-VS

Dr. Bowling-Heyward presented the process in assessing the regionalization and its impact on imports and exports of animals and animal products. She stated that in accordance with the World Organisation for Animal Health (OIE) on this slide, APHIS has defined a REGION in the

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regulations as any defined geographic land region identifiable by geological, political or surveyed boundaries. A region may consist of any of the following: 1) The entire country; 2) Part of a country such as a State or Province (zone, county, department, municipality, parish, Province, State, etc.); 3) Parts of several countries combined into single area; or 4) A group of countries combined into a single area. Regionalization process is defined in title 9, Code of Federal Regulations, part 92. The concept of regionalization recognizes that certain regions can be free of a disease, even if other parts are affected and, under the right conditions, trade can safely continue from the free regions.

APHIS follows a science- and risk-based approach that is consistent with obligations under the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary (SPS Agreement) and the international guidelines provided by OIE. The regionalization process is conducted in accordance with U.S. legislative laws and regulations. The legal framework for the process for regionalization is as follows: The country's chief veterinary officer issues the request for an animal health status evaluation. The country must submit complete information pertaining to the 8-factors. On the APHIS website, there is a detailed questionnaire pertaining to the 8-factors that describes the specific information needed to initiate the request for a disease status evaluation. Very often, the information gathering phase is a reiterative process, back and forth between technical contacts to ensure sufficient information is collected. After collecting and analyzing the information, APHIS may conduct a site visit to verify the information provided. Then, a qualitative import risk assessment is conducted that details the information provided and gives a risk estimation for disease introduction via commodities for import into the United States. The format of the import risk assessment is consistent with the OIE guidelines.

As previously stated, the foreign region must provide the eight factors information to support an animal health evaluation. The eight factors are:

1. Scope of the evaluation requested
2. Veterinary control and oversight
3. Disease history and vaccination practices
4. Livestock demographics and traceability
5. Epidemiological separation from potential sources of infection
6. Diagnostic laboratory capabilities
7. Surveillance practices
8. Emergency preparedness and response.

APHIS may request additional information to clarify and complete the information. A site visit may be conducted to verify the information and its implementation in the region. APHIS maintains a web-based list of APHIS-recognized animal health statuses of regions regarding specific animal diseases or pests, or acceptable commodities. The web list can be found on the APHIS website. The Animal Health Status of Regions web-based lists can be found on the APHIS web site at the link provided (<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-and-animal->

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product-import-information/ct\_animal\_disease\_status). APHIS also maintains disease-free lists (i.e. classical swine fever [CSF], foot and mouth disease [FMD], Newcastle disease [ND]) and disease-affected lists (i.e. African swine fever [ASF], African horse sickness [AHS], highly pathogenic avian influenza [HPAI]). Through the regionalization process previously described, regions may request that APHIS conduct an evaluation to be added to a disease-free list. Similarly, regions listed on the affected list may request that APHIS conduct an evaluation to remove regions from the affected list or reduce the size of the affected areas.

### **E.U. - Livestock Roadmap and its Impact on Animal Health**

Francisco Reviriego, E.U. Commission

Dr. Reviriego presented a comprehensive detail of the newly approved E.U.-livestock roadmap with specific details about its impact on the current E.U. animal health program as it was approved a couple years ago. The details of the presentation are depicted in the slide presentation. He showed the current challenges in moving animals and animal produces within E.U. members as well as non-EU members. Dr. Reviriego emphasized on the role of the advisory group in maintaining the effectiveness of the operation. He indicated that the USAHA model was used for this purpose. The full presentation is available on the committee web page.

### **E.U.-USA: Animal Health Collaboration, Trust and Trade: What is working?**

Francisco Reviriego, E.U. Commission

Dr. Reviriego presented a second topic which was the selected paper for the general announcement by this subcommittee. Dr. Reviriego emphasized on the role of face to face interactions with the technical people from USDA and others in order to maintain direct communications and understanding the required steps for maintain the flow of trade between U.S. and E.U. He was complimented by the USDA-APHIS technical staff members of their transparency and technical capability to apply the required international standards in moving animals and animal products. The full presentation is available on the committee web page.

### **Global Health Security Agenda – Where are we?**

Jane Rooney, One Health Coordination Center, USDA-APHIS-VS

Dr. Rooney outlined the most recent activities of USDA in the engagement with the Global Health Security Agenda (GHSA) as update of last year's presentation. She provided a brief overview of both before discussing specific USDA accomplishments and activities. She indicated that the Global Health Security issues are international issues that affect human, animal and environmental health. The GHSA is an effort by nations, international organizations, and civil society to accelerate progress toward a world safe and secure from infectious disease threats; to promote global health security as an international priority; and to spur progress toward full

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implementation of the World Health Organization (WHO) International Health Regulations 2005 (IHR), the World Organization for Animal Health (OIE), Performance of Veterinary Services (PVS) pathway, and other relevant global health security frameworks.

When the GHSA was launched, the United States made a commitment to partner with at least 30 countries over five years to achieve the GHSA targets. In July 2015, the U.S. Government announced its intent to invest more than \$1 billion in resources to expand the GHSA to prevent, detect, and respond to future infectious disease outbreaks in 17 countries. There is now a growing partnership of over 50 nations, international organizations, and non-governmental stakeholders including World Bank, Gates Foundation, OIE and FAO involved in GHSA. The goal of GHSA is to help build countries' capacity to help create a world safe and secure from infectious disease threats and elevate global health security as a national and global priority.

The key principles of this initiative are:

- Working together through a multilateral and multi-sector approach, and;
- Strengthening both the global capacity and nations' capacity to prevent, detect, and respond to human and animal infectious diseases threats, whether naturally occurring or accidentally or deliberately spread.

While the formal GHSA initiative may have launched in 2014, many of the foundational principles and practices date much further back. APHIS continues to receive support from this administration for continuation of the GHSA and the principles of GHSA. In addition to the key principles mentioned above, there are three main priorities of GHSA. Those are

- Prevent
- Detect
- Respond

In order to accomplish these goals, there are two main areas of focus to keep in mind:

1. Work on specific technical areas called "Action Packages"
2. Country Evaluations

To encourage progress toward these goals, the "Action Packages" concept was developed to facilitate regional and global collaboration toward specific GHSA objectives and targets. USDA-APHIS has a prominent role in several of the packages. These action packages help advance implementation of the IHR and similar animal health and disease reporting systems of the OIE, by building countries capacity to prevent, detect, and respond to infectious disease threats. All GHSA member countries participate in one or more Action Packages and may choose to fulfill this commitment by building capacity at a national, regional, and/or global level. Each Action Package includes a 5-year target, an indicator (or indicators) by which to measure progress, and lists of baseline assessment, planning,

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monitoring, and evaluation activities to support successful implementation. Dr. Rooney then briefly described the Joint External Evaluation (JEE) process and the U.S. JEE. It is voluntary and collaborative with multisector participation team. It includes 19 Technical Areas which are made up of the 11 GHSA Action Packages plus eight additional areas identified in the International Health Regulation Assessments. In a JEE assessment, a team of approximately ten external experts assess a country's capacity to prevent, detect, and rapidly respond to public health threats according to WHO guidelines, based on criteria indicated in the JEE Assessment questions. In late May 2016, the United States underwent a JEE of the 11 GHSA Action Packages and eight IHR requirements. The review team was very complementary of the collaboration among Departments, State, local and tribal governments. They were particularly pleased with the transparency and openness of the USA in its self-evaluations. The review team asked for an explanation of how the animal health sector was incorporated into the JEE. Many recommendations were supportive of the current One Health structures and encouraged us to continue to further the One Health approach. Health and Human Services (HHS) also committed to ensuring better linkages with animal health and agreed they could do better in fostering the One Health Approach. The External Evaluation identified some clear overarching themes that were observed during this assessment:

- Although a One Health approach is utilized and there is good collaboration between, and within state, government and other stakeholders, the U.S. might benefit from developing a more formal One Health strategy that encompasses the federal, state, and local levels.
- USDA had involvement across many action packages and were asked to co-lead the development of the self-assessment on Zoonotic Diseases.
- APHIS worked in very close collaboration with CDC's One Health Office and other federal Departments.
- Through this collaboration on many other action packages we were able to inform others on the critical role agriculture and animal health play in many areas of human health.
- The value of this process was in the development of new or expanded relationships for future collaboration.
- The results of such collaborations are evident in the recommendations which we recognized were necessary but now appear in print form external sources.

Dr. Rooney emphasized that this process has helped to address the USAHA resolution of 2015 to "commit United States Department of Agriculture (USDA) resources to building strong linkages with the Global Health Security Agenda."

## **Global Preparedness for High Impact Animal Diseases” Using the Global Rinderpest Action Plan**

Lee Myers, USDA-APHIS-VS and FAO in Rome

On behalf of Dr. Myers, Dr. Mo Salman presented a short abstract of the role of Global preparedness for high impact animal disease in the post eradication effort of rinderpest. The human food chain is under continued threat from transboundary animal diseases, emerging diseases and zoonoses whether by accidental, natural or intentional incursion. The Food and Agriculture Organization (FAO) of the United Nations is committed to supporting Member Nations and Partners in preparing for and responding to disasters and crises, including animal diseases, which threaten agriculture, food and nutrition security or food safety. FAO’s work in emergencies focuses on reducing people’s vulnerability to hazards, including animal disease threats, before, during and after disasters through risk assessment, risk reduction, emergency response and rehabilitation.

Created by the FAO Animal Health Service to better prepare its member countries, the Good Emergency Management Practices: The Essentials (GEMP) is an overall approach to manage animal health emergencies, supporting veterinary services in increasing preparedness to animal disease outbreaks and decreasing the time needed to response to a crisis. GEMP is a collection of organized procedures, structures and resource management tools that help emergency managers detect diseases in an early stage in an animal population, predict and limit the spread, target control measures, and eliminate the disease with subsequent re-establishment of verifiable freedom from infection. GEMP is applicable at the national, regional and international levels. In countries, the GEMP guides national animal health services to prepare disease-specific contingency plans.

The FAO and World Organization for Animal Health (OIE) Rinderpest (RP) Secretariat is spearheading the development of a Global Rinderpest Action plan (GRAP) based on GEMP essentials. FAO and OIE each presented official Declarations of Global Freedom from RP in 2011. As a part of these historical celebrations, Member Countries directed the two organizations to work jointly in managing all aspects of RP in the post-eradication era.

The GRAP aims to ensure continued global freedom from RP by outlining the actions that should be taken and by whom in the event of a RP outbreak, and is the global operational plan that complements all other national, continental/regional and international plans for RP. The GRAP also enables veterinary officials to identify and prioritize gaps that need to be addressed to prepare for potential RP re-emergence. By mitigating risks and strengthening global plans, the GRAP also provides the necessary confidence for decision makers to call for the destruction of remaining rinderpest virus containing material stocks. The purpose of the GRAP is to:

- 1) Complement and expand on the RP emergency management guidance already put in place by the FAO, OIE, continental/regional organizations and countries.

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- 2) Provide a framework for recognizing, reporting and rapidly suppressing any RP re-emergence.
- 3) Provide decision-making pathways leading to full implementation of RP emergency management measures.

The GRAP is congruent with the former Global Rinderpest Eradication Program (GREP) and incorporates the principles from the Food and Agriculture Organization (FAO) GEMP and the emergency management stages of preparedness, prevention/ mitigation, detection, response and recovery. The plan also includes measures from and is referenced in the OIE Terrestrial Code as the international contingency plan, which is the GRAP. An important component is ensuring that all countries have an operational National Contingency Plan (NCP).

The GRAP Zero Draft was introduced at the FAO international meeting for “Maintaining Global Freedom from Rinderpest” in Kathmandu, Nepal June 14-16, 2017. Forty-three participants attended the meeting, including representatives of 17 countries continuing to store rinderpest virus and countries at risk (neighboring those keeping the virus), and representatives from OIE, the African Union Inter-African Bureau for Animal Resources (AU-IBAR), the existing Rinderpest Holding Facilities (RHF), and invited experts. The objectives of the meeting were met, including feedback from participants on the GRAP and the annex on the Operational Framework for the Rinderpest Vaccine Reserve.

The Tabletop Exercise (TTX) is an important component in preparedness to validate the next iteration of the draft GRAP. It will focus on a simulated outbreak of rinderpest in the Horn of Africa and involve key personnel discussing a simulated scenario. Exercise play will be limited to the use of current plans, policies, training, and procedures as they relate to the draft plan. Lessons learned from the regional TTX conducted in Africa will help to improve the next iteration of the GRAP to be validated in future exercises.

Emergency management planning for rinderpest (RP) is a good example of threat reduction by addressing potential pathogens at their source. Building capacity in emergency management helps regions and countries prepare for and manage effective responses to animal disease disasters and crises. Implementing the essentials of GEMP will help to sustain animal health, human health, food security and community resilience.

### **Committee Business:**

No resolutions were presented by the subcommittee members. No other issues were brought up during the business session. Members of the subcommittee, however, were reminded to share their opinions about the new structure of the committee and sub-committees. The above changes to the mission statements were noticed and should reflect in the coming version of the USAHA website.

Dr. Salman would like to recommend Dr. Elizabeth Parker to be the vice-chair of the Subcommittee on GAHT if the decision is made to maintain the current structure. Dr. Parker has the broad experience in trade issues with



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extensive technical capabilities and contacts. In addition, several of the 19 non-members attendance can be major contributors to this subcommittee; thus, it is recommended to be included in the roster of GAHT for next year.

The meeting was adjourned at 5:30 p.m.

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### REPORT OF THE SUBCOMMITTEE ON LIVESTOCK IDENTIFICATION

Chair: Rod Hall, OK

Vice Chair: Kevin Maher, IA

The Committee met on Sunday, October 16, 2017 from 1:00-5:30 p.m. There were 47 members and 31 guests present. Chairman Dr. Rod Hall reviewed the Subcommittee housekeeping rules, request for members and guests to fill out the forms in the back of the room and reviewed the agenda.

#### Presentations and Reports

##### Animal Disease Traceability Update

Neil Hammerschmidt and Sunny Geiser-Novotny, USDA-APHIS-VS

The USDA published a final rule, "Traceability for Livestock Moving Interstate," on January 9, 2013. Animals covered by the regulation, unless otherwise exempt, are required to be officially identified and accompanied by an Interstate Certificate of Veterinary Inspection (ICVI) or other movement documentation. The Animal Disease Traceability (ADT) framework was designed and implemented at that time to support the foundation aspects of traceability and to enable States and tribes to meet the animal identification and interstate movement requirements without imposing a one-size-fits-all system across the country.

##### Outreach and Preliminary Next Steps Recommendations

Much of the focus of ADT in 2017 has been on obtaining feedback on what aspects of the initial ADT framework are working well, what issues are problematic or challenging and to examine and define opportunities to advance traceability. APHIS held nine public meetings from April through July of this year and provided a Federal Registry comment period to hear industry feedback on the current ADT framework. The comments may be viewed at: <https://www.aphis.usda.gov/traceability/downloads/summary-of-feedback-adt-program.pdf>. Additionally, an 18-member State/Federal working group deliberated since March 2017 to prepare preliminary recommendations on the next steps for ADT. The recommendations address 14 key issues, including:

- When official ID should be required (change of ownership, commingling, etc.)  
Cattle should be identified to their birth premises, thus the official identification records need to provide birth premises information of the animal. Regulations need revising to include interstate commerce and if USDA has the authority establish each of the following triggers that would require official identification:
  - Change of ownership
  - First point of commingling
  - Interstate movement (may reflect no sale and no commingling)

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- Implementation of electronic identification  
The United States must move toward an EID system for cattle with leadership and buy-in from the industry sectors. A comprehensive plan is necessary to address the multitude of very complex issues related to the implementation of a fully integrated electronic system. The plan should be developed through a specialized industry-lead task force with government participation. The objectives of the task force should account for several of the key issues including:
  - Standardization (of technology to ensure compatibility of systems across manufacturers)
  - Transitional technology solutions
  - Timelines
  - Funding (cost of tags and readers)

The ADT working group 14 preliminary recommendations were presented at the National Institute of Animal Agriculture (NIAA)/USAHA Traceability forum on September 26 in Denver. APHIS will publish the report in the Federal Registry and accept public comments and the ADT working group will finalize their report after review and consideration of the comments.

### **Trace Performance Measure (TPM) Third Year Comparison – Preliminary Results**

The third-year comparison values show substantial improvement in the ability of states to perform the trace exercises. The percent of successfully completed TPMs increased for all four measures. Much of the improvement in successfully finding the records is likely due to advances in electronic record keeping and databases. The emphasis placed on record keeping systems, particularly electronic systems, to retrieve data associated with the TPMs has resulted in a favorable trend demonstrating improved traceability completion time and, for the most part, a greater number of TPMs successfully completed. Although expansion of electronic record keeping systems has contributed to a decrease in the time required for searching records to trace livestock, some states report that continued advancement of electronic records will only be achieved in future years with additional information technology investments. The ongoing administration of the TPMs through the current cooperative agreement period will help document continued progress as well as identify possible limitations to the current ADT infrastructure.

### **Collection and Correlation of Identification at Slaughter**

Successful traceability relies on maintaining the animal's identity at slaughter plants through final carcass inspection. However, the collection of ID and correlation to the carcass through final inspection at slaughter is a challenging area in need of improvement. A State and Federal (APHIS and FSIS) working Group convened in November 2016 to address the challenges has focused on:

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- Development of training and outreach materials on the requirements for new plant, FSIS and APHIS personnel.
- Monitoring of diagnostic submissions collected to ensure correlation practices are sufficiently applied at slaughter plants.
- Maintaining constant communication and collaboration with FSIS to address specific areas of concern

### **Meat Processors Perspective: Pros and cons of ID at processing plant operations**

Brad Chandler, FPL Food, LLC.

The three forms of identification (ID) typically seen at slaughter facilities that slaughter mostly cull cows are USDA Back Tags, electronic ID, and National Uniform Eartagging System (NUES) tags. Each type of ID has its pros and cons. The best form of ID from the packers' perspective is electronic ID.

### **International ID Perspective – Canada: Overview of the Canadian Livestock Identification and Traceability System**

Eric Aubin, Canadian Food Inspection Agency (CFIA)

In 2006, Federal, Provincial, and Territorial Ministers of Agriculture and Food announced the need for an enhanced National Traceability System.

Cooperators are CFIA, Agriculture and Agri-Food Canada, Provincial and Territorial Governments, and Responsible Administrators.

Responsible Administrators are Private, not for profit organizations that manage regulated traceability data on behalf of CFIA.

ID requirements for ruminants are approved ear tag with International Organization for Standardization (ISO) 11784 number applied prior to leaving the farm of origin. Swine, depending on destination, may include ear tags with ISO number or herd mark (shoulder slap tattoo).

Reporting of ID is required at import, export, slaughter, disposal, and issuance of tags.

Lessons Learned:

- Traceability Systems cannot be built in isolation – they require industry/government collaboration.
- Invest in forums where industry and governments can work together on developing policy, identifying investment priorities, and building communications and best management practices.
- Program design needs to balance industry readiness and costs to implement with the identified performance targets of the system.
- Focus attention on data integrity and data quality at every stage of the process.
- Financial investments by industry will help industry own the risks and get more industry buy-in for preventative/control programs.

### **International ID Perspective**

Mark Davidson, USDA-APHIS

### **Animal Disease Traceability (ADT) Support**

ADT is a program of high importance for VS. As a result of our cooperation with the cattle industry, we have a program that is highly supported by cattlemen across the country. Knowing where diseased and at-risk animals are, where they have been, and when, is important to ensure a rapid response to animal disease events.

### **ADT Framework**

The current ADT framework, defined and established through collaboration with all stakeholders, covers a small portion of what is referred to as full traceability. When APHIS initiated ADT, we intentionally agreed to focus on the very basic aspects of traceability, with the understanding that we'd build upon that foundation over time and only when we've successfully implemented what we refer to as Phase I. Under Animal and Plant Health Inspection Service (APHIS) ADT regulations, animals moved interstate, unless otherwise exempt, must have official identification (ID) and be accompanied by an interstate certificate of veterinary inspection (ICVI) or other movement document. Since the rule went into effect in March 2013, the focus of the ADT program has been educating stakeholders about the rule's requirements; identifying animals—particularly cattle—using official ID; collecting animal movement information; increasing the volume of electronic/searchable records; and ensuring rule compliance.

ADT is a performance-based program. The results of our traceability performance measures (TPM) have documented that we are making good progress in the administration of official ID devices and ICVIs. Based on the data obtained from over 1,600 trace exercises through the 12-month performance period it's clear States are also making excellent progress.

Animal health officials in brand States certainly value the traceability information provided through brand inspections and consider it an asset of their overall traceability infrastructure. While brands alone may not meet all the needs for disease traceability, they certainly complement our efforts and we are committed to working cooperatively with brand inspection authorities. As a result of our efforts, we are able to more accurately and reliably retrieve information and determine the location of infected animals.

### **ADT Future Opportunities**

We are eager to look ahead and consider additional opportunities to advance traceability. In doing so, we've held public meetings to get stakeholder input on what's working and to identify gaps. While we've had success implementing the initial phase of ADT, we realize changes to the initial framework will warrant discussion and consideration.

Among the issues that require further discussion include:

- Limiting the traceability regulation to interstate movements;
- Various exemptions that allow cattle to move from their farm/ranch without official ID; and
- Multiple ID methods and technologies.

### **ADT Official ID Requirements**

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We exempted the official ID requirement for beef feeder cattle in the ADT regulation to avoid “getting too big too soon” and we wanted to implement the regulation for breeding herds first. While beef feeder cattle need to be included in the official ID requirement, we need to address other gaps in our traceability infrastructure first.

### **ADT Port Trade**

VS is exploring ways to better capture official ID on imported livestock as they enter the United States. Canada already has radio frequency identification (RFID) ear tags in many animals and we are looking at ways to bundle the data file to make it more portable as the livestock head to the border. The processes being piloted may also allow more comprehensive data to be recorded in VS Process Streamlining (VSPS). Data that we capture in VSPS is accessible by State Animal Health Officials (SAHOs) for traceability purposes, which is driving our focus on putting individual animal ID for imported livestock into the system. It is also our priority to expand the use of electronic records using private systems that are accessible during animal disease events.

### **ADT Global Trade**

Any enhancement to traceability is beneficial to live animal exports. Importing authorities vary in their current requirements for traceability and generally encourage increased traceability and tracking of any animal movement prior to export. Title 9 of the *Code of Federal Regulations* (CFR), Part 91, “Exportation of Live Animals, Hatching Eggs or Other Embryonated Eggs, Animal Semen, Animal Embryos, and Gametes from the United States,” Section 91.5, requires that “Livestock that are intended for export must be identified in a manner that allows individual animals to be correlated to the animals listed in the export health certificate. If the importing country requires a specific or an additional form of identification, the livestock must also bear that form of identification.” Therefore, all livestock (horses, cattle, captive cervids, sheep, swine, and goats, regardless of intended use) that are presented for export must be officially identified and that individual ID must be recorded on the veterinary export health certificate (per Section 91.3(b)(1)(v)). We identify the animals according to APHIS ID methods. These can include metal ear tags, markings, microchips, RFID, etc. Many cattle exporters already prefer RFIDs as the primary means of ID for ease of use and sorting of animals. Animals export disease tests results are linked to their official ID that correlates directly to the veterinary export health certificate.

### **AMS Verification Services Overview**

Existing Agriculture Marketing Service (AMS) programs provide excellent options for producers to participate in certification programs to expand their marketing options. It is important that VS and AMS continue to establish systems compatibility, so ID devices used for ADT also support the AMS marketing program. AMS provides voluntary, user-fee-funded services to provide third party verification that standards are adhered to. In some cases, those are standards set by a company for themselves (e.g., under the USDA

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Process Verified Program) for a wide variety of processes. Additionally, those are standards established by another entity with a specific set of requirements. For example, a foreign government under a Quality Systems Assessment (QSA) program, including the Export Verification (EV) Program.

### **Mandatory Export Verification Programs**

When an importing country demands specific requirements that are outside the U.S. delegated authority's role (such as the USDA's Food Safety and Inspection Service [FSIS]), AMS QSA/EV programs are implemented to verify these requirements. EV programs are designed to address specific requirements of foreign governments for international trade:

- Developed through negotiation
- AMS works with the Foreign Agriculture Services, FSIS, and the United States Trade Representatives to discuss requirements with the foreign government
- FSIS ultimately issues the export certificates

AMS currently operates 14 export verification programs covering 25 foreign countries/markets which meet specific requirements for beef, pork, and poultry. The fee-for-service for AMS voluntary audit-based verification programs is \$108/hour, plus travel expenses. Cumulatively, the value of the products that flow into the 25 foreign markets under AMS Export Verification programs is in excess of \$3.8 billion per year. The return on investment is over \$5,000 for every \$1 spent on AMS EV programs.

### **International ID Perspective - Mexico**

Othón Reynoso Campos, SINIIGA

Since 2005, Mexico has been promoting the usage of official identification in order to achieve production records, animal health, and control of mobilization and traceability for food safety schemes.

They utilize low frequency radio frequency identification (RFID) tags. In 2011 through 2014 the government purchased tags for producers and since that time producers have been required to purchase the tags. There has been a slow but steady increase in the number of tags utilized. There are almost 800 locations where ID may be applied and read as well as the producers' premises.

### **UHF Pilot EID Update**

Nephi Harvey, Fort Supply Technologies

In April 2017, the State of New Mexico Livestock Board funded a pilot project for cattle moving from Mexico into the United States across the Santa Teresa Border into the United States using ultra high frequency (UHF) electronic identification (EID) tags from AniTrace. The test was very successful and showed the role that UHF technology can have in achieving "speed of commerce" identification of individual animals.

Project goals:

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- 1) Test the viability of long range, passive (no battery) UHF RFID bangle style livestock ear tags, readers and data collections systems to improve and/or provide:
  - a) Speed and accuracy of livestock inspections at MX-U.S. borders and
    - i. **Results=>** Exceeded expectations. UHF 100% accurate. Never waiting on the UHF system to process livestock except for some training.
  - b) True traceability
    - i. **Results=>** Traceability provided from shipping back to MX producer.
  - c) Single tag (with redundant back up) to replace:
    - i. Three current tags for spayed heifers
    - ii. Two current tags for steers
      - i. **Results=>** only needs approval by U.S. and MX officials.
- 2) Ease of tagging at producer.
  - a) **Results=>** No reported issues tagging. Simple two-piece tag design
- 3) Ease of uploading data to USDA.
  - a) **Results=>** Simple and fast. No issues.
- 4) Ease of reading the UHF tags as offloaded at MX Union.
  - a) **Results=>** 100% read of all animals using hand held reader and stationary reader. Recommend future installation of fixed readers at receiving scales where animals are already weighed, counted and assigned holding pens.
- 5) Ease of reading UHF tags at USDA inspection on MX side.
  - a) **Results=>** 100% reads off all animals. UHF system also caught 6.6% visual read errors from USDA inspectors trying to read current metal and button tags numbers correlated with the UHF tag. (10 visual read errors on 151 animals in the pilot)
- 6) Ease of reading UHF tags in open pens MX and U.S. side.

**Results=>** 100% reads obtained with only two passes of animals. Minimal stress to animals and safety to operators. No head catch required. Groups of 20 animals read and recorded in less than 60 seconds per group.

### Observations and Summary:

- 1) Long range passive UHF tags, readers and data collection systems are a reliable and proven system both for mobile pen or fixed location identification (reading) of livestock.
- 2) UHF tags can replace multiple current ID's which have developed on both sides of the border.
- 3) Data from the UHF tags can be used on the U.S. side to provide currently unavailable traceability.



## INTERSTATE AND INTERNATIONAL COMMERCE

- 4) UHF Tags ease the capture and traceability of animals both on U.S. and MX sides of the border.

### **Equine Microchip Look Up Tool Update**

Alex Turner, Colorado Department of Agriculture

Brief update on the efforts that National Institute of Animal Agriculture (NIAA) has made regarding Equine ID with members of the Equine industry. There seems to be an industry swell of support for microchipping and we are trying to facilitate a national lookup tool to help manage some of that information. There have been discussions with private companies and why government holdings of this information may not be the solution.

### **Livestock Market Panel of Owners and Managers**

Jerry Etheredge, Montgomery Stockyards and Livestock Marketing Association (LMA)

Jim Reynolds, National Livestock Commission

Jake Parnell, Cattlemen's Livestock Market

Main points shared included:

- Livestock markets sell 31 million head of cattle, 7 million hogs, and 3 million sheep/lambs annually. (*USDA, Grain Inspection, Packers and Stockyards Administration [GIPSA]*)
- Livestock markets sell \$40 billion worth of livestock annually. (*USDA-GIPSA*)
- 80% of cattle producers sell at livestock auction market at least once per year. (*Cattlemen's Beef Board*)
- Our customers are not pushing us for mandatory identification (ID).
  - Of producers choosing to take a recent online BEEF magazine survey, nearly 38% were unaware of USDA's ADT program.
- We don't see cattle currently bringing a premium simply for being identified.
  - Additional information (e.g. non-hormone treated cattle [NHTC]) is often needed for value to appear.
- Small herds make up a large portion of the U.S. beef industry.
  - Average cow herd is 40 head
  - Farms with fewer than 100 beef cows account for:
    - 90.4 percent of all farms with beef cows
    - 45.9 percent of all U.S. beef cows.
- Costs of identification are significant and include
  - Labor
  - Shrink
  - Risk of injury (livestock and humans) and associated insurance costs
  - Facilities
  - Slows speed of sale

## REPORT OF THE COMMITTEE

Enforcing only at markets could push producers out of this method of selling and harm the common goal of compliance.

A cost-benefit analysis and industry input are needed prior to considering mandatory identification of feeder cattle or mandatory electronic ID for currently-covered cattle populations.

### **Small Ruminant Update**

Cynthia Wolf, University of Minnesota, Veterinary Diagnostic Laboratory

On October 3, 2017, USDA-APHIS unofficially discontinued providing National Scrapie Eradication Program (NSEP) plastic ear tags while still providing National Uniform Eartagging System (NUES)-like metal tags. The U.S. sheep industry has seen widespread adoption of primarily official plastic tags which has made scrapie traceability a reality. This form of official identification (ID) is a pivotal component as is slaughter surveillance of the NSEP. It is estimated that 70% of the heads surveilled at slaughter are identified with official plastic tags. It is likely that ID requirements will soon become more stringent for goats. For the reasons outlined in the presentation, now is the wrong time to discontinue program-provided plastic tags. Their use has been paramount to why we have been successful with this eradication program.

### **Subcommittee Business Meeting:**

The business meeting was called to order at 4:55 p.m.

Dr. Alex Turner presented a resolution on the 'Microchip Identification of Imported Horses'. Dr. Robert Cobb submitted a motion to accept; Dr. Keith Roehr seconded the motion. There was no discussion. The resolution was unanimously approved. Dr. Rod Hall submitted a second resolution on the 'Identification and Documentation of Cattle in Commerce'. Dr. Cobb made a motion to accept the resolution; Dr. Brandon Doss seconded the motion. There was a moderate amount of discussion and several suggestions were made from the floor to improve the wording of the resolution. Several friendly amendments were approved, and the resolution passed as amended.

The meeting adjourned at 5:18 p.m.

**USAHA/AAVLD COMMITTEE ON NATIONAL ANIMAL HEALTH  
LABORATORY NETWORK (NAHLN)**

Chair: Barbara Powers, CO  
Vice Chair: Harry Snelson, NC

Kimberly Abramo, MD; Helen Acland, PA; John Adaska, CA; Bruce Akey, TX; Gary Anderson, KS; Marianne Ash, IN; Cat Barr, TX; Bill Barton, ID; Tim Baszler, WA; Tammy Beckham, KS; Lisa Becton, IA; Rob Bildfell, OR; Steven Bolin, MI; Y Reddy Bommineni, FL; Richard Breitmeyer, CA; Sandra Bushmich, CT; Beverly Byrum, OH; Craig Carter, KY; Robert Cobb, GA; Matt Cochran, TX; Emily Cooper, OK; Estela Cornaglia, QC; Dustin Cox, NM; Beate Crossley, CA; Marie Culhane, MN; Barbara Determan, IA; Cristy Dice, CO; Edward Dubovi, NY; François Elvinger, NY; Kristy Farmer, AL; Ann Fitzpatrick, MN; Richard Fredrickson, IL; Joseph Garvin, VA; Patricia Godwin, KY; Stephen Goldsmith, DC; Patrick Halbur, IA; Steven Halstead, MI; Timothy Hanosh, NM; Beth Harris, IA; Bob Hillman, ID; Stephen Hooser, IN; Pamela Hullinger, CA; Bill Johnson, OK; Jim Kistler, FL; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Mary Lis, CT; Christina Loiacono, IA; Rodger Main, IA; David Marshall, NC; Barbara Martin, IA; Michael McIntosh, NY; Thomas McKenna, MA; Beth Melton, MO; Linda Meola, AR; Doris Miller, GA; Richard Mock, NC; Rey Molina, TX; Igor Morozov, KS; Stacy Morris, TX; Thomas Mullaney, MI; Dustin Oedekoven, SD; Claudia Osorio, MD; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; Amar Patil, NJ; Robert Poppenga, CA; Barbara Powers, CO; Rachel Reams, MI; Debbie Reed, KY; M. Gatz Riddell, AL; Keith Roehr, CO; Jeremiah Saliki, GA; Renee See, WV; Mina Shibata, IL; Kathryn Simmons, DC; Joan Smyth, CT; Harry Snelson, NC; Wendy Stensland, IA; Amy Swinford, TX; Manoel Tamassia, NJ; Deepanker Tewari, PA; Sarah Tomlinson, CO; David Zeman, SD; Shuping Zhang, MO.

The Committee met on October 15, 2017 at the Town and Country Hotel in San Diego, California from 12:00-3:00 p.m. There were 33 members and 29 guests present.

**Update on Appropriations and Farm Bill**

Brad Mollett

1. Working on funding through the House and Senate and
2. mandatory Farm Bill funding. Seem to have support on Farm Bill efforts in House and Senate Agriculture Committees. Need to have the deans of the vet schools and agriculture commissioners, USAHA to send support letters specific to states, vet schools, etc. Pursue all states but especially Texas, Kansas, Iowa, California. Timeline: ~ December 15

**IT Update from NAHLN**

Christiana Loiacono, USDA-APHIS-VS-NVSL

Michael Martin, Clemson University Livestock Poultry Health

## REPORT OF THE COMMITTEE

1. 59 laboratories/31 capable of messaging at least one disease, five preparing to message, four beginning the process – messaging can be affected by a multitude of factors such as changes at the laboratory, changes in leadership, etc. Can message eight diseases.
2. Goals
  - Continue to expand # of laboratories that can message
  - Expand NAHLN scope diseases for which they can message
  - Expand integration into EMRS and others
  - Implementation of NLRAD
  - Exercises to practice messages and provide competencies
3. Challenge is getting data from LMS out to the programs that need to get the data
4. ~ 4 major LMS systems
5. Still a challenge getting data to the states (data generated in a laboratory for animals housed in another state).

### **LOINC Standardization update**

Rodger Main, Iowa State University

1. \$700,000 project funded in cooperation with *Swine Health Information Center* (SHIC) and USDA
2. Establish/ adopt diagnostic standards – standardizing results for electronic transfer of data from the Veterinary Diagnostic Laboratories (VDLs).
3. Starting with swine diagnostic data
4. Achievements
  - Updated HL-7 messaging
  - Web-based HL-7 message validator
    - i. Send message and feedback on what happened to the message
  - Submitted request for 389 Logical Observation Identifiers Names and Codes (LOINC)s received 192 approvals. Waiting on 203 LOINCs.
5. Still to be done:
  - Continue/finalize hl7 messaging across labs
  - Finalize mapping to results
  - Work thru nuances of messaging non-traditional result types

### **Swine Information Systems for CIS**

Rich Baca, USDA-APHIS-VS-CEAH

1. Information Technology (IT) support for Client Information Sheet (CIS) at USDA
2. Comprehensive laboratory submission module (CLSM) for field personnel data entry using Tableau
  - Objectives

## NAHLN

- i. Modernizes the Veterinary Services (VS) laboratory submission system
  - ii. Assists rapid deployment of data management solutions
  - iii. Gives the program the ability to configure new data streams reducing dependency on it for software modifications
- Completed
  - i. System scope
  - ii. Software specs
  - iii. User acceptance testing
- Remaining
  - i. Federally required security assessment process
  - ii. Authority to operate CLSM
  - iii. Prioritizing surveillance streams to implement (streams include pseudorabies (PRV), Swine Brucellosis, foot and mouth disease (FMD))
- Reporting
  - i. Swine Enteric Coronavirus Disease (SECD), pseudorabies (PRV), Influenza A virus in swine (IAV-S)
  - ii. Outcomes – implementation of new tools and use of metadata, standards and visually oriented tools
- Value
  - i. Reduction of 6,560 hours in reporting time = \$300,000 savings just associated with six reports
- Distribution
  - i. Internal dashboards
  - ii. Laboratories and industry stakeholders
  - iii. Descriptive reporting for public access
- Next
  - i. Move CLSM into production and prioritize additional swine diseases for implementation
  - ii. Validate the dashboard requirements with stakeholders for a planned roll out in spring 2018
  - iii. Finalize data collection strategy to increase use of electronic tools for field data collection

### **CDFA HPAI/LPAI Outbreak Data and Pooling Potentials**

Alireza Javidmehr, California Department of Food and Agriculture

1. Important due to potential for shift/drift from low pathogenic avian influenza (LPAI) to highly pathogenic avian influenza (HPAI)
2. Currently, concern with false negatives for LPAI
3. Currently pool samples – results in dilution effect leading to higher PCR cycling. Pooling samples could significantly lower the positive predictive value of the PCR test.

## REPORT OF THE COMMITTEE

4. Using sensitivity of 86.5% for polymerase chain reaction (PCR) in 1/11 pooled samples. Results may depend on the virulence of the virus.
5. Recommendations
  - Don't use pooled samples during an outbreak.
  - Additional studies needed to evaluate pooling sensitivity and the factors that influence sensitivity.

### **Barcoding Exercise Report**

Christina Loiacono, USDA-APHIS-VS-NVSL

Update on the recent exercise to evaluate barcode use for lab submissions.

### **Antimicrobial Resistance Program Update**

Beth Harris, USDA-APHIS-VS-NVSL

1. Activity resulting from the USDA National Antimicrobial Action Plan
2. Using data from swine National Animal Health Monitoring System (NAHMS) 2017 Antimicrobial use survey
3. NAHLN Pilot Project focusing on abtbc resistance in animal pathogens
  - Four bacteria – e. coli, salmonella enterica, staph intermedius group, mannheimia haemolytica
  - Species: Cattle, swine, poultry, horses, dogs, cats
  - Objectives
    - i. Develop process for tracking AMR data at national level
    - ii. Deploy across multiple labs
    - iii. Identify info important to vet diagnostic community regarding trends in AMR
  - 19 laboratories selected for Year 1 of the pilot
  - Measures of success
    - i. Laboratories meet 50% or more of target numbers
    - ii. VS can develop parameters for messaging aspartate aminotransferase (AST) data ( $\geq$  20% of laboratories able to successfully message)
    - iii. VS is developing reporting mechanism back to state/fed reg authorities and other stakeholders
  - Next in Year 2
    - i. Incorporate sequencing
    - ii. Add other spp
    - iii. Add abtbc

### **Tactical Sciences from NIFA**

Bruce Akey, Texas A&M Veterinary Medical Diagnostic Laboratory

1. Effort to draw together several NIFA program pieces dealing with detection response education about disease to achieve:
  - Foster collaboration between programs within NIFA
  - Branding of “tactical sciences” vs strategic (longer term outlook)
2. Draft document has been produced emphasizing: communication, transparency, trust between groups (particularly on shared funding), and accountability.

**Resolution 10 working group on QA for program diseases** – Bruce Akey and Beverly Schmitt provided an update on the working group efforts

### **Update on Criteria for Laboratory Levels in the NAHLN**

Christina Loiacono, USDA-APHIS-VS-NVSL

- 9 categories for NAHLN laboratory evaluation. Laboratories need 90% for level 1, 60% for Level 2, Level 3 laboratories are < 60%
- 4 areas within each category
- 14 Level 1 laboratories currently
- ISO 17025 or AAVLD approved
- Changes in geographical distribution based on number animals and number of farms and farmgate value for each commodity.
- State level risk evaluated by presence of vectors, wildlife, and potential routes of entry
- Other updates for NAHLN coordinating council

### **Committee Business:**

The Committee recommends that USAHA re-submit a letter in support of mandatory funding in the 2018 Farm Bill in support of the NAHLN.

**REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS**

Chair: David Schmitt, IA

J Lee Alley, AL; Philip Bradshaw, IL; Richard Breitmeyer, CA; Paul Brennan, IN; Jones Bryan, SC; Stephen Crawford, NH; Thomas Hagerty, MN; Steven Halstead, MI; Charles Hatcher, TN; Bob Hillman, ID; Donald Hoenig, ME; Bruce King, UT; Maxwell Lea, Jr., LA; James Leafstedt, SD; Donald Lein, NY; Bret Marsh, IN; Michael Marshall, UT; David Marshall, NC; Richard McCapes, CA; David Meeker, VA; Lee Myers, GA; John Ragan, VA; Glenn Rea, OR; David Schmitt, IA; David Smith, NY; Scott Stuart, CO; Tahnee Symanski, MT; H. Wesley Towers, DE; Max Van Buskirk, PA; Richard Willer, HI; Larry Williams, NE; Ernest Zirkle, NJ.

**Nominations**

**OFFICERS**

PRESIDENT ..... Barbara C. Determan, Early, IA  
PRESIDENT-ELECT ..... Kristin M. Haas, Montpelier, VT  
FIRST VICE-PRESIDENT ..... Martin A. Zaluski, Helena, MT  
SECOND VICE-PRESIDENT ..... Paul J. McGraw, Madison, WI  
THIRD VICE-PRESIDENT ..... Charles W. Hatcher, Nashville, TN  
TREASURER ..... Annette M. Jones, Sacramento, CA

**DISTRICT DELEGATES**

NORTHEAST ..... Guy Hohenhaus, MD; Belinda Thompson, NY  
NORTH CENTRAL ..... Louis Neuder, MI; Paul Brennan, IN  
SOUTH ..... L. "Gene" Lollis, FL; Eric Jensen, AL  
WEST ..... Bill Sauble, NM; H. M. Richards, III, HI

**Resolutions**

**RESOLUTION NUMBER: 1, 6, 13, 16 AND 22 COMBINED; APPROVED  
SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT  
COMMITTEE ON FOREIGN AND EMERGING DISEASE  
COMMITTEE ON SWINE  
COMMITTEE ON CATTLE AND BISON  
COMMITTEE ON SHEEP, GOATS AND CAMELIDS  
SUBJECT MATTER: ADEQUATE FUNDING FOR PREVENTION,  
DIAGNOSIS, AND RESPONSE FOR FOREIGN ANIMAL  
DISEASE OUTBREAKS  
BACKGROUND INFORMATION:**



## NOMINATIONS AND RESOLUTIONS

As United States animal agriculture has become increasingly dependent on exports it is imperative that there are adequate resources in place to prevent, diagnose and respond to Foreign Animal Disease (FAD) outbreaks. For example, an outbreak of Foot and Mouth Disease (FMD) would immediately close all export markets. The cumulative impact of an outbreak on the beef and pork sectors over a 10-year period would be more than \$128 billion. The annual jobs impact of such reduction in industry revenue is 58,066 in direct employment and 153,876 in total employment. Corn and soybean farmers would lose \$44 billion and nearly \$25 billion, respectively, making the impact on these four industries alone almost \$200 billion. A workable FMD vaccine bank can minimize the impact on livestock producers and reduce government costs of a catastrophic FMD outbreak in the United States.

State resources to address prevention of, and preparation for, FAD outbreaks and other animal disease emergencies are often inadequate. Prevention and preparation will be essential in minimizing the impacts to animal agriculture of an FAD incursion.

Laboratory capability to detect and diagnose an initial incursion of an FAD quickly and capacity to meet diagnostic needs during an outbreak response is essential to an effective response including determination of the scope of the outbreak and opportunities to continue interstate movement and resume trade. Utilization of the National Animal Health Laboratory Network laboratories will augment the activities of the Foreign Animal Disease Diagnostic Laboratories at National Veterinary Services Laboratory and Plum Island. The laboratories will need to operate synergistically for maximum effect.

While response to a FAD often includes mass depopulation of animals, the United States Department of Agriculture FAD PRoP plan for FMD is contingent on vaccination for all but the smallest, localized outbreak. The United States currently does not have access to enough FMD vaccine to handle more than a very small, localized disease event. Worldwide vaccine production is limited, and there is no surge capacity to produce the millions of doses needed to address a large-scale outbreak in the United States. Iowa State University estimated it would cost \$150 million a year for five years to bring vaccine availability to the level necessary to control such an outbreak.

### **RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture, the National Assembly of State Animal Health Officials, and State Departments of Agriculture/Animal Health Commissions to recognize the critical importance of a vaccine bank that prioritizes an adequate number of doses of Foot and Mouth Disease Vaccine, including surge capacity; the National Animal Health Laboratory Network, and block grants for state animal health agencies to enhance their ability to prevent and prepare for a foreign animal disease emergency.

## REPORT OF THE COMMITTEE

USAHA further urges the aforementioned groups to support, to the extent legally permissible, mandatory funding of \$150 million per year for the life of the Farm Bill for the vaccine bank, \$30 million per year for the National Animal Health Laboratory Network and \$70 million per year in block grants to states to enhance their ability to prevent and prepare for a foreign animal disease emergency within the next Farm Bill.

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**RESOLUTION NUMBER: 2    APPROVED AS AMENDED**  
**SOURCE: USAHA/AAVLD COMMITTEE ON DIAGNOSTIC**  
**LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT**  
**SUBJECT MATTER: VETERINARY PUBLIC PRACTICE AWARENESS**  
**AND PROMOTION**

**BACKGROUND INFORMATION:**

There have been several workforce studies over the last few years addressing the future of veterinary medicine and the critical role the profession plays in meeting societal needs, and the additional challenges the profession faces such as increased student debt, mental health and wellness, career transition, and retention in the profession. Most citizens of the nation are not aware of all the significant contributions veterinarians make to public health. To meet the increasing costs of veterinary education and the decreasing federal and state funding to support that education, veterinary colleges are increasing tuition and increasing class sizes in an attempt to meet those financial challenges.

A National Academy of Sciences (NAS) report from 2013 entitled "Workforce Needs in Veterinary Medicine" states that most of those students will likely practice companion animal medicine, and that "these actions will increase the supply of companion animal practitioners, the largest group of veterinary practitioners, at a time of uncertain demand for companion animal services." The report further states that "the veterinary profession should expand its capacity to address complex global problems, such as those associated with food security, by encouraging interactions between United States (US) veterinary graduates and other disciplines and cultures, particularly in the developing world, where the profession has the opportunity to leverage its expertise in One Health and lead advances in food animal husbandry welfare, water safety and security, and the health of wildlife and ecosystems." However, society must be convinced that investment in veterinary medicine is imperative. The study states that "the public, policymakers, and even medical professionals are frequently unaware of how veterinary medicine fundamentally supports both animal and human health and well-being" and that "broadening the public's understanding will require commitment by veterinary leadership, the academe, and practitioners to develop and promote the profession as one that offers diverse career paths with many different niches for veterinarians, ranging from traditional companion animal practice to public and private sector positions in

## NOMINATIONS AND RESOLUTIONS

biomedicine, animal research, wildlife, the environment, global food production, food safety and security, and public health.”

An Association of American Veterinary Medical Colleges (AAVMC) report of 2008 stated, “To safeguard the US economy, public health and food supply, there must be recruitment and preparation of additional veterinarians into careers in public health, food systems, biomedical research, diagnostic laboratory investigation, pathology, epidemiology, ecosystem health, and food animal practice.” Conclusion 1 of the NAS report states in part “societal needs for veterinary expertise are substantial and growing, but the potential contributions of veterinary medicine are not realized because appropriate positions in relevant sectors are lacking.” Although there are many reasons why there has not been adequate public sector financial support of veterinary education and opportunities, one clear reason is the lack of awareness of the public and decision-makers, and indeed many early career veterinary students, as to the value, skills, and broad interdisciplinary capabilities of veterinarians. To enhance the ability of the veterinary profession to better meet societal needs and to provide more opportunities for employment for veterinarians, it is critically important to increase public awareness of the skills, abilities, and broad-based training of veterinarians.

### **RESOLUTION:**

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians strongly urge the American Veterinary Medical Association to develop and implement an action plan to lead a public relations campaign with a goal to raise public and professional awareness of the breadth of skills of veterinarians in diagnostic and regulatory medicine and the contribution of veterinary medicine to public, animal, and environmental health.

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**RESOLUTION NUMBER: 3 NOT APPROVED, REFERRED TO EXECUTIVE COMMITTEE**

**SOURCE: USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS**

**SUBJECT MATTER: NEAR REAL-TIME MAPPING OF HIGH QUALITY VETERINARY DIAGNOSTIC LABORATORY DATA FOR IMPROVED ANIMAL HEALTH SITUATIONAL AWARENESS**

### **BACKGROUND INFORMATION:**

When animal morbidity and mortality is suspected, the first step is to verify the diagnosis and establish the existence of an outbreak. Veterinary diagnostic laboratories (VDLs) do an outstanding job of accomplishing this in partnership with their clients---practicing veterinarians, producers, and animal owners. One of the final steps of outbreak investigation is to communicate the findings. Laboratory testing results are communicated back to a lab client via a diagnostic case report that is mailed, faxed, emailed, or made available via an

## REPORT OF THE COMMITTEE

electronic portal. Once the case is finalized and distributed, the communication is concluded. In other words, most veterinary diagnostic laboratories in the United States routinely utilize testing results to benefit the health of only one animal or a group of animals on one premises. On the other hand, near real-time mapping of various VDL data streams (diagnostic test result such as diagnoses, etiologies, sensitivity testing) provide situational awareness for animal health (better communication of lab findings while still maintaining full confidentiality). Early recognition of animal health problems leads to quicker medical responses and better health outcomes. The real beauty of VDL data streams is that they originate in laboratories that are, for the most part, fully accredited by the American Association of Veterinary Laboratory Diagnosticians to the ISO 17025 standard and incorporate some of the best quality control and assurance available with respect to method development, test validation, proficiency testing and beyond.

### **RESOLUTION:**

The American Association of Veterinary Laboratory Diagnosticians and the United States Animal Health Association support the development and implementation of a national and regional Geographical Information System (GIS) mapping pilot project of high quality data streams captured by veterinary diagnostic laboratories to improve animal health situational awareness of reportable and non-reportable animal diseases.

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**RESOLUTION NUMBER: 4 AND 7 COMBINED    APPROVED**  
**SOURCE: COMMITTEE ON EQUINE**  
**COMMITTEE ON INTERSTATE AND INTERNATIONAL COMMERCE**  
**SUBJECT MATTER: MICROCHIP IDENTIFICATION OF IMPORTED**  
**HORSES**

### **BACKGROUND INFORMATION:**

The United States (US) equine industry recognizes the need for implementation of enhanced identification and traceability. Over the last five years, breed organizations such as The Jockey Club and discipline organizations such as the United States Equestrian Federation have implemented regulations requiring horses to be microchipped. Additionally, organizations such as the American Quarter Horse Association and the United States Trotting Horse Association are drafting proposals for utilization of microchips within their breed. With this increasing domestic microchip identification of horses, there is a recognized need for required microchips on imported horses.

With increased global livestock movement, the disease risk is greater to the US horse population. This may be manifested by introduction of various diseases through imported horses. Therefore, traceability of these animals is a critical element in the protection of the US horse population. Lack of a traceable, reliable and permanent identification system for horses imported

## NOMINATIONS AND RESOLUTIONS

into the US makes it difficult to conduct trace back of animals that are potentially infected with or exposed to an infectious disease.

The committee recognizes similar resolutions regarding microchip for imported horses were presented in 2008 (Resolution 27) and in 2014 (Resolution 16). The responses to these resolutions indicated that due to a lack of domestic use of microchips there could be no international requirement. The significant advances in implementation of required microchips in the domestic horse population warrant a change in approach to import regulations for imported horses.

### **RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to revise the Code of Federal Regulations to require all equids imported into, or returning to, the United States be identified with an implanted radio frequency identification (RFID) microchip that complies with the International Organization for Standardization 11784 and 11785 standards (134.2 kHz), unless already implanted with a readable 125 kHz microchip. Universal RFID readers should be present at all import centers and border stations to read both 125 and 134.2 kHz microchips. Additionally, the USAHA urges USDA-APHIS-VS to, at the time of equid importation into the United States, record microchips of imported equidae and electronically capture microchip data in a searchable database accessible to animal health officials during a disease investigation.

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### **RESOLUTION NUMBER: 5    APPROVED AS AMENDED**

#### **SOURCE: COMMITTEE ON EQUINE**

#### **SUBJECT MATTER: EQUINE INFECTIOUS ANEMIA TESTING FOR HORSES IMPORTED THROUGH SOUTHERN BORDER PORTS**

#### **BACKGROUND INFORMATION:**

Horses imported from Mexico have been identified as a high risk population of horses which pose a significant risk to the health of the national equine population. Over the past few years, there have been numerous horses confirmed to be infected with Equine Infectious Anemia (EIA) at the southern border ports. Mexico importers recognize the issue and one importer has suggested to the United States Department of Agriculture (USDA) port veterinarian that positive horses identified in the United States (US) be branded to prevent dissemination of disease. USDA policy is to reject entry of EIA positive horses and their cohorts. However, while awaiting test results these positive horses remain in the border pens with insect vectors which have the potential to spread disease to all horses in the pens at the Mexican border. These exposed horses enter the United States incubating disease and have the potential to distribute EIA infection throughout the United States. Additionally, once rejected the exposed horses

## REPORT OF THE COMMITTEE

are not tracked or monitored and have the potential for re-presentation at the same border port or another Mexican border port. Lastly, the official EIA test used for entry purposes is the agar gel immunodiffusion test which has the potential for not identifying early incubation of the disease agent. With the prevalence of disease in Mexico, the border port identification challenges, the lack of vector control at the ports and the challenges in diagnostic testing, additional measures are necessary to protect the health of the US equine population.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to take the following actions regarding equine entering through the southern border ports:

1. Implement a 45-90 day pre-import negative Equine Infectious Anemia (EIA) Agar Gel Immunodiffusion (AGID) test requirement for all equidae entering through a Southern Border Port. Test must be performed by a Laboratory Approved by the National Government Animal Health Authority.
2. Require a statement on the importing health certificate which states "Between the time of EIA test and export, the equid has not been on an EIA infected premises or exposed to an EIA positive equid."
3. The positive equid and all exposed equidae in the lot with the EIA reactor animal shall be requested to be microchipped and the identification information be recorded in a searchable database. This database shall be developed to have the ability to identify and recognize these equidae and prevent the exposed equidae from being allowed entry for 45 days.

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**RESOLUTION NUMBER: 8 APPROVED**

**SOURCE: COMMITTEE ON INTERSTATE AND INTERNATIONAL COMMERCE**

**SUBJECT MATTER: IDENTIFICATION AND DOCUMENTATION OF CATTLE IN COMMERCE**

**BACKGROUND INFORMATION:**

On March 11, 2013, the United States Department of Agriculture (USDA) Animal Disease Traceability (ADT) rule became effective. Under the final rule, unless specifically exempted, livestock moving interstate must be officially identified and accompanied by an interstate certificate of veterinary inspection. Owner-shipper statements or brand certificates may be used in certain circumstances when shipping and receiving states agree to alternative movement documentation. Beef breed stocker/feeder cattle less than 18 months of age are exempted from the ADT rule regarding official identification unless they are destined to an exhibition, show, rodeo,

## NOMINATIONS AND RESOLUTIONS

or recreational event. At that time, states were encouraged to issue official National Uniform Eartagging System (NUES) tags to producers to identify livestock.

Traceability has improved since the implementation of the ADT rule. There continues to be gaps in the ability of states to trace diseased cattle back to their premises of origin. States have encountered challenging problems such as improper administration of NUES tags, errors in recording NUES tags, and lost time and errors in transcribing information from paper forms into easily searchable databases to trace cattle in some disease cases.

The cattle industry, the United States Department of Agriculture, and State Animal Health agencies rely on traceability to control and respond to disease incidents quickly, facilitate business continuity in the event of a disease outbreak, and satisfy domestic consumers and international trading partners. To be more effective and efficient in these tasks, the United States' cattle traceability program must be strengthened.

While it is expected that increased efficiency and decreased labor costs will allow the industry to purchase tags and equipment and maintain equipment after the program is in place and functioning properly, it is equally expected that the USDA will provide seed money to states and/or industry for the same. The successful implementation of a conversion to electronic identification (ID) from NUES tags will depend on the ability to negotiate a cost sharing agreement between the involved parties.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and State Departments of Agriculture, Animal Health Commissions, and Boards of Animal Health to set a mandatory date of January 1, 2021 to discontinue allowing visual only tags (including NUES tags) to be applied as official identification (ID) and a date of January 1, 2023 for all cattle and bison which are currently required to be officially identified under the rule to have electronic official ID tags which meet the standards defined by the USDA.

USDA shall be responsible for determining the specifications of the electronic official ID tags and reading equipment on or before July 1, 2019 after consultation with technology companies, industry, and other countries that have successfully implemented electronic ID programs. Official electronic ID tags must be read at the speed of commerce. Cattle and bison shall be identified prior to or when they leave their premises of birth or at the first point of commingling. Traceability to the premises of birth shall be maintained. Federal and State cost sharing shall be considered.

Federal/State Agencies, Industry, and Technology Companies shall ensure cost sharing for this project.

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REPORT OF THE COMMITTEE

**RESOLUTION NUMBER: 9    APPROVED**  
**SOURCE: COMMITTEE ON FARMED CERVIDAE**  
**SUBJECT MATTER: BRUCELLOSIS TESTING IN FARMED CERVIDAE**  
**BACKGROUND INFORMATION:**

Over the last 50 years of bovine brucellosis eradication in cattle in the United States, elk and bison in the Greater Yellowstone Area (GYA) have been an impediment to the completion of the Program. Whitetail deer, mule deer, and elk in the other 47 brucellosis free states have never been identified as being either a reservoir for the disease or a public health risk in regard to being infected with *Brucella abortus* or transmitting the agent.

The elk in the GYA are not privately owned or controlled, and it is presently illegal to trap, possess, or transport these free-ranging elk privately. Therefore, they cannot legally enter animal commerce channels and are not an issue in regard to interstate shipment of brucellosis-infected elk.

In 2013, the United States Animal Health Association membership approved a resolution to eliminate interstate *Brucella* testing requirements for whitetail deer and mule deer.

**RESOLUTION:**

- 1) The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to eliminate brucellosis testing requirements for interstate movement of farmed elk, red deer, and other cervid species that originate outside of the Greater Yellowstone Area (GYA) if and when a federal rule for Brucellosis is published.
- 2) The United States Animal Health Association urges state regulatory officials to eliminate brucellosis testing requirements for interstate movement of farmed elk, red deer, and other cervid species that originate outside of the Greater Yellowstone Area (GYA).

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**RESOLUTION NUMBER: 10    APPROVED**  
**SOURCE: COMMITTEE ON FARMED CERVIDAE**  
**SUBJECT MATTER: FARMED CERVID TB HERD CERTIFICATION**  
**TESTING INTERVALS**  
**BACKGROUND INFORMATION:**

The primary objective of the cervid bovine tuberculosis (bTB) herd accreditation program is to eliminate *Mycobacterium bovis*, the causative agent of bTB, in farmed cervids as part of a comprehensive approach to eradicate bTB in domestic cattle and bison in the United States. All farmed cervids destined for interstate movement are required to be tested for bTB.



## NOMINATIONS AND RESOLUTIONS

To establish an Accredited Free herd in the United States Department of Agriculture, Animal and Plant Health Inspection Service Cervid bTB Herd Accreditation Program, the entire herd of cervids over 12 months of age must have two negative tests in 9-15 month intervals. The accreditation is valid for 33 to 39 months from the original anniversary date and a negative whole herd retest must be performed in that period of time to maintain the accredited herd status. Animals from Accredited Free herds are allowed to be moved interstate at any time without additional testing. Details on the bTB testing requirements for interstate movements of cervids from monitored herds, qualified herds, and accredited herds from modified accredited States and zones are provided in the federal regulations (Title 9 Code of Federal Regulations (CFR) Parts 77 and 86) and in the 1999 Uniform Methods and Rules (UM&R) on Bovine Tuberculosis Eradication.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to modify the tuberculosis test requirements for maintaining cervid accredited herd status described in Title 9 Code of Federal Regulations (CFR) Part 77.35 to allow the test interval to be extended to 5 years for certain cervid herds if all of the following requirements have been met:

1. The cervid herd has continuously maintained accredited status for at least 6 years following initial herd accreditation.
2. Since initial herd accreditation, all non-natural additions to the accredited cervid herd have come from other accredited cervid herds only.
3. No evidence of bovine tuberculosis has been disclosed in either cattle or cervidae (wild or farmed) in the state or zone within the state in which the cervid accredited herd is located for the most recent 6 years.

Further, if bovine tuberculosis has been disclosed in either cattle or cervidae (wild or farmed) in a state or designated zone within the state in which the cervid accredited herd is located within the most recent 6 years, the test interval for maintaining cervid accredited status will be 3 years.

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**RESOLUTION NUMBER: 12 APPROVED**

**SOURCE: COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY**

**SUBJECT MATTER: STANDARDS FOR LABELING REQUIREMENTS  
FOR FETAL BOVINE SERUM**

**BACKGROUND INFORMATION:**

The animal serum industry and its products, especially Fetal Bovine Serum (FBS), have suffered reputational damage over the years due to issues with product integrity and traceability.

## REPORT OF THE COMMITTEE

In 2006, serum producers organized the International Serum Industry Association (ISIA), which established ethics and industry standards and set the stage for improving the industry's reputation through audit and certification processes.

Notwithstanding this effort, in 2013 an incident occurred via discovery that over a five-year period (2008-2013) an estimated 280,000 liters of FBS had been adulterated and mislabeled. United States (US) and European authorities were alerted and measures were taken to recall the unused products. The company involved has since gone out of business, but the consequences of this incident on research projects, diagnostic lab results, and vaccine producing companies is still unknown. It is possible that years of research may have been adversely affected, as well as the accuracy of diagnostic test results, safety of vaccines, and the reproducibility of protocols. The recall alert stated that FBS may have been adulterated with "adult bovine serum albumin (BSA) of US origin, water and/or cell growth promoting additives...in varying portions...ranging from 23-50% of the products composition..." Furthermore, it appeared that some lots were inaccurately represented as to their origin. Estimates were that the company involved in this incident controlled up to 25% of the worldwide market for FBS.

Because the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service does not have authority to directly regulate the serum industry and animal serum products, their involvement in this incident and other reported cases is limited to preventing the adverse effects questionable products may have on individual licensees of Veterinary Biologic products. FBS used by researchers, constituting approximately one third of all serum produced and used in the US, is not regulated. Therefore, in most cases, the serum producer is not held accountable by USDA in the event of issues with its products and their potential adverse effects.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to study the possibility of requesting authority and/or amending existing regulations, which would support standards for labeling requirements for all Fetal Bovine Serum products, as well as penalties and recall responsibilities.

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**RESOLUTION NUMBER: 14    APPROVED**  
**SOURCE: COMMITTEE ON SWINE**  
**SUBJECT MATTER: STATE ANIMAL HEALTH OFFICIAL AND**  
**SUBMITTING VETERINARY DIAGNOSTIC LAB ACCESS TO**  
**VETERINARY DIAGNOSTIC LABORATORY RECORDS REPORTED**  
**FROM THE NATIONAL ANIMAL HEALTH LABORATORY**  
**NETWORK LABS AND THE NATIONAL VETERINARY SERVICES**

## NOMINATIONS AND RESOLUTIONS

### **LABORATORY TO THE UNITED STATES DEPARTMENT OF AGRICULTURE'S LABORATORY MESSAGING SERVICE**

#### **BACKGROUND INFORMATION:**

The United States Department of Agriculture's (USDA) Laboratory Messaging Service (LMS) is a database application that serves as the centralized point of receipt for electronic veterinary diagnostic records being reported from National Animal Health Laboratory Network (NAHLN) labs to the USDA. LMS also receives test results being reported from cases forwarded from NAHLN labs to the USDA, Animal and Plant Health Inspection Service (APHIS), National Veterinary Services Laboratory (NVSL) for further diagnostic testing. Significant advances have been made in the NAHLN's ability to electronically transfer (message) veterinary diagnostic records from NAHLN labs and NVSL to LMS. These stepwise improvements in connectivity between veterinary diagnostic laboratories (VDLs) and USDA represent great progress towards establishing seamless and scalable systems of reportable disease veterinary diagnostic information transfer between United States VDLs and veterinary medical officials. However, USDA does not currently have an effective application for providing State Animal Health Officials (SAHOs) electronic access to the VDL records received into LMS that have originated from animals or farm sites in their respective States. Similarly, NAHLN labs do not have electronic access to diagnostic results from case submissions in which they forward onto NVSL for further testing. Permissioned access solutions are needed to bridge this gap in connectivity that exists between the USDA's LMS, State Animal Health Officials, and VDLs.

The USDA response to a previous resolution referred to USDA, APHIS, Veterinary Services (VS) doing an assessment of 2016 capabilities and initial requirements. The response then included the intention to pilot test a state-based reporting solution to provide SAHOs with electronic access to veterinary diagnostic laboratory results that have been electronically reported to USDA, APHIS, VS using the VS LMS during the spring of 2018. Pending the successful pilot, the web-based software would be fully deployed by October 1, 2018.

#### **RESOLUTION:**

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians encourage the United States Department of Agriculture (USDA) to

1. Work with State Animal Health Officials (SAHOs) and industry to determine the requirements for a web-based reporting software solution and then develop an application that provides SAHOs electronic access to veterinary diagnostic laboratory records originating from animals or farm sites within their respective States that have been reported from National Animal Health Laboratory Network Labs or USDA, Animal and Plant Health Inspection Service

## REPORT OF THE COMMITTEE

(APHIS), National Veterinary Services Laboratory (NVSL) to USDA's Laboratory Messaging Service,

2. Provide veterinary diagnostic laboratories electronic access to diagnostic results from case submissions which that same veterinary diagnostic laboratory has forwarded onto USDA, APHIS, NVSL for further testing, and
3. Work with State Animal Health Officials and industry to ensure the full deployment of the web-based software solution resulting from the 2018 pilot project if the project meets the previously determined launch date of October 1, 2018.

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**RESOLUTION NUMBER: 15 APPROVED AS AMENDED**

**SOURCE: COMMITTEE ON SWINE**

**SUBJECT MATTER: A NATIONALLY-COORDINATED BIO-SURVEILLANCE SYSTEM THAT RAPIDLY DELIVERS REAL-TIME DATA FOR ANALYSIS TO IMPROVE FOREIGN ANIMAL DISEASE DETECTION**

### **BACKGROUND INFORMATION:**

As United States (US) animal agriculture has become increasingly dependent on exports it is imperative that there are adequate resources in place to prevent, diagnose, and respond to Foreign Animal Disease (FAD) outbreaks. For example, an outbreak of Foot and Mouth Disease (FMD) would immediately close all export markets. The cumulative impact of an outbreak on the beef and pork sectors over a 10-year period would be more than \$128 billion. The annual jobs impact of such reduction in industry revenue is 58,066 in direct employment and 153,876 in total employment. Corn and soybean farmers would lose \$44 billion and nearly \$25 billion, respectively, making the impact on these four industries alone almost \$200 billion.

These costs can only be mitigated if the US can mount a swift and thorough response once FMD is detected within our borders. Delay in detection of FMD or any other regulatory foreign animal disease risks a fatal delay in response.

On April 12-13, 2017, more than twenty-six representatives from the US swine industry, State Animal Health Officials (SAHOs), federal animal health officials, and academia came together for a common priority to discuss protecting swine health and developing a national bio-surveillance system for the US swine industry. Specific key elements and recommendations captured in the final report from the discussions at the workshop can apply to all animal protein species. The group agreed that a national surveillance vision should be risk-based, real-time, reliable (accurate information), efficient, representative, and integrate data in a timely manner so disease events can be identified quickly.

## NOMINATIONS AND RESOLUTIONS

### Some Across-species Key Elements of an Optimal Risk-Based Comprehensive Disease Preparedness System

1. Supports prevention, preparedness, response, mitigation, and recovery from foreign and emerging animal diseases of concern
2. Includes a process for prioritizing, evaluating, implementing, and revising surveillance objectives
3. Includes feed and other common production inputs
4. Utilizes standardized, electronic, real-time data capture for data that will support risk-based preparedness
5. Facilitates communication between existing industry, state, and federal disparate response and database systems
6. Produces timely action oriented executive summary information for “rapidly digestible situational awareness”

FADs, including FMD, classical swine fever and African swine fever, are often clinically (visually) indistinguishable from other endemic, non-regulatory diseases. A Twenty-first Century approach to FAD surveillance is needed to quickly identify an outbreak and achieve meaningful disease response and business continuity capabilities that will drive sustainable production in the US animal protein industries in the event of a foreign animal disease that threatens to disrupt trade and commerce.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture to collaborate with stakeholders to organize and facilitate a meeting of animal protein commodity organizations, state animal health officials, and other critical stakeholders to discuss the following key elements to help achieve progress in developing an optimal nationally-coordinated bio-surveillance system that rapidly delivers real-time data for analysis to improve foreign animal disease detection.

### Some Across-species Key Elements of an Optimal Risk-Based Comprehensive Disease Preparedness System

1. Supports prevention, preparedness, response, mitigation, and recovery from foreign and emerging animal diseases of concern
2. Includes a process for prioritizing, evaluating, implementing, and revising surveillance objectives
3. Includes feed and other common production inputs
4. Utilizes standardized, electronic, real-time data capture for data that will support risk-based preparedness
5. Facilitates communication between existing industry, state, and federal disparate response and database systems
6. Produces timely action oriented executive summary information for “rapidly digestible situational awareness”

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**RESOLUTION NUMBER: 17 APPROVED**  
**SOURCE: COMMITTEE ON CATTLE AND BISON**  
**SUBJECT MATTER: PERMITTED RESEARCH ON *BRUCELLA***  
***ABORTUS* AS A SELECT AGENT**

**BACKGROUND INFORMATION:**

Select Agent regulations restrict possession, transfer, and use of select agents and toxins to protect the Nation from terrorist attacks. The restrictions have been highly effective in limiting access to dangerous agents and toxins by unauthorized individuals.

Unfortunately, opportunities for important research on *Brucella abortus*, a disease endemic in Greater Yellowstone Area (GYA) wildlife, has also been severely limited by these same regulations. The National Academy of Sciences recently published a report titled, Revisiting Brucellosis in the Greater Yellowstone Area, and concluded that brucellosis research is not only critical but should be expanded in response to the spread of brucellosis in the Greater Yellowstone Area.

*Brucella abortus* research restrictions have recently been clarified in an August 18, 2017, memo from the Department of Health and Human Services and the United States Department of Agriculture (USDA) titled, FSAP Policy Statement: Non-Exclusion of Study-Related Activities Involving Naturally Infected Animals. The memo clarified that it is not permissible to:

- “Remove an animal which is naturally infected with a select agent from its natural environment to an artificially established environment for the purpose of the intentional exposure or introduction of a select agent to a naïve or experimental animal, or
- Introduce a naïve animal to a natural environment where there is an animal which is naturally infected with a select agent for the purpose of the intentional exposure or introduction of a select agent to the naïve or experimental animal.”

These limitations leave the Biosafety Level 3 (BSL-3) Agricultural Research Service facility at Ames, Iowa as the only United States facility capable of conducting brucellosis pathogenesis studies in a laboratory setting. Further, these restrictions preclude any pathogenesis studies under field conditions based on natural transmission of disease in either wildlife or livestock. Therefore, studying vaccine response in cattle, elk, or domestic bison in the Greater Yellowstone Area due to natural infection is no longer possible.

As the disease is continuing to expand, the tools previously available to address the problem have become unavailable.

**RESOLUTION:**

The United States Animal Health Association (USAHA) strongly urges that within the Select Agent regulations, the United States Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS) permit brucellosis research studies on pathogenesis under field conditions in endemic areas based on natural transmission of disease.

## NOMINATIONS AND RESOLUTIONS

Further, the USAHA urges the USDA and DHHS to vigorously work to remove *Brucella abortus* from the Select Agent list.

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**RESOLUTION NUMBER: 18 APPROVED**

**SOURCE: COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES**

**SUBJECT MATTER: H5/H7 LOW PATHOGENIC AVIAN INFLUENZA  
RESPONSE**

### **BACKGROUND INFORMATION:**

The National Poultry Improvement Plan (NPIP) is the Federal government's poultry disease control program administered in cooperation with state animal health officials and poultry producers. The General Conference Committee (GCC) of the NPIP is the Official Federal Advisory Committee to the Secretary of Agriculture on matters pertaining to poultry health. Among other duties, the GCC is responsible for advising and making recommendations to the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) on maintaining adequate NPIP funding to enable the Senior Coordinator to fully administer NPIP Provisions, advise USDA, APHIS with respect to administrative procedures and interpretations of the NPIP Provisions as contained in Title 9 Code of Federal Regulations, and to serve as a direct liaison between the NPIP and the United States Animal Health Association.

In 2002 H7N2 Low Pathogenic Avian Influenza (LPAI) was identified in North Carolina, Virginia, and West Virginia costing producers hundreds of millions of dollars. A surveillance program was not in place to detect the potential spread of Avian Influenza (AI). In response, the NPIP LPAI program was created to provide an incentive for regular AI surveillance and to protect poultry producers through indemnification and compensation should H5/H7 LPAI be found.

AI remains a concern for poultry producers in the US with the H5N2 Highly Pathogenic Avian Influenza (HPAI) in 23 states in 2014–2015; H7N8 HPAI/LPAI in Indiana in 2016, H5N2 LPAI in Wisconsin in 2017, and H7N9 HPAI/LPAI in Tennessee, Alabama, Kentucky, and Georgia in 2017. The NPIP is the only Federal program responsible for H5/H7 LPAI surveillance, response, and containment activities. HPAI flocks are fully indemnified and compensated by USDA, APHIS, VS; however, indemnity and compensation for H5/H7 LPAI flocks is under discussion by VS. Disruption of indemnity and compensation for H5/H7 LPAI can result in loss of confidence and trust, and could potentially create a harmful impact on future responses to H5/H7 LPAI. This loss of confidence and trust discourages poultry producers (commercial, independent growers, and small flocks) from fully complying with NPIP testing programs and cooperating with state and Federal regulatory authorities. Without dedicated funding for LPAI indemnity and compensation, there is no incentive for producers to participate in voluntary NPIP programs.

## REPORT OF THE COMMITTEE

### **RESOLUTION:**

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services provide a clear policy on H5/H7 Low Pathogenic Avian Influenza (LPAI) indemnity, compensation, and Initial State Response and Containment Plans. USAHA requests that policy be developed with input, participation, and feedback from the National Poultry Improvement Plan (NPIP) Participants, Official State Agencies, and the NPIP, General Conference Committee. Changes will be presented to delegates for discussion and voting at the 2018 NPIP Biennial Conference. In addition, the USAHA requests that Congress appropriate new, no-year, mandatory fiscal appropriations dedicated for LPAI indemnity and compensation to ensure continued participation in NPIP H5/H7 LPAI programs.

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**RESOLUTION NUMBER: 19    APPROVED**

**SOURCE: COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES**

**SUBJECT MATTER: H5/H7 LOW PATHOGENIC AVIAN INFLUENZA PROGRAM**

### **BACKGROUND INFORMATION:**

The National Poultry Improvement Plan (NPIP) is the Federal government's poultry disease control program administered in cooperation with state animal health officials and poultry producers. The General Conference Committee (GCC) of the NPIP is the Official Federal Advisory Committee to the Secretary of Agriculture on matters pertaining to poultry health. Among other duties, the GCC is responsible for advising and making recommendations to the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) on maintaining adequate NPIP funding to enable the Senior Coordinator to fully administer NPIP provisions, advise USDA, APHIS with respect to administrative procedures and interpretations of the NPIP provisions as contained in Title 9 Code of Federal Regulations, and to serve as a direct liaison between the NPIP and the United States Animal Health Association.

In 2002 H7N2 Low Pathogenic Avian Influenza (LPAI) was identified in North Carolina, Virginia, and West Virginia costing producers hundreds of millions of dollars. A surveillance program was not in place to detect the potential spread of Avian Influenza (AI). In response, the NPIP LPAI program was created to provide an incentive for regular AI surveillance and to protect poultry producers through indemnification and compensation should H5/H7 LPAI be found.

AI remains a concern for poultry producers in the United States with the H5N2 Highly Pathogenic Avian Influenza (HPAI) in 23 states in 2014–2015; H7N8 HPAI/LPAI in Indiana in 2016, H5N2 LPAI in Wisconsin in 2017, and H7N9 HPAI/LPAI in Tennessee, Alabama, Kentucky, and Georgia in 2017.



## NOMINATIONS AND RESOLUTIONS

The NPIP is the only Federal program responsible for H5/H7 LPAI surveillance, response, and containment activities. Disruption of prevention and surveillance activities for H5/H7 LPAI will result in loss of confidence and trust, and could potentially create a harmful impact on future responses to H5/H7 LPAI. This loss of confidence and trust discourages poultry producers (commercial, independent growers, and small flocks) from fully complying with NPIP testing programs and cooperating with state and Federal regulatory authorities.

### **RESOLUTION:**

The United States Animal Health Association urges Congress to increase funding for the avian health commodity line item appropriation.

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### **RESOLUTION NUMBER: 20 APPROVED**

**SOURCE: COMMITTEE ON SHEEP, GOATS AND CAMELIDS**

**SUBJECT MATTER: MINOR USE ANIMAL DRUG PROGRAM**

### **BACKGROUND INFORMATION:**

The approval of animal drugs for use in minor species is critical to the appropriate treatment of sheep, goat, and camelid disease and to the maintenance of animal health. The Minor Use Animal Drug (MUAD) Program provides much-needed and valuable service to the sheep, goat, and camelid industries throughout the United States. Strategies to prevent antimicrobial resistance and promote antimicrobial stewardship, an issue of emerging importance, depend on accurate recommendations on therapeutic regimen and withdrawal periods for responsible extra-label use of medications in small ruminants. The continued work of the MUAD Program will be essential to the sustainability and growth of the industry through the availability of the United States Food and Drug Administration-approved medications for use in sheep, goats, and camelids.

The United States Animal Health Association (USAHA) appreciates and supports the efforts of the MUAD Program. The research conducted under this program will be essential to the sustainability of the small ruminant industries and to the maintenance of sheep and goat health. USAHA acknowledges the importance of research conducted under the MUAD Program. It is further noted that the Minor Use/Minor Species Grant Program relates only to projects with protocol concurrence, and that the MUAD Program is critical in providing information essential to food safety and animal care and welfare of sheep, goats, camelids and other minor species.

### **RESOLUTION:**

The United States Animal Health Association urges Congress to authorize a permanent funding mechanism for the Minor Use Animal Drug Program and urges the United States Food and Drug Administration and the United States Department of Agriculture to include permanent funding for the

## REPORT OF THE COMMITTEE

Minor Use Animal Drug Program in their budget requests at a level that meets the needs of minor use and minor species requests.

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**RESOLUTION NUMBER: 21    APPROVED**

**SOURCE: COMMITTEE ON SHEEP, GOATS AND CAMELIDS**

**SUBJECT MATTER: NATIONAL SCRAPIE ERADICATION PROGRAM FUNDING**

### **BACKGROUND INFORMATION:**

Due to the success of the cooperative National Scrapie Eradication Program, no new cases of scrapie have been identified in the United States (US) in the past 18 months. There are key components of the program that have been critical to this success and the effort to have the US be recognized internationally as free from scrapie, which would open new markets to US sheep and goat products. Surveillance and traceability are vital to this eradication program. Program use of sheep and goat official tags have demonstrated that official plastic tags are preferred over metal tags for readability and to reduce safety concerns. Funding for tags that are readable, acceptable to producers and efficient for regulators is essential to continue identification compliance and progress of the program.

### **RESOLUTION:**

The United States Animal Health Association urges the United States Secretary of Agriculture to request a congressional appropriation of five million additional dollars of new money to be added to the Equine, Cervid and Small Ruminant health line for the purpose of supporting Small Ruminant Health Programs to complete the eradication of scrapie and assure program success. It is vital that this new funding does not reduce other current United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services program funding lines.

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**RESOLUTION NUMBER: 23    APPROVED AS AMENDED**

**SOURCE: COMMITTEE ON WILDLIFE AND CAPTIVE WILDLIFE**

**SUBJECT MATTER: ANNUAL REPORTING ON CHRONIC WASTING DISEASE EPIDEMIOLOGICAL DATA**

### **BACKGROUND INFORMATION:**

Chronic wasting disease (CWD) has been recognized in wild cervids since the 1980's. Availability of complete epidemiological information is critical for evaluating the effectiveness of science-based disease control programs. Access to pertinent information from epidemiological investigations across the country in wild populations is imperative to developing success strategies for managing the disease.

## NOMINATIONS AND RESOLUTIONS

More comprehensive information is needed on CWD epidemiology in the affected wild populations. Analysis of data from CWD affected populations across the country will improve risk assessment. Comprehensive epidemiological data evaluation may potentially identify factors contributing to the detection of CWD, enhance mitigation strategies to reduce the likelihood of CWD in new populations, and facilitate its earliest detection when it is present.

### **RESOLUTION:**

The United States Animal Health Association (USAHA) Requests The United States Department Of Agriculture (USDA), Animal And Plant Health Inspection Service, Veterinary Services and other appropriate federal and state agencies to work cooperatively to assemble, analyze, summarize, and make available annually to the Committee on Wildlife And Captive Wildlife at the usaha meeting all pertinent information from epidemiological investigations of Chronic Wasting Disease (CWD) in cervid populations (including wild, free-ranging, and captive). Specific Information Requested May Include:

- 1) Compiled CWD testing data from each state to include:
  - a) Overall state testing numbers of each susceptible species tested;
  - b) Number of CWD positive tests found annually in each state;
  - c) Overall state testing in wild populations;
  - d) Prevalence of CWD in positive populations;
  - e) Population totals for each susceptible species of wild herds in each state;
  - f) Demography of positive and negative animals in infected herds;
  - g) Results from all tissues that were tested;
  - h) Duration of monitoring prior to detection of the first case - including numbers of animals in the herd, numbers tested, and numbers not tested;
  - i) Results of trace-forward and trace-back investigations; and
  - j) All other pertinent data that will enhance risk assessment of CWD in cervids and identification of effective mitigation measures.
- 2) Compiled data should also be posted on the USDA website.

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**RESOLUTION NUMBER: 24    APPROVED**  
**SOURCE: COMMITTEE ON PARASITIC AND VECTOR BORNE DISEASES**  
**SUBJECT MATTER: DEVELOPMENT AND IMPLEMENTATION OF A CATTLE FEVER TICK CONTROL PROGRAM IN MEXICAN STATES BORDERING TEXAS**

**BACKGROUND INFORMATION:**

The Cattle Fever Tick Eradication Program (CFTEP), established in 1906, is the oldest livestock pest eradication program in the nation. CFTEP's mission is to eradicate fever ticks from the United States (US) and to prevent re-establishment of cattle fever ticks in the US. A permanent quarantine zone was established along the Texas side of the Rio Grande in 1943. Cattle fever ticks were eradicated from Texas in 1946, except for incursions across the river into the permanent quarantine zone and the free areas of Texas.

The establishment of the permanent fever tick quarantine zone in 1943 created a buffer zone between Mexico and the rest of the US to prevent and/or limit the incursion of fever ticks into the fever tick "free" areas of country. Since that time, successful maintenance of the permanent quarantine zone has been based on the systematic inspection and treatment of cattle maintained within the zone to detect and eradicate incursions of fever ticks from endemically infested wildlife hosts and cattle from Mexico. From the onset of the CFTEP, 100% treatment of all cattle on infested premises has proven to be the most effective method of eradicating cattle fever ticks. The successful eradication of fever ticks from the US in 1946 was primarily attributable to the 100% treatment requirement.

However, in the last twenty years, factors such as changes in land use transitioning away from cattle production to wildlife, recreational uses, and increasing wildlife populations, especially white-tailed deer, elk, red deer and Nilgai antelope, have complicated and challenged fever tick eradication efforts and thus, successful maintenance of the permanent quarantine zone. The CFTEP has incorporated additional treatment and preventative treatment methodologies, such as ivermectin-treated corn for treating white-tailed deer, treatment of cattle with doramectin, and the use of a fever tick vaccine in cattle to help offset the impact of these challenges, but has not completely mitigated the challenges because there are not any available treatments for fever tick infested Nilgai antelope and some other cattle fever tick hosts.

Despite the incorporation of new methodologies into the existing eradication program, fever tick infestations, both within and outside of the permanent quarantine zone, are expanding. The largest contributing factor to the expansion is the fever tick burden present on Mexican origin wildlife and livestock populations located along the Rio Grande in Mexico. Mexico does not have a fever tick eradication or control program that would decrease the fever tick population/burden on wildlife and livestock on the Mexican side of the Rio Grande. When coupled with the inadequacy of the Rio Grande river as a barrier, especially, for cattle fever tick infested wildlife, the unchecked fever tick population in Mexico will continue to cross the Rio Grande on infested wildlife and livestock, overwhelming the capability of the CFTEP to successfully maintain the efficacy of the buffer created by the permanent quarantine zone and resulting in ongoing incursions of fever ticks into the "free" areas of Texas, and potentially the rest of the US.

## NOMINATIONS AND RESOLUTIONS

### **RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service and Agriculture Research Service to collaborate with Mexican National Animal Health Officials, Mexican State Animal Health Officials from the Mexican states that border Texas, and Mexican livestock and wildlife industry representatives to develop and implement a fever tick control or eradication program that will reduce or eliminate the fever tick population along the Mexican side of the Rio Grande river, and thus the threat of fever tick incursion presented by wildlife and livestock populations across the Rio Grande from the permanent quarantine zone in Texas.

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### **RESOLUTION NUMBER: 25 APPROVED**

**SOURCE: COMMITTEE ON PARASITIC & VECTOR BORNE DISEASES**

**SUBJECT MATTER: ACCELERATED RESEARCH AND DEVELOPMENT FOR SUPPORT OF INTEGRATED ERADICATION**

**EFFORTS OF THE CATTLE FEVER TICK**

#### **BACKGROUND INFORMATION:**

Cattle Fever Ticks (CFT), known scientifically as *Rhipicephalus* (formerly *Boophilus*) *annulatus* and *Rhipicephalus microplus*, threaten the profitability and viability of the United States (US) livestock industry. These ticks transmit the agents causing bovine babesiosis, or cattle tick fever, and anaplasmosis, which can kill cattle. A dire need exists to find sustainable solutions for the current emergency situation with CFT in the US.

Efforts by the Cattle Fever Tick Eradication Program (CFTEP) have historically concentrated in the Permanent Quarantine Zone located in south Texas since CFT were eradicated from the rest of the US in 1943. Preventing the re-emergence of CFT into the US however is complicated because;

- CFT in Mexico continuously attempt to expand to the north
- CFT can be resistant to certain chemicals (also known as acaricides) used to kill ticks
- Complex interactions between CFT and exotic weeds along the transboundary region
- Stray livestock and wildlife crossing the Rio Grande from Mexico
- The significant increase of CFT infestations in White-Tailed Deer (WTD) and Nilgai.

WTD and Nilgai come in contact with cattle, and preserve CFT populations in the environment. These changes have recently led to multiple outbreaks of CFT involving cattle deep into South Texas, with the potential for this livestock pest to re-establish throughout the Southern US.

Integrated management practices that consider the new ecology of CFT and adaptation of precision agro-ecological practices are required to address the livestock-wildlife interface aspect of the problem. Development of novel technologies is also required to eliminate acaricide-resistant CFT.

## REPORT OF THE COMMITTEE

In collaboration between the CFT response, research and stakeholder communities, the following CFT priority research objectives have been developed, along with a projected annual research expenditure of approximately \$15 million dollars;

### **Research Objectives:**

1. Discovery and testing of new vaccines for control of cattle fever ticks and the Babesia pathogen
2. Develop alternative treatment methods for cattle
3. Field treatments for horses, corrals, pens, and pasture loafing areas
4. Develop methods for control of cattle fever ticks on Nilgai antelope
5. Improve effectiveness of treatments for infested deer
6. Identify, evaluate and release biological control agents from native range of cattle fever ticks in Southeast Asia and Europe.
7. Improve diagnostic detection of tick-infested/infected animals and pastures
8. Evaluation of rangeland vegetation that affects survival of cattle fever ticks
9. Development of artificial rearing systems for ticks to accelerate testing of vaccines, acaricides and biological control agents.
10. Outreach to South Texas ranchers, hunters and landowners to integrate eradication tactics and document sustainability of best practices

### **RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture, the National Assembly of State Animal Health Officials, and State Departments of Agriculture/Animal Health Commissions to recognize the critical importance of developing new and innovative technologies and tools to assist Cattle Fever Tick (CFT) responders in their ongoing fight to eradicate the CFT from Texas and the United States.

USAHA further urges the aforementioned groups to support to the extent legally permissible, mandatory research funding of \$15 million per year for the life of the next United States Farm Bill to help ensure achievement of the identified research objectives.

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**RESOLUTION NUMBER: 26 APPROVED**

**SOURCE: COMMITTEE ON PARASITIC & VECTOR BORNE DISEASES**

**SUBJECT MATTER: EPIZOOTIC HEMORRHAGIC DISEASE AND BLUE TONGUE VIRUS DATA**

**BACKGROUND INFORMATION:**

Epizootic Hemorrhagic Disease (EHD) and Blue Tongue Virus (BTV) are caused by a virus of the genus *Orbivirus* and are considered some of the most significant diseases affecting North American cervidae. The EHD and

## NOMINATIONS AND RESOLUTIONS

BTV viruses are wide spread and periodically cause serious epidemics in the cervid species. The diseases are carried by biting flies and occur on a seasonal basis.

These diseases infect and kill thousands of farmed and free ranging deer each year. There is little data compiled and disseminated by the United States Department of Agriculture, Animal and Plant Health Inspection Service that details the estimated number of deaths related to known EHD/BTV infections and the specific strains per state. Strains of EHD and BTV vary by state and by year.

### **RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to prepare a descriptive report to present at the 2018 USAHA Annual Meeting and each annual meeting, thereafter. The report shall include the following data that is available:

- 1) Number of estimated farmed cervid deaths related to Epizootic Hemorrhagic Disease (EHD) and Blue Tongue Virus (BTV) per state and cervid species in the previous year.
- 2) Number of estimated wild cervid deaths related to EHD and BTV per state and cervid species in the previous year.
- 3) Strains of EHD and BTV that have been known to be found in each state for both farmed and wild cervidae in the previous year.

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**RESOLUTION NUMBER: 27 APPROVED**

**SOURCE: COMMITTEE ON ONE HEALTH**

**SUBJECT MATTER: INCREASED FISCAL YEAR 2019 FUNDING FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, WILDLIFE SERVICES ORAL RABIES VACCINATION PROGRAM**

### **BACKGROUND INFORMATION:**

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Rabies Management Program (NRMP) has demonstrated through the strategic implementation of cooperative oral rabies vaccination (ORV) programs targeting wildlife to be cost-effective, while continuing to reduce rabies exposure and transmission among wildlife, livestock, pets and people. The World Organization for Animal Health (OIE) feels the most effective strategy to implement large scale rabies control efforts is at the source in animal (i.e., vector) populations. ORV programs are designed to immunize target wildlife species by increasing the percentage of rabies-immune animals within vaccination zones, resulting in the reduction of rabies cases, prevention of viral spread, and eventual rabies elimination.

## REPORT OF THE COMMITTEE

In early 2016, WS with federal, state, academic, and international experts developed a comprehensive strategy to implement Phase 2, elimination of raccoon rabies variant in the Eastern United States. WS also developed and initiated an Enhanced Rabies Surveillance Program with state cooperation throughout the Northeast, Atlantic, and adjacent Mid-West and Southern States to enhance early detection of rabies cases or translocation of animals with rabies. This resulted in detection of two raccoons with raccoon rabies variant west of the Virginia immune barrier in 2017 and immediate contingency baiting strategy by WS and the state to eliminate danger of spread to a new area.

Successful programs in Texas continue with rabies elimination in gray foxes, as well as ongoing studies on rabies control methodology in skunks and maintaining a protective immune barrier along the Mexican border to keep the United States free of coyote (canine) rabies and protect Texas from gray fox rabies reentry. The requested funding will allow USDA to:

- Fully implement and continue the enhanced rabies surveillance program.
- Implement contingency action in response to rabid animals in sensitive areas.
- Continue Phase 1 as outlined in the U.S. National Plan for Wildlife Rabies Management that maintains existing operational programs (immune zones) to control rabies in wildlife populations.
- Continue the investigation of novel and US-licensed vaccines and baits.
- Continue studies related to rabies control in skunks.
- Initiate Phase 2 of the national plan to eliminate raccoon rabies variant in the U.S.

### **RESOLUTION:**

The United States Animal Health Association requests the 117th Congress to appropriate a minimum of \$30 million for program management and contingency actions at the state level in the Fiscal Year 2019 budget line item for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Rabies Management Program.

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**RESOLUTION NUMBER: 28 AND 11 COMBINED    APPROVED**  
**SOURCE: COMMITTEE ON ONE HEALTH; COMMITTEE ON BIOLOGICS**  
**AND BIOTECHNOLOGY**  
**SUBJECT MATTER: FUNDING REQUEST IN THE 2018 FARM BILL FOR**  
**THE ELIMINATION OF RACCOON RABIES IN THE UNITED**  
**STATES**

### **BACKGROUND INFORMATION:**

Terrestrial wild animals are the primary sources of human and domestic animal exposures to rabies in the United States (US). Approximately 92.6% of reported rabies cases are confirmed in wildlife species, with rabid



## NOMINATIONS AND RESOLUTIONS

raccoons dominating the wild animal submissions. Domestic animals have accounted for approximately 50% of all animals submitted for testing to the Centers for Disease Control and Prevention during recent years, with an excess of 92 million cattle at risk of rabies exposure annually. Rabies is commonly misidentified in pastoral animals because individuals typically present with depression and an unwillingness to eat or drink, with the appearance of an obstruction in the mouth or throat that may result in multiple exposures to family members, farm employees, friends, neighbors, and veterinary personnel. Associated animal mortality and farm quarantines add to the direct economic losses that are sustained by the US agrarian industry. An estimated 40,000 people also receive costly post-exposure rabies treatments each year in the US. Approximately \$300 million was spent to live with rabies in the US during 2014. Presently, an expenditure of \$634 million/year is projected to combat a fatal virus that gravely impacts all mammalian species.

Annual vaccinations of domestic livestock herds are often considered too costly and in some cases, not even possible. Conversely, canine rabies in domestic dogs was eliminated several decades ago through widespread vaccination in the US. Continual vaccination of pets and livestock serves to decrease domestic animal and human exposures to the fatal rabies virus; however, it does nothing to resolve the disease in free-ranging wildlife vector species. Accordingly, baits containing federally licensed, oral rabies vaccines have been widely distributed to control and eliminate terrestrial rabies in wild animal populations in North America. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) presently coordinates Phase 1 of a cost-effective, National Rabies Management Program (NRMP), in cooperation with numerous state, local and federal agencies, universities, and other partners. Oral rabies vaccination (ORV) previously eliminated and continues to prevent incursions of canine rabies in south Texas coyotes and gray foxes along the US-Mexico border. Similarly, the ORV program has successfully sequestered raccoon rabies to the east coast and prevented costly westward viral advance into naïve states beyond the Appalachian Mountain Range. When implemented, Phase 2 of the NRMP seeks to systematically eliminate terrestrial rabies variants in the US. The local elimination of raccoon rabies from Long Island alone provided for cumulative financial benefits exceeding \$14 million in NY during 2016. Similarly, the Provinces of Ontario, Quebec and New Brunswick (Canada) have derived positive One Health and financial benefits by eliminating periodic incursions of raccoon rabies from New York and the New England States.

The North American Rabies Management Plan provides a firm foundation for the US, Canada, and Mexico to establish international partnerships to control and eliminate rabies. Recent pharmaceutical evolutions and bait developments have resulted in novel products that have enhanced rabies vaccination efficacy in raccoons and skunks, thereby providing advanced tools that have successfully eliminated raccoon and fox

## REPORT OF THE COMMITTEE

rabies variants in the US and Canada. Strategic planning has also been completed in the form of expert panels and a DELPHI process, to formulate wildlife vaccination strategies and establish associated costs that are required to definitively achieve the goal of raccoon variant elimination in North America. An increase of \$12.5 million, added to the current USDA APHIS\$ WS budget for wildlife rabies control, will facilitate initiation of Phase 2 of the National Rabies Management Plan. USDA will be provided with the means to implement a coordinated and systematic approach towards raccoon rabies elimination. The programmatic successes that have already been achieved in the US and Canada will be expanded. As rabies elimination milestones are achieved within regions and states, it is expected that funding will also become increasingly available from state and local partners to accelerate the ultimate goal of terrestrial rabies elimination in North America.

### **RESOLUTION:**

The United States Animal Health Association requests that the United States Congress add \$12.5 million in the 2018 Farm Bill for the current annual, United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services budget to initiate Phase 2 of the National Rabies Management Plan, raccoon rabies elimination in the United States.

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## COMMITTEE ON ONE HEALTH

Chair: Liz Wagstrom, IA

Vice Chair: Joni Schefftel, MN

Helen Acland, PA; Gary Anderson, KS; Robin Anderson, TX; Joseph Anelli, MD; Chris Ashworth, AR; James Averill, MI; Kay Backues, OK; Deanna Baldwin, MD; Karen Beck, NC; Justin Bergeron, ME; Kathe Bjork, CO; Richard Breitmeyer, CA; Paul Brennan, IN; Tom Burkgren, IA; Joseph Corn, GA; Michael Costin, IL; Stephen Crawford, NH; Tarrie Crnic, KS; Ignacio dela Cruz, MP; Thomas DeLiberto, CO; Jacques deMoss, MO; Barbara Determan, IA; Cristy Dice, CO; Leah Dorman, OH; Brandon Doss, AR; Tracy DuVernoy, MD; Anita Edmondson, CA; Brigid Elchos, MS; François Elvinger, NY; Anna Claire Fagre, CO; William Fales, MO; Heather Fenton, GA; John Fischer, GA; Allison Flinn, DC; Katie Flynn, CA; Patricia Foley, IA; Larry Forgey, MO; Heather Fowler, IA; Nancy Frank, MI; Tony Frazier, AL; Tam Garland, TX; Donna Gatewood, IA; Robert Gerlach, AK; Eric Gingerich, IN; K. Fred Gingrich II, OH; Gail Golab, IL; Timothy Goldsmith, MN; Michael Greenlee, WA; Jean Guard, GA; Scott Gustin, AR; Keith Haffer, SD; Rod Hall, OK; Steven Halstead, MI; Bill Hawks, DC; Kate Hayes, AL; Julie Helm, SC; Kristi Henderson, IL; Warren Hess, IL; Heather Hirst, DE; Christine Hoang, IL; Donald Hoenig, ME; Kristin Holt, GA; Danny Hughes, AR; Eric Jensen, AL; Annette Jones, CA; Anne Justice-Allen, AZ; Subhashinie Kariyawasam, PA; Donna Kelly, PA; Patrice Klein, DC; Michael Kopp, IN; Daniel Kovich, DC; Charlotte Krugler, SC; Todd Landt, IA; Emily Lankau, GA; Dale Lauer, MN; Elizabeth Lautner, IA; Chelsie Lawyer, IN; Jonathan Lebovitz, VA; Molly Jean Lee, IA; Donald Lein, NY; Anne Lichtenwalner, ME; Rick Linscott, ME; Mary Lis, CT; Lindsey Long, WI; Karen Lopez, DE; Mark Luedtke, MN; Margie Lyness, GA; Joanne Maki, GA; David Marshall, NC; Beatriz Martinez Lopez, CA; Rose Massengill, MO; Patrick McDonough, NY; Shirley McKenzie, NC; Caitlin McKenzie, WI; Katherine McNamara, VT; Scott McVey, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Gay Miller, IL; Sarah Mize, CA; Eric Mohlman, NE; Alfred Montgomery, DC; Susan Moore, KS; Brenda Morningstar-Shaw, IA; Lee Myers, GA; Thomas Myers, MD; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Skip Oertli, TX; Steve Olson, MN; Kristy Pabilonia, CO; Roger Parker, TX; William (Steve) Parker, GA; Janet Payeur, IA; William Pittenger, MO; David Pyburn, IA; Lisa Quiroz, CA; Valerie Ragan, VA; Shelley Rankin, PA; M. Gatz Riddell, AL; G. Donald Ritter, DE; Susan Rollo, TX; Gregorio Rosales, AL; Mark Ruder, GA; Larry Samples, PA; Roxana Sanchez-Ingunza, KS; John Sanders, WV; Travis Schaal, IA; Joni Schefftel, MN; David Schmitt, IA; Krysten Schuler, NY; Marc Schwabenlander, MN; Stacey Schwabenlander, MN; John Shaw, DC; Michael Short, FL; Richard Sibbel, IA; Tom Sidwa, TX; Kathryn Simmons, DC; Shri Singh, KY; Allison Siu, AL; David Smith, NY; Iga Stasiak, KY; Susan Stehman, PA; Patricia Stonger, WI; Kelly Straka, MI; Nick Striegel, CO; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Jane Teichner, FL; Belinda Thompson, NY; Beth Thompson, MN; Alberto Torres, AR; Bob Tully, KS; Jeff Turner, TX; Shauna Voss, MN; Liz Wagstrom, DC; Michele Walsh, ME; Doug Waltman, GA; Margaret Wild, CO; Ben Wileman, MN; Michelle Willette, MN; Brad Williams, TX; Sharon Williams, AR; Ross Wilson,

## REPORT OF THE COMMITTEE

TX; Nora Wineland, MO; Raquel Wong, HI; Mary Wood, WY; Melissa Yates, AR; Alan Young, SD; Marty Zaluski, MT; Andrea Zedek, SC; Bereket Zekarias, KS; Ernest Zirkle, NJ.

The Committee met on October 18, 2017 at the Town and Country Hotel in San Diego, California from 8:00 a.m. to 12:00 p.m. There were 41 members and 35 guests present. A discussion was held about development of a mission statement for the committee which will be conducted via email and conference calls with a draft for approval to be introduced to the committee in 2018.

### **Presentations and Reports**

The following Subcommittee Reports were received by the Committee and are included in their entirety following this report.

- Subcommittee on Pharmaceutical Issues
- Subcommittee on Rabies
- Subcommittee on Salmonella

### **Minnesota One Health Antibiotic Stewardship Collaboration**

Joni Scheftel, Minnesota Department of Health

### **Pew Charitable Trusts and Farm Foundation Efforts on Antimicrobial Stewardship**

Karin Hoelzer, The Pew Charitable Trusts

The presentation is available on the Committee web page.

### **The ABCs of Intergovernmental Organizations**

Mallory Gage, Gage Consulting

The presentation is available on the Committee web page.

### **The Codex Task Force on Antimicrobial Resistance**

Liz Wagstrom, National Pork Producers Council

Dr. Wagstrom provided an overview of the Codex Antimicrobial Resistance (AMR) efforts. A Code of Practice to Minimize and Contain the Spread of Antimicrobial Resistance was completed in 2005. In 2011, Guidelines for the Risk Assessment of Foodborne AMR was approved by the Codex Commission. A Physical Working Group was held in December 2016 to suggest scope of potential new work by Codex on this issue. The Physical Working Group report was approved in July 2017 by the Codex Commission to start new work on updating and revising the 2005 Code of Practice, developing a new Guideline on Surveillance and Monitoring of AMR and Antimicrobial Use. Additional Scientific Guidance request of FAO was also approved. First drafts of these documents have been developed by electronic working groups and have been commented on. The revisions are currently open for comment and will be discussed at the Task Force meeting to be

held in Korea in November. It is anticipated that this work will take 3-4 years to complete.

**USDA Position Development on Intergovernmental Organization Initiatives**

Kathe Bjork, USDA CEAH

The presentation is available on the Committee web page.

**U.S. CDC Interactions with Intergovernmental Organization Initiatives**

Dawn Sievert, CDC

The presentation is available on the Committee web page.

**FSIS Residue Testing Results**

Louis Bluhm, USDA-FSIS

The presentation is available on the Committee web page.

**Committee Business:**

A motion was made, seconded and passed to approve the following recommendation:

**RECOMMENDATION: 2017 Recommendations for the Diagnosis, Treatment and Management of Tuberculosis (*Mycobacterium tuberculosis* [*Mtb*]) in Elephants in Human Care**

**BACKGROUND INFORMATION:**

The issue of *Mycobacterium tuberculosis* infection in elephants in human care was historically the purview of the Subcommittee on Elephant Tuberculosis (TB) of the USAHA Committee on Tuberculosis, which produced “Guidelines for the Control of Tuberculosis in Elephants, 2010”. This document was adopted by USDA-APHIS Animal Care (AC) and remains the official guidance, although subsequent editions were produced, sometimes causing confusion. The Stakeholders Task Force on Management and Research Priorities of Tuberculosis in Elephants (hereafter Elephant TB Task Force) was formed following a recommendation from USDA-APHIS to bring more transparency and stakeholder involvement to the development of useful, consistent, and easy to follow guidelines for managing elephant tuberculosis. Members include veterinarians, elephant managers, animal and public health officials, epidemiologists, pharmacologists, physicians and other professionals with many years of experience working with elephants in zoos, circuses, and private facilities. After a multi-year effort, the Elephant TB Task Force produced the “2017 Recommendations for the Diagnosis, Management, and Treatment of Tuberculosis (*Mycobacterium tuberculosis*) in Elephants” as a guide for veterinarians, elephant caretakers, and animal and public health officials dealing with elephants, as well as an accurate source of information for the general public. The document reflects the most up to date and accurate

## REPORT OF THE COMMITTEE

information about what is currently the standard for diagnosis, treatment, and care of Mtb in elephants in human care based on current research, and the expertise and extensive experience of the Elephant TB Task Force.

Updates and improvements in the 2017 Recommendations:

1. The 2017 Recommendations clearly differentiate occupational risk from public health risk for humans in contact with TB infected elephants and provides guidance for how facilities with Mtb positive elephant should work with public health officials. Human health risk based on type of contact was not discussed in the 2010 document.
2. New in the 2017 Recommendations is an extensive table of diagnostic tests that includes which tests are available, where they are available and if they are still research based tests. The table separates diagnostic tests by whether they are direct (identify the organism) or indirect (antibody tests) and gives their advantages and short comings. It provides information on how veterinarians can contribute to the validation of some research-based tests, particularly the qPCR at NVSL.
3. The 2017 Recommendations provide guidance on how different serologic tests can be used to support a TB diagnosis and or used as a surveillance tool to guide other testing.
4. The 2017 Recommendations provide a simple framework for categorizing elephants into A-C risk categories based on their TB trunk wash test history and their previous or current exposure to other elephants with known status. It gives a clear roadmap for long-term monitoring and surveillance. In comparison, the 2010 Guidelines has multiple risk groups in confusing subsets based on serologic results and no clear way for an elephant to move from one group to another, particularly if the disease is never diagnosed in the animal.
5. Treatment protocols for Mtb infected elephants have improved over time as the veterinary community has gained experience with doses, methods of delivery and toxic side effects. The 2017 Recommendations include extensive treatment information as well as updated dosing regimens and schedules based on elephant tolerance and delivery success. New also are recommendations for therapeutic blood level monitoring and guidance on how to interpret these levels.

USDA-APHIS-AC will not be updating their 2010 Guidelines. The “2017 Recommendations for the Diagnosis, Management, and Treatment of Tuberculosis (*Mycobacterium tuberculosis*) in Elephants” has been carefully crafted in light of new scientific knowledge, and the experience and expertise of veterinarians and other experts currently working with TB in elephants. These are the most current guidelines available.

### **RECOMMENDATION:**

The USAHA recommends that the USDA, National Assembly of State Animal Health Officials (NASAHO), National Association of Public Health

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Veterinarians (NASPHV), veterinarians and others involved in elephant care, adopt the “2017 Recommendations for the Diagnosis, Treatment and Management of Tuberculosis (*Mycobacterium tuberculosis*) in Elephants in Human Care” document, as the best standard of care for elephants that may be exposed to Mtb or test positive for the disease, and encourages licensees and registrants who own elephants to follow these Recommendations as the current standard of the state of the disease in elephants.

A motion was made, seconded, and approved to accept the Subcommittee reports, including the recommendation from the Subcommittee on Rabies

## REPORT OF THE COMMITTEE

### REPORT OF THE SUBCOMMITTEE ON PHARMACEUTICAL ISSUES

Chair: Michael Costin, IL  
Vice Chair: Timothy Goldsmith, MN

The Subcommittee met on Tuesday, October 17, 2017 at the Town and Country Hotel in San Diego, California from 1:00 until 5:30 p.m. There were 12 members and 13 guests present. Basic housekeeping tasks were covered, including requesting attendees to sign-in. No old business or resolutions were discussed from previous year.

#### **Presentations and Reports**

##### **FDA Perspective on the Veterinary Feed Directive**

Mike Murphy, Center for Veterinary Medicine (CVM), Food and Drug Administration (FDA)

Link to presentation publicly available at:

<https://www.fda.gov/downloads/AnimalVeterinary/DevelopmentApprovalProcesses/UCM572948.pdf>

##### **American Feed Industry Association, Feed Industry Perspective of the Veterinary Feed Directive**

Preston R. Buff, American Council of Animal Naturopathy (ACAN), Regulatory Affairs, American Feed Industry Association (AFIA)

The American Feed Industry Association (AFIA), based in Arlington, Virginia, is the world's largest organization devoted exclusively to representing the business, legislative and regulatory interests of the U.S. animal food industry and its suppliers. Founded in 1909, the organization's membership is comprised of the total feed industry - from commercial and integrated feed manufacturers, to ingredient suppliers, pet food manufacturers, pharmaceutical companies, industry support and equipment manufacturers. The feed industry, by representation from AFIA has been involved with the Veterinary Feed Directive (VFD) from the creation of the Animal Drug Availability Act of 1996. Since this time, AFIA has been working in coalition with industry organizations, producer organizations, veterinarian organizations, and drug manufacturers to ensure the new changes in the VFD would happen as seamlessly as possible. Some of the actions AFIA has taken were to petition the Food and Drug Administration's Center for Veterinary Medicine (CVM) to reduce the regulatory burdens. AFIA conducted a survey of AFIA member companies prior to the rule's January 1, 2017, compliance deadline to determine the stockpile of Type A medicated articles which were not labeled with the updated usage restrictions. Based on the data received from these companies, AFIA submitted a citizen petition to the CVM to request an extension to exhaust the supply of medicated articles in a legal manner and to avoid disposal. The FDA responded and offered some guidance as to how best to use the remaining inventory of Type A medicated articles. The new rule also required VFD forms to be kept in paper



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format to comply with 21 CFR Part 11, electronic records and electronic signature requirements, which has been burdensome for member facilities. AFIA, along with the National Grain and Feed Association, submitted a citizen petition to the CVM to request an exemption from Part 11 requirements and allow feed distributors to maintain VFD records in an electronic format. Medicated feed mills who manufacture feed using Category II Type A medicated articles are required to submit duplicative information to the FDA for the Drug Establishment Registration (DER) and Medicated Feed Mill License. AFIA has discussed the issue of DER with the CVM and requested it be addressed for medicated feed mills. Educational efforts have been underway, including programs created by feed manufactures and AFIA to ensure the industry is prepared for the new implementation of the VFD rule. Most of the emphasis has been centered on training staff in retail outlets for medicated feed. Overall, the feed industry has made a smooth transition to be in compliance with the new rule. Some of the challenges feed distributors continue to be faced with are incomplete or inaccurate VFD forms. The feed industry has taken the approach to work collaboratively with the veterinarians and producers and to provide training where needed to practice continual improvement.

### **Veterinary Panel Discussion, Veterinary Feed Directive (VFD), After Action Report**

Tom Burkgren, American Association of Swine Veterinarians

Eric Gonder, representing American Association of Avian Pathologists

Jim Logan, representing American Association of Small Ruminant Practitioners

Don Hoenig, representing veterinarians who practice with bees.

A panel discussion of veterinarians representing different segments of the veterinary profession who have been impacted by the implementation of the Veterinary Feed Directive. Panelists were asked to prepare statements outlining the following questions:

- 1) What were some of your species-specific concerns leading up to the implementation of the VFD?
- 2) What did your organization do to try and alleviate those concerns?
- 3) How has the implementation of the VFD gone for your segment of the profession?
- 4) What complications have arisen since the implementation of the VFD that were not anticipated?
- 5) How have those complications impacted your segment of the industry?
- 6) What actions have been taken to address these issues?
- 7) Have you noticed any changes in your memberships' practices and perceptions since the implementation of the VFD?

**Producer Panel Discussion, Veterinary Feed Directive (VFD), After Action Report**

Kathy Simmons, National Cattleman's Beef Association

Heather Fowler, National Pork Board

Jim Logan, representing American Sheep Industry

Eric Gonder, Butterball, LLC

Don Hoenig, representing bee producers

A panel discussion of representatives of different segments of animal agriculture who have been impacted by the implementation of the Veterinary Feed Directive. Panelists were asked to prepare statements outlining the following questions:

- 1) What were some of your species-specific concerns leading up to the implementation of the VFD?
- 2) What did your organization do to try and alleviate those concerns?
- 3) How has the implementation of the VFD gone for your segment of the profession?
- 4) What complications have arisen since the implementation of the VFD that were not anticipated?
- 5) How have those complications impacted your segment of the industry?
- 6) What actions have been taken to address these issues?
- 7) Have you noticed any changes in your memberships' practices and perceptions since the implementation of the VFD?

**USDA – Update on the Current USDA-VS Antimicrobial Use and Future Longitudinal Antimicrobial Use and Resistance Studies on Swine and Cattle Feedlot Operations**

Kathy Bjork, USDA-APHIS-VS Center for Epidemiology and Animal Health (CEAH) National Animal Health Monitoring System (NAHMS)

The USDA-APHIS-VS-NAHMS is conducting antimicrobial use surveys on U.S. swine operations and cattle feedlots in 23 states in 2017, with anticipated study completion dates in mid-2018. These two initiatives are the first targeted studies conducted by NAHMS of antimicrobial use on farms, and they complement NAHMS' traditional studies. The results from these two studies will serve as a calendar year 2016 benchmark for monitoring changes related to the implementation of the FDA Veterinary Feed Directive on January 1, 2017. In the coming months, NAHMS will enter, validate, and analyze questionnaire data, with reports to be released in 2018.

On-farm antimicrobial use studies are one component of USDA's approach to addressing antimicrobial resistance under the USDA Antimicrobial Resistance Action Plan and the U.S. National Action Plan for Combating Antimicrobial Resistance in Bacteria. Funding was appropriated in FY2017 by the U.S. Congress to APHIS-VS for many initiatives and activities; these include on-farm surveillance and pathogen and commensal testing to better understand levels of antibiotic use and resistance, and the impact of use on resistance. In the future, APHIS-VS plans to conduct

## ONE HEALTH

longitudinal studies of concurrent on-farm antimicrobial use and bacterial resistance to enhance understanding of trends in use and resistance and the relationship between them.

### **Subcommittee Business:**

No resolutions

### **New Business:**

Belinda Thompson, Cornell Veterinary Diagnostic Laboratory

Issue highlights include:

- Concerns with Enrofloxacin use in the dairy industry (dogs as well).
- Routinely being used extra-label drug use (ELDU) for treatment of Salmonella.
- May not be recognizing as an issue in creation of resistance.
- Training of producers by veterinarians on how to record (falsify treatment records to show a respiratory disease).
- Think that should be removed from the use in cattle, to stop this use.
- Veterinarians contributing to the significance of this problem.

Discussion was held regarding process on moving issues forward through recommendations and resolutions. The Committee agreed that this would be captured and moved forward to the public health committee as a discussion.

## REPORT OF THE COMMITTEE

### REPORT OF THE SUBCOMMITTEE ON RABIES

Chair: Tarrie Crnic, KS  
Vice Chair: Ernest Oertli, TX

The Subcommittee met on Tuesday October 17<sup>th</sup>, 2017 at the Town and Country Hotel in San Diego, California from 8:00 am to 12:00 pm PT. There were 22 members and 14 guests present. The meeting was opened at by Dr. Crnic with a welcome to members, guests, and students present. The chair brought forward to the committee that the current mission statement for the committee would need updating due to the organizational restructure. Several conference calls will be held between the end of the 2017 annual meeting and 2018 annual meeting to update the mission statement to reflect the current mission of the committee. The updated mission statement will be voted on at the 2018 annual meeting. Next the chair presented on the status of the 2016 resolutions approved by the committee in Greensboro, North Carolina. Both resolutions are still in pending status with no action over the last year. The chair reminded attendees that only approved members could vote, but everyone was welcome to participate in discussion and ask questions. After opening remarks were completed, the first presenter of the day was introduced.

#### Presentations & Reports

##### **Rabies Control Projects in Bangladesh: Current Efforts by *Global HealthShare (GHS) Initiative and Humanity Beyond Barriers (HBB)***

Sheikh Selim DVM, MPVM, PhD  
Director  
PHL Associates, Inc.  
Davis, CA

##### The Facts

- Rabies remains endemic in Bangladesh today
- No known evidence to date that the current government programs so far meet the target herd immunity even in defined localized field trial data
- Uncoordinated national efforts
- Funding and corruption issues – unavailability and inadequate vaccines
- No effective animal ID, tracking system inadequate for surveillance of stray dogs
- Rabies has NOT been an effective reportable disease
- Human rabies is a disease of poverty affecting vulnerable populations and children
- Ignorance coupled with superstitions in extreme poverty creates a perfect storm for rabies

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- Elimination of human rabies is dependent on rabies elimination in dogs
- Breaking the urban cycle involving maintenance of infection in dog populations and a sylvatic cycle involving wildlife

### Rabies Control

- Awareness & Education (AE) and Interdisciplinary approach are critical [Compendium Animal Rabies Control (2016)]
- Human Rabies Control must also include PEP, AE and elimination of rabid animal exposures
- With similar missions, GHS and HBB partnered together and came forward to complement as strategic partners to help eliminate the pernicious cycle of rabies in Bangladesh
- HBB initiative: pilot project – community-empowerment tool – awareness building campaign
- GHS partnership: includes identifying and developing market driven solutions to promote health and wellness in connection with rabies in Bangladesh

### Immediate objective: *Break the barriers of IGNORANCE & Save Lives!*

- Awareness Building and Education

#### Part 1: 2015-'16

- Day Camp at central Infectious Disease Hospital (IDH) rabies prevention unit
- Distribute calendars, posters, and brochures to visitors/bite victims, health workers
- Advocacy meeting with hospital staff including doctors, nurses, and health workers

#### Part 2: 2016

- A quantitative pilot study - Knowledge, Attitude and Practice (KAP). Baseline data collection/educational diagnosis (for Capacity Building and Mobilization)
- High school students and teachers (n=1,500) – Awareness building among school students. Share and spread the knowledge/word with families, friends, relatives and the community.

#### Part 3: 2017

- Collaboration with government – MOU/formal collaboration
- Advocacy/partnering meeting at the routine monthly Local Government Coordination Meeting
- Meeting resolution by the Administration Department to delegate task to respective departments (including Departments of Information, Education, Health, and Livestock) to work with NGO (HBB)
- Initiate pilot project to train slaughter house workers and butchers who may get exposed to rabid food animals

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### Future plans of HBB in Bangladesh

- Conduction of one integrated pilot study in an Island as Kutubdia / Cox's bazar / Hatia. (Advocacy meeting at all levels; animal and human vaccination; dog birth control; training to medical and paramedical personnel on diagnosis, prevention and treatment of animal bite cases)
- Development of internet applications to help animal bite victims, establish a network of trained people for immediate advice and referral for PEP
- Establishment of a call center and maintain database
- Coordination with MOH, LGRD, DLS for proper implementation of rabies control activities

### GHS/HBB Future plans in Bangladesh

- Establishment of a central Rabies Diagnostic and Research Lab, lab diagnosis and treatment at central and field level
- Development of national database and surveillance system for animal bite and rabies cases
- Human Resource Development
- Technical support for procurement and production of quality vaccine (IDTCV & RIG) by government and private sector
- Coordination with stakeholders working on rabies control (WHO, MOH, LGRD, DLS, FAO, OIE and NGOs)

### **Rabies Awareness in the United States: Two Opinion Surveys on Wildlife Rabies Prevention**

Joanne Maki, North America, Veterinary Public Health, Technical Director  
Boehringer Ingelheim,

Wildlife rabies prevention programs using oral rabies vaccines (ORV) in the United States (US) have proven over time to be cost-beneficial. US ORV success stories include the elimination of the canine rabies variant from the US, potential elimination of the gray fox variant from Texas as well as stopping the raccoon variant from spreading westward beyond the Appalachian Mountains. Agencies tasked with wildlife rabies prevention in the US have limited resources to raise community awareness about the benefits of their programs. Increased public support and state level funding of ORV programs will be required to eliminate raccoon and skunk rabies on a national scale. State public health veterinarians play a critical role in rabies prevention and collaborate with federal, state and county ORV programs vaccinating wildlife reservoir populations against rabies. To identify challenges, gaps and opportunities to support ORV programs in general, US state public health veterinarians and state veterinarians were interviewed by phone in 2014 and surveyed using a web-based opinion poll in 2017. Results of these surveys provided insights as to how to improve rabies awareness in the general public as well as suggest ways to foster communication and

increase collaboration between state agencies. A summary of findings from both surveys will be presented.

### **Compendium of Animal Rabies Prevention and Control, 2016**

Jennifer House, DVM, MPH, DACVPM

State Public Health Veterinarian

Colorado Department of Public Health and Environment

The Compendium of Animal Rabies Prevention and Control is a publication of the National Association of State Public Health Veterinarians (NASPHV). It contains best practice recommendations for animal rabies prevention and control programs throughout the U.S. to facilitate standardization across jurisdictions. The document is reviewed and revised as necessary. These recommendations do not supersede state and local laws or requirements. It is traditionally published in JAVMA with subsequent MMWR publication.

Consensus guidelines based on:

- Peer reviewed literature
- Expert opinion
- Unpublished data

Applied differently by jurisdiction:

- Flexible enough to account for variability
- Specific enough to be used as regulation or law

The Compendium acknowledges the lack of standardized data collection by jurisdictions. No national data exists on:

- Incubation periods
- Number of animals quarantined
- Vaccination histories of exposed animals
  - Those that completed strict quarantine versus those that didn't
  - Vaccine failures
- Epidemiologic characteristics of animals developing rabies

Areas of the Compendium discussed include: reporting of surveillance data; pre-exposure vaccination; post-exposure management of currently vaccinated animals, animals overdue on vaccination, animals never vaccinated, animals vaccinated with no documentation; livestock; and reduced quarantine period.

### **Ontario's Wildlife Rabies Control Program**

Beverly Stevenson, Wildlife Research Technician, Wildlife Research and Monitoring Section, Ministry of Natural Resources and Forestry

A review and update of rabies control efforts in Ontario was presented via teleconference. Ontario was once the rabies capital of North America averaging 1,500 confirmed cases per year. Due to successful rabies control programs, Ontario was able to eliminate both raccoon strain and fox strain rabies from southern Ontario. After more than ten years of being raccoon strain rabies free, cases were confirmed in December 2015 in a highly-

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populated area of the province. Aggressive control measures were immediately implemented and have been ongoing since then in an attempt to contain the spread of the disease with the goal of eventual elimination. Also, in December 2015, fox strain rabies was again confirmed in southwestern Ontario after nearly a three-year absence. This presentation will focus on the current status, control strategies, the need for surveillance, and the need to mitigate wildlife translocation. There have been 100 new case of raccoon variant rabies and 8 new cases of arctic fox variant rabies found in Ontario to date in 2017.

### **Subcommittee Business:**

The business meeting was opened by Dr. Crnic at 8:50 am and the presence of a quorum was established. Two resolutions were brought forward for consideration. The first resolution considered was a funding request in the 2018 Farm Bill for the elimination of raccoon Rabies in the United States. The committee approved this resolution to be moved forward for consideration by the One Health Committee. The second resolution considers was a request for increased fiscal 2019 funding for the United States Department of Agriculture, Animal Plan Health Inspection Service, Wildlife Services Oral Rabies Vaccination Program. This resolution was also approved by the committee to be moved forward for consideration by the One Health Committee. Upon completing work on the resolutions, a discussion on companion animal interstate movement Rabies vaccination requirements was opened. This topic was brought was forward by a member of the USDA APHIS Animal Care staff as a concern expressed by licensed breeders under the Pet Animal Act relating to the inconsistency of interstate movement vaccination requirements between states. After discussion, it was established that it was unlikely that standardization of requirements could be reached. Committee members suggested that a recommendation from the committee could be brought forth to promote the inclusion of companion animal vaccination and movement requirements on other established animal movement regulation websites. The committee voted on and approved the following recommendation:

“The USAHA Subcommittee on Rabies recommends to responsible state agencies that the dog, cat, and ferret vaccinations and any requirements for interstate movement for each state be added to websites listing requirements for interstate movement of animals.”

This recommendation will be moved forward to the One Health Committee for further consideration. The business meeting was adjourned at 9:50 am.



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### **REPORT OF THE SUBCOMMITTEE ON SALMONELLA**

Acting Chair: Julie Helm, SC

Acting Vice Chair: Pat McDonough, NY

The Subcommittee on Salmonella met on October 16, 2017 at the Town and Country Hotel in San Diego, California from 1:00–4:00 p.m. There were 25 members and 18 guests present (with 51 attendees present in the room at one time). Acting Chair Julie Helm presided and welcomed the Subcommittee. There were no resolutions from 2016 to review.

Dr. Matthew Wise, Centers for Disease Control and Prevention, in lieu of Dr. Megin Nichols, Centers for Disease Control and Prevention, presented the Multistate Outbreaks of Salmonella in 2017 Linked to Food and is included in these proceedings.

Ms. Lauren Stevenson, Centers for Disease Control and Prevention, in lieu of Dr. Megin Nichols, Centers for Disease Control and Prevention, presented the Multistate outbreaks of Salmonella in 2017 Linked to Animal Contact and is included in these proceedings.

Dr. Misha Robyn, Centers for Disease Control and Prevention, presented A Multi-tiered Approach to Prevent Human Salmonella Outbreaks from Contact with Live Animals and is included in these proceedings.

Dr. Eric Gingerich, Diamond V, presented A Pre-Harvest Intervention Effect on Salmonella Contamination of Processed Broilers and Turkeys and is included in these proceedings.

Dr. Kristina Lantz, USDA, National Veterinary Services Laboratories, in lieu of Ms. Brenda Morningstar-Shaw, USDA, National Veterinary Services Laboratories, presented Salmonella Serotypes Isolated from Animals and Related Sources, January 1-December 31, 2016 and is included in these proceedings.

Dr. Kis Robertson Hale, U.S. Department of Agriculture (USDA), Food Safety and Inspection Service, presented Salmonella Update from USDA's Food Safety and Inspection Service and is included in these proceedings.

Dr. Julie Helm, Clemson University Livestock Poultry Health, in lieu of Dr. Denise L. Brinson, US Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, presented the National Poultry Improvement Plan Salmonella Status Report and is included in these proceedings.

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Subcommittee Business: There were no old business items, new business items, recommendations nor resolutions presented to the Subcommittee.

The meeting adjourned at 4:00 p.m. on October 16, 2017.

### Reports and Presentations

#### **Multistate Outbreaks of *Salmonella* in 2017 Linked to Food**

Matthew Wise

Centers for Disease Control and Prevention (CDC), Division of Foodborne, Waterborne, and Environmental Diseases, Outbreak Response and Prevention Branch

Multistate outbreak investigations of salmonellosis require the use of molecular subtyping techniques to identify illness clusters for further investigation. CDC works with numerous other local, state, and federal agencies to investigate these illness clusters, using epidemiologic, microbiologic, traceback, and environmental assessment data to link outbreaks to a food or animal source. The gold standard subtyping technique for these investigations has been pulsed-field gel electrophoresis for over 2 decades. However, whole genome sequencing is now routinely being used in multistate salmonellosis investigations, making them more effective by refining case definitions and increasing the confidence that clinical, food, and environmental isolates are likely to share a common source. Major multistate foodborne salmonellosis investigations conducted in 2017 were linked to vehicles such as imported papayas, ground beef, and chicken. These investigations highlight the growing utility of whole genome sequencing in multistate investigations and how it is helping to identify new questions to tackle with respect to food safety.

#### **Multistate outbreaks of *Salmonella* in 2017 Linked to Animal Contact**

Lauren Stevenson

Centers for Disease Control and Prevention (CDC), Division of Foodborne, Waterborne and Environmental Diseases, Outbreak Response and Prevention Branch

CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) are reopening the investigation of a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections. Since 2015, 46 people infected with the outbreak strains of *Salmonella* Heidelberg have been reported from 14 states. Fourteen (30%) people have been hospitalized. No deaths have been reported. Illnesses started on dates ranging from January 27, 2015 to July 11, 2017. Fifteen (33%) people in this outbreak are children under the age of 5 years. Epidemiologic and laboratory investigations linked ill people in this outbreak to contact with calves, including dairy bull calves. Additional

information can be found at: <https://www.cdc.gov/salmonella/heidelberg-11-16/index.html>.

CDC and multiple states are investigating a multistate outbreak of human *Salmonella* infections linked to contact with pet turtles. Thirty-seven people infected with the outbreak strain of *Salmonella* Agbeni have been reported from 13 states. Illnesses started on dates ranging from March 1, 2017 to August 3, 2017. Of 33 people with available information, 16 have been hospitalized. No deaths have been reported. Twelve (32%) ill people are children 5 years of age or younger. Epidemiologic and laboratory findings link the outbreak of human *Salmonella* Agbeni infections to contact with turtles or their environments, such as water from a turtle habitat.

CDC and multiple states are investigating 10 separate multistate outbreaks of *Salmonella* infections in people who had contact with live poultry in backyard flocks. These outbreaks are caused by several DNA fingerprints of different *Salmonella* bacteria: *Salmonella* Braenderup, *Salmonella* Enteritidis, *Salmonella* Hadar, *Salmonella* I 4,[5],12:i-, *Salmonella* Indiana, *Salmonella* Infantis, *Salmonella* Litchfield, *Salmonella* Mbandaka, *Salmonella* Muenchen, and *Salmonella* Typhimurium. The outbreak strains of *Salmonella* have infected over 1,000 people in 48 states and the District of Columbia. Illnesses started on dates ranging from January 4, 2017 to July 31, 2017; 215 ill people have been hospitalized. One death has been reported. Epidemiologic, traceback, and laboratory findings link the 10 outbreaks to contact with live poultry, such as chicks and ducklings, from multiple hatcheries. In interviews, 498 (74%) of 672 ill people reported contact with live poultry in the week before illness started. Contact with live poultry or their environment can make people sick with *Salmonella* infections. Live poultry can be carrying *Salmonella* bacteria but appear healthy and clean, with no sign of illness.

### **A Multi-tiered Approach to Prevent Human *Salmonella* Outbreaks from Contact with Live Animals**

Misha Robyn

Centers for Disease Control and Prevention, Division of Foodborne, Waterborne and Environmental Diseases, Outbreak Response and Prevention Branch

Human *Salmonella* outbreaks from contact with live animals continue to be a serious public health problem. These outbreaks present unique challenges for prevention. In comparison with foodborne *Salmonella* outbreaks, there is limited regulatory authority for investigation and implementation of prevention measures. Additionally, as many animals carry *Salmonella* asymptotically, there might be limited ability and incentive to eliminate or reduce strains that are pathogenic to humans but do not cause animal disease. The focus of prevention strategies has changed over time, in some situations focusing on legislation, in other situations on education and awareness of those who contact live animals, and more recently, on comprehensive approaches involving animal producers, distributors, and

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retail stores. This multi-tiered approach is best illustrated in prevention efforts for live poultry-associated salmonellosis, but examples can also be found in prevention approaches to turtle-associated salmonellosis and ruminant-associated salmonellosis. In the continuing efforts to prevent *Salmonella* outbreaks, possibilities for disease prevention in all segments in the “farm to customer” chain should be explored.

### **A Pre-Harvest Intervention Effect on Salmonella Contamination of Processed Broilers and Turkeys**

Eric Gingerich, Diamond V

Most broiler and turkey processors rely heavily on post-harvest interventions in the plant to reduce *Salmonella* contamination to levels that will comply with USDA standards of performance. Very little emphasis has been given to pre-harvest interventions.

Pre-harvest interventions can include the use of probiotics, prebiotics, vaccines, organic or inorganic acids, botanicals, etc. given in the feed or water prior to slaughter. This presentation will give data on the effect of one pre-harvest, feed administered fermentation metabolite product\* on the reduction of *Salmonella* contamination of carcasses, parts, and ground meat. The fermentation metabolite product is fed at 2.5 lbs. per ton from day old to slaughter.

Initial evidence of a reduction in *Salmonella* shedding was performed by Dr. Steve Carlson at Iowa State University where broiler chicks were infected with a nalidixic acid resistant strain of *Salmonella typhimurium* and half were placed on the product in the feed at 21 days and the other half served as controls. Feces tested at 28, 35, and 42 days showed a significant reduction ( $p < 0.0001$ ) in *Salmonella* numbers and cecal contents showed this same reduction at 49 days. The same experiment was conducted three separate times with the same results.

In field trials, ceca samples taken from control (not fed product) and treated (fed product) during evisceration show a consistent, significant reduction in both prevalence and *Salmonella* numbers per gram of cecal contents. In 21 field trials, the average percent reduction in prevalence was 54.1% and showed an 86.8% reduction in *Salmonella* colony forming unit per gram of cecal material. This indicates that the fecal material shed into the house prior to loadout that is eaten by the birds or found on the feathers of the birds is reduced before coming to the plant. Upon entering the plant, any material from the digestive tract, crop or intestines, is theorized to be reduced. Also, the level of contamination of feathers contaminating the scalding water is likely reduced. Two trials will be shown where two flocks fed the product in succession show a successive reduction in *Salmonella* prevalence and numbers in cecal contents.

A correlation to this finding of reduced cecal load and a reduction in *Salmonella* contamination further in processing was found as well. Results of four trials will be shown that show a significant reduction in *Salmonella*

contamination of carcasses, parts, and/or ground meat. The trial data of one trial also shows that feeding the product in successive flocks, reduces contamination levels of ground meat in each successive flock.

\* Diamond V XPC™

### ***Salmonella* Serotypes Isolated from Animals and Related Sources, January 1-December 31, 2016**

B.R. Morningstar-Shaw, T.A. Mackie, D.K. Barker, E.A. Palmer  
USDA, National Veterinary Services Laboratories, Diagnostic Bacteriology Laboratory, Ames, IA

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely performs serotyping of *Salmonella* isolates submitted by private, State, and Federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes *Salmonella* serotyping submissions received at the NVSL from January 1 through December 31, 2016.

*Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food and other). Serotyping data from isolates submitted for research purposes are not included in the source-specific summaries. Based on information provided by the submitter, the isolates were divided into animal source categories for analysis. The animal sources include Avian, Cattle, Chicken, Dog/Cat, Equine, Pig, Reptile/Amphibian, Turkey, Wild/Zoo, and Other (environment, unknown).

*Salmonella* serotyping at the NVSL is an ISO 17025 accredited test. *Salmonellae* are typed via classical serotyping using polyvalent and single factor antisera to determine the O and H antigens and/or via molecular typing using the xMAP *Salmonella* serotyping assay. Approximately 60% of the sera used at the NVSL is produced in-house as previously described (Ewing, 1986), the remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. *Salmonella* antigenic formulae are determined as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont, 2007). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

In 2016, 13,295 submissions were received for *Salmonella* serotyping. *Salmonella* isolates were divided into clinical isolates (5,258), non-clinical isolates (5,727), and research (2,310). The sources of clinical and non-clinical *Salmonella* isolates are shown in Table 1. There were 254 different serotypes identified from 47 states and the District of Columbia in 2016. Table 2 lists the 10 most common serotypes when all animal sources were combined. The 10 most common serotypes accounted for 62% of the total clinical isolates submitted and 60% of the total non-clinical isolates submitted. The most common isolates from chickens, turkeys, pigs, cattle, and equine are listed in Tables 3-7.

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The NVSL provided a *Salmonella* Group D proficiency test to 98 individuals in 85 different laboratories. The purpose of the proficiency test was to assess the ability of laboratories to detect or isolate *Salmonella* Group D and/or *Salmonella* Enteritidis from simulated environmental samples. The test consisted of 10 lyophilized cultures containing various combinations of *Salmonella* and common contaminants typically found in environmental swabs. The 2016 test included *Salmonella* serotypes Anatum, Enteritidis, Heidelberg, Javiana, Newport and I 9,12:non-motile. Contaminant bacteria included *Citrobacter sedlakii*, *Citrobacter amalonaticus*, *Citrobacter freundii*, *Enterobacter cloacae*, *Enterobacter* species, *Klebsiellae pneumoniae*, *Providencia rettgeri*, and *Pseudomonas aeruginosa*. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained 13% of the test kits and tested them blindly for quality assurance purposes. The results of the proficiency test are shown in Table 8.

**Table 1: Sources of submissions to the NVSL for *Salmonella* serotyping in 2016**

Source	No. Clinical Submissions	No. Non-Clinical Submissions
Cattle	1,414	194
Chicken	287	3,252
Horse	830	39
Swine	1,885	235
Turkey	259	1,156
All others	583	851
<b>Total</b>	<b>5,258</b>	<b>5,727</b>

**Table 2: Most common serotypes in 2016: All sources**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
4,[5],12:i:-	776	Senftenberg	751
Typhimurium	755	Mbandaka	412
Dublin	345	Enteritidis	364
Cerro	296	Typhimurium	309
Javiana	231	Hadar	300
Derby	189	Worthington	252
Montevideo	183	Thompson	223
Heidelberg	178	Cerro	217
Newport	177	Montevideo	212
Agona	161	London/Newport	198
All others	1,967	All others	2,291
<b>Total</b>	<b>5,258</b>	<b>Total</b>	<b>5,727</b>

**Table 3: Most common serotypes in 2016: Chickens**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
Enteritidis	129	Senftenberg	490
Typhimurium	32	Mbandaka	363
Kentucky	31	Worthington	237
Heidelberg	15	Enteritidis	213
III 13,23:g,z51:-	8	Thompson	198
All others	72	All others	1,751
<b>Total</b>	<b>287</b>	<b>Total</b>	<b>3,252</b>

**Table 4: Most common serotypes in 2016: Turkeys**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
Senftenberg	38	Hadar	291
Ouakam	25	Senftenberg	239
Bredeney/Albany	21	London	194
Typhimurium	19	Muenchen	95
Uganda	17	Uganda/Albany	51
All others	118	All others	235
<b>Total</b>	<b>259</b>	<b>Total</b>	<b>1,156</b>

**Table 5: Most common serotypes in 2016: Pigs**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
4,[5],12:i:-	652	4,[5],12:i:-	48
Typhimurium	277	Typhimurium	41
Derby	179	Derby	25
Infantis	98	Agona	17
Agona	91	Infantis	12
All others	588	All others	92
<b>Total</b>	<b>1,885</b>	<b>Total</b>	<b>235</b>

**Table 6: Most common serotypes in 2016: Cattle**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
Dublin	332	Cerro	30
Cerro	275	Typhimurium	25
Typhimurium	142	Montevideo	17
Montevideo	110	Heidelberg	16
Heidelberg	101	Newport	15
All others	454	All others	104
<b>Total</b>	<b>1603</b>	<b>Total</b>	<b>290</b>

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**Table 7: Most common serotypes in 2016: Horses**

All sources	
Serotype	No. Isolates
Javiana	207
Typhimurium	202
Newport	67
Agona	40
Montevideo	38
All others	315
<b>Total</b>	<b>869</b>

**Table 8: Summary of NVSL *Salmonella* Group D proficiency test**

	2011	2012	2013	2014	2015	2016
<b>Participants</b>	70	73	61	80	94	98
<b>Mean Score</b>	97%	92%	94%	98%	98%	97%
<b>Score Range</b>	100-85%	100%-29%	100-68%	100-80%	100-68%	100-80%
<b>Below Passing</b>	0	7	4	0	1	0

Ewing, WH. 1986. Edward and Ewing's Identification of Enterobacteriaceae. 4<sup>th</sup> edition. Elsevier Science Publishing Co., Inc., New York, U.S.

Grimont, PAD, Weill, FX. 2007. Antigenic Formulae of the *Salmonella* Serovars. 9<sup>th</sup> edition. WHO Collaborating Centre for Reference and Research on *Salmonella*. Paris, France.

**Salmonella Update from USDA's Food Safety and Inspection Service**

Kis Robertson Hale, US Department of Agriculture (USDA), Food Safety and Inspection Service, Office of Public Health Science

*Salmonella* reduction is an important priority for USDA's Food Safety and Inspection Service (FSIS). This presentation will highlight recent developments in the agency's ongoing efforts to prevent foodborne salmonellosis attributable to meat and poultry products. With the application of Whole Genome Sequencing and adoption of a new sampling medium that maximizes pathogen recovery during verification testing, FSIS has leveraged advanced technology and science to better confront *Salmonella* in its regulated products. In addition, FSIS continues to contribute data from two sampling programs to the interagency National Antimicrobial Resistance Monitoring System (NARMS), partnering with other federal partners to ensure the detection of resistance trends among *Salmonella* (and other bacteria) of food animal origin. Analysis shows patterns of resistance that appear to vary depending on the animal or commodity source and the kind of sample taken [(cecal vs. Hazzard analysis and critical control points (HACCP)]. While these findings enhance our understanding of *Salmonella*,



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they also signal the need to further explore questions concerning factors contributing to antimicrobial resistance.

**National Poultry Improvement Plan (NPIP) Status Report**

Denise L. Brinson, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Surveillance, Preparedness and Response Services

Pullorum-Typhoid Status: There were no isolations of Salmonella pullorum in commercial poultry in FY2013, FY2014, FY2015, FY2016, or FY2017. There were no isolations of Salmonella pullorum in backyard birds in FY2014, FY2015, FY2016, or FY2017. There have been no isolations of Salmonella gallinarum since 1987 in any type poultry in the US.

Hatchery Participation in the National Poultry Improvement Plan Testing Year FY2017	
Egg and Meat-Type Chickens: Participating	254
Turkeys: Participating	49
Waterfowl, Exhibition Poultry and Game Birds: Participating	665

Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2017	
U.S. Pullorum-Typhoid Clean Flocks	291
Birds in Flocks	6,998,694
Birds Tested	53,455

Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary, Testing Year FY2017	
U.S. Pullorum-Typhoid Clean Flocks	5,169
Birds in Flocks	107,420,261
Birds Tested	294,097

Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary, Testing Year FY2017	
U.S. Pullorum-Typhoid Clean Flocks:	386
Birds in Flocks	4,301,448
Birds Tested	27,421

Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2017	
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U. S. Pullorum-Typhoid Clean Flocks	9,134
Birds in Flocks	2,989,785
Birds Tested	448,200

U.S. <i>Salmonella enteritidis</i> Clean Egg-Type Breeding Chickens No. of flocks and birds in flocks by State with <i>Salmonella enteritidis</i> isolates, 1990-2017			
State	Environmental	Dead Germ	Birds
Arkansas			
Flocks	1		2
Birds in Flocks	6,000		15,000
Georgia			
Flocks	4	2	
Birds in Flocks	50,400	46000	
Illinois			
Flocks	3	2	1
Birds in Flocks	3,900	3700	1200
Indiana			
Flocks	15	2	1
Birds in Flocks	158,345	27,479	15,092
Kentucky			
Flocks	1		
Birds in Flocks	6,625		
Ohio			
Flocks	17		9

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U.S. <i>Salmonella enteritidis</i> Clean Egg-Type Breeding Chickens No. of flocks and birds in flocks by State with <i>Salmonella enteritidis</i> isolates, 1990-2017			
Birds in Flocks	192,700		91,600
Oregon			
Flocks	2		
Birds in Flocks	19,516		
Pennsylvania			
Flocks	16		6
Birds in Flocks	166,385		78,450
Texas			
Flocks	1		
Birds in Flocks	10,000		

U.S. <i>Salmonella enteritidis</i> Clean Egg-Type Breeding Chickens No. of flocks and birds in flocks by Phage Type with <i>Salmonella enteritidis</i> isolated		
Phage Type 13	Environmental	Dead Germ
Flocks	11	2
Birds in Flocks	152,000	3,700
Phage type 13A		
Flocks	5	2
Birds in Flocks	54,321	27,479
Phage type 2		

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Flocks	2	
Birds in Flocks	28,900	
Phage type 23		
Flocks	21	
Birds in Flocks	16,000	
Phage type 28		
Flocks	2	2
Birds in Flocks	15,000	46,000
Phage type 34		
Flocks	2	
Birds in Flocks	12,500	
Phage type RNDC		
Flocks	1	
Birds in Flocks	7,000	
Phage type- Untypeable		
Flocks	2	
Birds in Flocks	24,000	
Phage type 8		
Flocks	21	
Birds in Flocks	237,701	

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Egg-type Chicken breeding flocks with isolates of <i>Salmonella enteritidis</i> by phage type and by year 1989-2017		
Year	No. Flocks	Phage Type
1989	1	13A
1990	11	13A, 13, 8, 28
1991	12	13A, 13, 8
1992	10	Untypeable, 13A, 8, 28, 34
1993	5	Untypeable, 8, 2
1994	3	13A, 8
1995	2	13A, 28
1996	5	Untypeable, RNDC, 13A, 8, 2
1997	2	8
1998	2	8
1999	1	13
2000	4	13, 8
2001	1	13
2002	0	
2003	0	
2004	0	
2005	1	13
2006	1	34
2007	4	13, 8
2008	3	8
2009	0	
2010	3	8(2), 13
2011	0	
2012	0	
2013	0	
2014	1	NA
2015	0	
2016	0	
2017	0	

U.S. <i>Salmonella enteritidis</i> Clean Egg-Type Breeding Chickens No. of flocks and birds in the flocks with <i>Salmonella enteritidis</i> isolates, 1990-2017			
	Environmental	Dead Germ	Bird
Flocks	72	6	19
Birds in Flocks	726,871	77,179	201,342

## COMMITTEE ON PARASITIC AND VECTOR-BORNE DISEASES

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The Committee met on October 18, 2017 at the Town and Country Hotel in San Diego, California at 8:00 a.m. There were 48 members and 40 guests present.

### Presentations and Reports

#### **Update on Southeastern Cooperative Wildlife Disease Study (SCWDS) Arthropod Surveys, Epizootic Hemorrhagic Disease Virus (EHDV), Bluetongue Virus (BTV) Research and 2017 HD Activity**

Mark Ruder, Stacey Vigil, Clara Kienzle, David Stallknecht, and Joe Corn, SCWDS

James Mertins, USDA, Animal and Plant Health Inspection Service (APHIS), National Veterinary Services Laboratories (NVSL)

In collaboration with the USDA-APHIS-VS, SCWDS conducts surveys for exotic arthropods in the Southeastern United States and Caribbean region. Current programs include surveys for the tropical bont tick on wildlife in Vieques, Puerto Rico; surveys for cattle fever ticks on wildlife in the Cattle Fever Tick Quarantine Area in Texas; and surveys for *Culicoides* vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeastern United States. Surveys for the tropical bont tick on mongooses, cattle egrets and feral horses in Vieques began in late 2014 and parts are ongoing. Surveys for cattle fever ticks on deer and other ungulates in South Texas were conducted during 2016 and will continue during 2017/18 in collaboration with USDA-APHIS-VS and the Texas Animal Health Commission. Since 2007, surveys for *Culicoides* have detected a total of 59 species and new state records for 14 *Culicoides* species in numerous states. *Culicoides* surveys during 2017 were conducted at multiple sites in the Coastal Plain physiographic region of Georgia, South Carolina and North Carolina, as well as one site within Georgia's Piedmont region.

PARASITIC AND VECTOR-BORNE DISEASES

Annually, the SCWDS receives tissue samples from throughout the United States from wild ruminants suspected to have orbiviral hemorrhagic disease. Virus isolation and identification is performed and findings from the 2016 and 2017 transmission seasons are reported here. During 2016, 49 viruses were isolated from 161 tissue samples, representing six species of wild ruminant (138 white-tailed deer, 9 mule deer, 5 pronghorn, 4 bighorn sheep, 4 elk, and 1 nilgai) from 22 states. Isolations of EHDV-1 (1), EHDV-2 (27), EHDV-6 (6), BTV-2 (1), BTV-3 (10), BTV-13 (1), and BTV-17 (3) were made from white-tailed deer or mule deer (see Table). As of October 6, 2017, there have been 110 viruses isolated from 192 tissue samples, representing 22 states and six species (185 white-tailed deer, 2 mule deer, 1 elk, 1 bighorn sheep, 1 cow, and 1 domestic goat). To date, isolations of EHDV-1 (2), EHDV-2 (92), EHDV-6 (8), BTV-2 (1) and untyped pending (7) were made from white-tailed deer or cattle (see Table).

<b>2016 SCWDS EHDV &amp; BTV Diagnostics</b>		
Virus Isolations		
<b>STATE</b>	<b>SPECIES</b>	<b>VIRUS</b>
Arkansas	white-tailed deer	EHDV-2
Florida	white-tailed deer	EHDV-6
Georgia	white-tailed deer	EHDV-2
		BTV-13
Illinois	white-tailed deer	EHDV-6
Kansas	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	BTV-2
		BTV-3
		EHDV-6
Nebraska	white-tailed deer	BTV-17
	white-tailed deer	EHDV-2
	mule deer	
New Mexico	mule deer	EHDV-2
		EHDV-6
North Carolina	white-tailed deer	EHDV-2
South Carolina	white-tailed deer	EHDV-2
Virginia	white-tailed deer	BTV-3
		EHDV-2
West Virginia	white-tailed deer	BTV-3
		EHDV-1
		EHDV-2

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**2017 SCWDS EHDV & BTV Diagnostics**

Virus Isolations  
*as of October 6, 2017*

<b>STATE</b>	<b>SPECIES</b>	<b>VIRUS</b>
Alabama	white-tailed deer	EHDV-6
Arkansas	white-tailed deer	EHDV-1
Connecticut	white-tailed deer	EHDV-6
Kansas	white-tailed deer	EHDV-1
		EHDV-2
		EHDV-6
Kentucky	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	BTV-2
Maryland	white-tailed deer	EHDV-2
		EHDV-6
Michigan	white-tailed deer	EHDV-6
Mississippi	white-tailed deer	EHDV-2
Nebraska	white-tailed deer	EHDV-2
North Carolina	white-tailed deer	EHDV-2
Ohio	white-tailed deer	EHDV-2
Pennsylvania	white-tailed deer	cow
		EHDV-2
		EHDV-6
Tennessee	white-tailed deer	EHDV-2
Virginia	white-tailed deer	EHDV-2
West Virginia	white-tailed deer	EHDV-2
		EHDV-6

During 2017, SCWDS has been supporting multiple state wildlife agencies in the investigation of a hemorrhagic disease outbreak that appears to be centered on the Cumberland Plateau physiographic region. The outbreak is primarily associated with EHDV-2 and extends from the Alabama-Tennessee border north to Ontario. Investigation of the outbreak is ongoing. Although the 2017 outbreak does not appear to be as geographically widespread as the severe outbreaks observed during 2007 and 2012, it represents the third prominent outbreak in parts of the Northeast over the past ten years. The continuing trend of increased frequency and intensity of hemorrhagic disease in this part of the country continues to be a concern for wildlife managers. An additional noteworthy observation from 2017 was the isolation of EHDV-6 from deer in Alabama, Connecticut, Pennsylvania, and West Virginia. EHDV-6 had not been previously documented in these states and the CT isolate represents the northeastern most detection of this serotype in the United States. Further, BTV-2, a



## PARASITIC AND VECTOR-BORNE DISEASES

serotype historically only sporadically isolated from white-tailed deer, was detected in Louisiana in both 2016 and 2017.

During 2016, a BTV-3 outbreak in free-ranging white-tailed deer occurred in West Virginia and Virginia and was investigated by Virginia Department of Game and Inland Fisheries, West Virginia Division of Natural Resources, and SCWDS. Initial findings were provided in the 2016 report to this committee. Here, results of a post-outbreak serological survey and findings from a BTV-3 experimental infection of white-tailed deer are presented.

### **USDA VSV/EP/Arbovirus Update**

Angela M. Pelzel-McCluskey, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

#### **Equine Piroplasmosis**

Since November 2009, more than 342,000 domestic U.S. horses have been tested for equine piroplasmosis (EP) through active surveillance and movement testing. To date, 387 EP-positive horses (377 *Theileria equi*-positive, 10 *Babesia caballi*-positive) have been identified through this surveillance. These positive horses are unrelated to the 2009-2010 *T. equi* outbreak on a Texas ranch where 413 positive horses were identified in connection with the outbreak and natural tick-borne transmission on the ranch was documented to have occurred over at least 20 years. The Texas ranch outbreak of *T. equi* was successfully eradicated through strategic culling, tick mitigation, and chemotherapeutic treatment of infected horses. Of the 387 positive horses identified through active surveillance, 333 were Quarter Horse racehorses, 14 were Thoroughbred racehorses, and 33 were horses previously imported to the United States before August 2005 under the complement fixation test. The remaining seven positive horses were classified as originating from “other” high-risk groups with six of the seven having a history of illegal movement from Mexico. The epidemiological investigations conducted in all of these cases have indicated no evidence of tick-borne transmission and the cases in racehorses specifically have involved iatrogenic transmission as the method of spread.

So far in 2017, 23,202 domestic U.S. horses were tested for EP with the identification of 48 horses positive for *T. equi*. Forty-five (45) were Quarter Horse racehorses, two horses had a history of illegal movement from Mexico (one Quarter Horse racehorse and one Andalusian stallion), and one horse was an Arabian mare previously imported from Brazil in 2001 using the complement fixation test for entry. The Quarter Horse racehorses were participating in sanctioned racing, unsanctioned racing, or both and one of these horses was found to be dually infected with both *T. equi* and equine infectious anemia (EIA). The majority of these horses were found as clusters of positives associated with the same trainer and/or owner and epidemiological investigations conducted have implicated iatrogenic transmission (needle/syringe/intravenous (IV) equipment reuse, blood transfusions, contamination of multi-use drug vials, etc.) as the primary

## REPORT OF THE COMMITTEE

method of transmission in all Quarter Horse racehorse cases identified in 2017.

All EP-positive horses are placed under State quarantine and the horse owners are offered four options for long-term management under state/federal regulatory oversight: 1) life-time quarantine, 2) euthanasia, 3) export from the country, or 4) long-term quarantine with enrollment in the APHIS-VS and Agricultural Research Service (ARS) treatment research program. In February 2013, APHIS-VS established a policy to release horses previously infected with *T. equi* which had completed the official treatment program, been proven cleared of the organism by a series of methods over time and were test negative on all available diagnostics. Of the 387 positive horses identified, 200 have either died or been euthanized, 19 have been exported, and 135 have been enrolled in the treatment program. Sixty-four (64) of the horses enrolled in the treatment program have met all of the test-negative requirements and have been released from quarantine. From the 2009-2010 Texas ranch outbreak, 163 horses were enrolled in the treatment research program and have completed treatment with more than 150 horses having met all test-negative requirements and are eligible for release. Successful results from the treatment research program were previously reported by Ueti et al. in "Re-emergence of the Apicomplexan *Theileria equi* in the U.S.: Elimination of Persistent Infection and Transmission Risk" published in *PLoS One*, September 2012.

Given that the primary high-risk population for EP over the past several years has been determined to be limited to Quarter Horse racehorses, targeted surveillance in this population is critical to identifying positive cases quickly and mitigating further iatrogenic spread of the disease. While annual surveillance for EP was previously conducted at levels of approximately 75,000 horses per year in 2010 and 2011, surveillance numbers since that time have been dropping annually and now hover around 20,000 horses tested per year. Additionally, while there were once 11 states with EP test requirements to enter sanctioned racetracks in 2010, that number had dropped in recent years to only four states with an EP test requirement to enter tracks. This decline in surveillance testing in the high-risk population hinders the goal of early detection and is likely to lead to further disease spread over time. Due to continued findings of cases in sanctioned Quarter Horse racehorses, racing commissions and tracks were strongly encouraged to implement or re-establish EP-test requirements and currently there are at least nine states who have responded to this call with new requirements. Additional industry support and involvement is needed at this juncture to: 1) increase EP surveillance in Quarter Horse racehorses and, 2) assist in educational outreach to prevent the poor biosecurity practices which have led to continued spread by iatrogenic means in this population.

### **Equine Infectious Anemia**

An update of the 2016 and 2017 case counts for equine infectious anemia (EIA) in the United States was presented. In 2016, there were at least 1,279,579 horses tested for EIA in the U.S. Of these horses tested, 52

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EIA-positive horses were identified on 34 premises in 17 states. A full report of the 2016 EIA cases is available on the USDA-APHIS website.

So far in 2017, there have been at least 39 EIA-positive horses identified in eight states (Colorado-6, Florida-1, Illinois-8, Kansas-10, North Carolina-1, Oklahoma-2, Tennessee-1, and Texas-10). Thirty-two (32) of the 39 EIA-positives were in Quarter Horse racehorses with iatrogenic transmission and/or illegal movement from Mexico either suspected or confirmed. Twenty-five (25) of these cases were found in horses participating in unsanctioned (bush track) racing including one case of EIA/EP dual infection and seven of the cases were in horses participating primarily in sanctioned racing. The majority of these cases were identified as infected clusters of horses epidemiologically-linked to the same owner or trainer. Of the additional seven EIA cases that were not in Quarter Horse racehorses, four were a cluster of older, previously untested horses on the same premises, one was a middle-aged horse with unknown history, one was a mule, and one was a case of new transmission at a permanent EIA quarantine facility. There may be additional EIA-positives that have been confirmed at the state-level and not yet reported federally but will eventually be included in the national-level EIA report scheduled to be compiled in early 2018.

Although the current prevalence of EIA in the U.S. equine population remains very low at 0.004%, changes in the epidemiology of cases have shifted in recent years. While EIA cases were previously identified as primarily natural transmission by biting fly vectors in untested and under-tested populations, an increase in cases of iatrogenic transmission mainly in Quarter Horse racehorses has begun to be recognized more frequently. In 2017, already a significant increase in EIA cases in Quarter Horse racehorses (32 of 39 cases) is observed as compared to 2016 where only 11 of the 53 EIA cases were in Quarter Horse racehorses. New education and outreach in this emerging high-risk population is needed to mitigate the spread of these types of cases.

### **Equine Arboviruses (WNV, EEE)**

An update on the 2016 and 2017 case counts for equine cases of West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) Virus in the United States was presented. In 2016, a total of 337 equine cases of WNV were reported from 31 states and 118 equine cases of EEE were reported from 15 states. Complete annual reports for WNV and EEE equine cases are available on the USDA-APHIS website.

Data on equine WNV and EEE cases are provided to APHIS-VS via bi-weekly reporting from the Centers for Disease Control's (CDC) ArboNET database. VS's Center for Epidemiology and Animal Health validates the report through communication with state animal health officials and posts the most recent validated case report to the USDA-APHIS website in an attempt to provide the public with more timely equine case information during the year. As of the October 3, 2017 report, 198 equine WNV cases have been reported in 32 states and 53 equine EEE cases have been reported in 13 states.

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Although epidemiological details associated with each reported case are not available through ArboNET, communication with state animal health officials on a subset of reported WNV and EEE cases has indicated the majority of these cases to have been confirmed in either unvaccinated or under-vaccinated equids. Often it has been identified that economic hardship plays a role in a horse owner's decision not to booster vaccinate horses for EEE or WNV thereby leaving them inadequately protected from these viruses. Given the costs associated with laboratory confirmation of a positive case, it is widely understood that the equine cases confirmed and reported through the ArboNET system are likely to reflect significant underreporting of the actual cases counts of EEE and WNV in U.S. equids.

### **Screwworm Outbreak and Its Eradication: Florida: 2016-2017**

John B. Welsh, Action Programs of International Services, USDA-APHIS

On July 5, 2016, a male Key deer, killed by a motor vehicle on Big Pine Key, Florida, was observed to have severe myiasis on the top of its head in relation to its antlers. Throughout the summer, several more Key deer with myiasis were euthanized. A number of domestic animals with myiasis were also seen from July to September. On September 29, 2016, a biologist with the United States Fish and Wildlife Service (USFWS), National Key Deer Refuge on Big Pine Key, contacted the Florida Department of Agriculture and Consumer Services (FDACS) concerning the cases of myiasis in the deer and a sample of larvae were submitted by FDACS to the National Veterinary Services Laboratories (NVSL) of USDA as a foreign animal disease (FAD) investigation. The NVSL confirmed New World Screwworm (NWS) on September 30. Immediately upon the confirmation of NWS by the NVSL, the USDA Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), in partnership with USDA, APHIS International Services (IS), organized a unified Incident Command with FDACS and Monroe County, Florida. An Incident Command Post was set up in Marathon, Florida for on-scene management to respond to the outbreak and eradicate NWS. The unified Incident Command worked closely with the USDA, Agricultural Research Service (ARS), the Panama – United States Commission for the Eradication and Prevention of Screwworm (COPEG), Florida Keys Mosquito Control District, Monroe County, and others. Field work was initiated in the lower keys on October 4 and the sterile insect release was initiated on October 11. The number of Key deer mortalities associated with NWS rose from 30 in September to nearly 100 in October, peaking around the week of October 9, with approximately 30 mortalities that week. Animals with NWS myiasis were confirmed on six islands in the Lower Florida Keys and fertile NWS flies were collected on ten islands. On January 6, 2017, NVSL confirmed a stray domestic dog found near Homestead, Miami – Dade County, on the Florida mainland, was positive for NWS. This was the only case of NWS outside the Florida Keys. Sterile insect release in the Miami – Dade County detection area was initiated on January 13 and continued through March 21. Back in the lower Keys, the

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last reported case of NWS was collected on January 7, 2017. In total, there were 145 cases: 128 presumptive cases and 17 confirmed cases of NWS in the Florida Keys, with the majority (135) observed in Key deer. Biologists of the USFWS estimate for that for each of the deer known to have died as a result of NWS myiasis, another deer succumbed to myiasis, unobserved in the natural environment. No production livestock were affected during the outbreak. The last sterile insect release in the Florida Keys was made on April 25, 2017, approximately seven months after the NVSL confirmed the NWS infestation in Key deer. Passive surveillance (follow-up on reports of myiasis by USFWS, local veterinarians and the public) continues to be conducted by APHIS District personnel and personnel of the FDACS.

### **2017 CFTEP Summary**

Hallie Hasel, USDA, Veterinary Services (VS)

The Cattle Fever Tick Eradication Program (CFTEP) encompasses an area of land along the Texas/Mexico border from Del Rio to Brownsville, approximately 500 miles. This strip of land was established in 1938 as the Permanent Quarantine Zone (PQZ), a border to keep the cattle fever tick from moving north following its eradication from most of the southeast U.S.

In FY17, our infested premises continued to increase, primarily in Webb, Zapata, and Starr Counties. The CFTEP now has 2,440 premises under quarantine, with 204 as infested premises. Fever ticks have progressed into the northern portion of Webb County north of Laredo, and into previously free areas of Webb, Zapata, and Starr Counties. Three USDA APHIS Incident Management Teams, along with over 126 animal health technicians, were deployed to assist with managing the infested premises.

Changing demographics along the southern border, in conjunction with continued fever tick pressure from Mexico, has contributed significantly to the increase in infested premises. Mexico does not have a fever tick eradication program, and both infested livestock and wildlife continue to move across the border.

CFTEP has limited available treatments for fever ticks. Livestock treatments include CoRal spray/dip, Dectomax Injectable, and Ivermectin medicated molasses tubs. Wildlife treatment is limited to Ivermectin treated corn for whitetail deer; no other forms of treatment are available for exotic wildlife, including nilgai, axis, red deer, and other exotics now present along the southern border.

The BM86 fever tick vaccine was introduced in September 2016 and continues to be used in the PQZ. Limited herds have been injected outside of the PQZ following an epidemiological risk assessment. CFTEP vaccinated over 11,549 head since the vaccine was introduced.

Fever tick research is in high demand. Alternative treatment methods and treatments with longer duration of kill are needed for livestock, including equine. Wildlife treatment methods, including exotics, and treatment for

## REPORT OF THE COMMITTEE

pastures/premises/cleaning/disinfection are also required for fever tick eradication to continue.

### **Texas Cattle Fever Tick Update**

TR Lansford, Texas Animal Health Commission

This presentation provides an update on the cattle fever tick eradication efforts in the quarantined areas outside of the Permanent Quarantine Zone (PQZ) and some of the unique challenges that are being faced in those areas.

Competent wildlife vectors and treatment challenges associated with those species, combined with favorable climatic conditions and increasing fever tick burden/pressure from Mexico, are resulting in continued fever tick outbreaks. The number of newly discovered infested premises in south Texas (in all quarantine areas) in 2017 increased 800% as compared to 2014. Currently, there are nearly 1.2 million acres under some category of fever tick quarantine outside of the permanent quarantine zone and 200,000 acres under active fever tick quarantine within the permanent quarantine zone. These acreages represent approximately 2,440 premises.

The temporary preventive quarantine area (TPQA) and associated control purpose quarantine areas (CPQAs) established in 2014 continue from Cameron County up the coast into Willacy and Kenedy counties. Additionally, the CPQAs established in 2014 in Jim Wells and Kleberg counties, as a result of legal cattle movements from Cameron County, are still in place.

A CPQA was established in Live Oak County (approximately 110 miles north of the permanent fever tick quarantine zone) in late November 2016. The origin of the infestation is unknown at this time. More than 480 head of cattle departed the six infested premises that had been stocked in the 12 months prior to the discovery of their infestation. These trace-outs resulted in the quarantining of premises in 54 counties ranging from south Texas to the Texas panhandle. None of these trace premises have subsequently been found to be infested and are undergoing final inspection and release.

As a result of establishing the CPQA in Live Oak County, an existing dipping vat in close proximity to a livestock market was refurbished and placed into service in January 2017. In addition to servicing the regulatory treatment requirements for cattle under fever tick quarantine in Live Oak County, the dipping vat facility has greatly increased fever tick surveillance through the voluntary inspection and treatment of cattle coming from other areas of south Texas. More than 20,000 head of cattle have been inspected and treated at the facility since January. Voluntary surveillance led to the discovery of a fever tick infested premises in Webb County in April 2017. A similar inspection and treatment facility was re-opened at a livestock market in Jim Wells County in March 2017. The voluntary treatment of cattle at these markets has reduced the number of fever tick traces extending beyond the market level in the production system for cattle originating from premises discovered as infested since the dipping facilities were put into service.

## PARASITIC AND VECTOR-BORNE DISEASES

Lastly, fever tick outbreaks largely associated with the high population density of white-tail deer and their associated movements continue to expand in Starr, Zapata, and Webb counties. There are currently more than 403,000 acres under some category of fever tick quarantine in these counties. More than 1,300 corn feeders have been or will be deployed to deliver ivermectin-treated corn to the white-tail deer populations in the impacted areas of these counties from February through July of 2018.

### **Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/ Polymerase Chain Reaction (PCR) Positives-Calendar Year 2016**

Sabrina Swenson, National Veterinary Services Laboratory (Presenting for Tracy Sturgill)

Bluetongue virus or ribonucleic acid (RNA) was detected in 23 samples submitted or collected during calendar year 2016.

The positive bluetongue virus isolation (VI) and PCR test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2016 are listed in Table 1.

REPORT OF THE COMMITTEE

Table 1. **Bluetongue virus (BTV) isolations/PCR positives, calendar year 2016**

<b>State</b>	<b>No.</b>	<b>Species</b>	<b>PCR</b>	<b>VI</b>	
CA	1	Sheep	BTV-1	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
CA	1	Sheep	BTV-13	Not done	WADDL BTV-pos PCR, submission for sequencing
CA	1	Deer	BTV-17	Not done	CDFA-spleen
CA	1	Pronghorn Antelope	BTV-17	Not done	Los Angeles Zoo- WADDL
CA	1	Sheep	BTV-17	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
CA	1	Alpaca	No type	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
FL	3	Sheep	BTV-1	Not done	High Ct, no VI; 1 also pos BTV-3
FL	1	Sheep	BTV-3	Not done	Also pos BTV-1
FL	1	Sheep	BTV-22	Not done	High Ct, no VI
FL	5	Sheep	No type	Not done	High Ct, no VI
LA	1	Deer	BTV-3	Not done	
OK	2	Cattle	BTV-17	Not done	High Ct, no VI
OK	1	Sheep	BTV-17	Not done	
SD	1	Deer	BTV-17	Not done	
TX	1	Deer	BTV-3	Not done	
VA	1	Deer	BTV-3	Not done	SCWDS BTV-pos PCR submission for typing; Low CT, no VI



PARASITIC AND VECTOR-BORNE DISEASES

During calendar year 2016, 25 samples tested positive for EHDV by VI and/or PCR. The positive EHDV isolation and PCR test results from submissions to NVSL in 2016 are listed in Table 2.

**Table 2. Epizootic Hemorrhagic Disease virus (EHDV) isolations/PCR positives, calendar year 2016**

<i>State</i>	<i>No.</i>	<i>Species</i>	<i>PCR</i>	<i>VI</i>	
IA	1	Deer	EHDV-1	Not done	
IA	2	Deer	EHDV-2	Not done	
IA	2	Deer	EHDV-6	Not done	
MO	1	Deer	EHDV-2	Not done	
NC	2	Deer	EHDV-2	Not done	
OK	1	Cattle	No type	Not done	
OK	1	Sheep	No type	Not done	
SD	10	Deer	EHDV-2	Not done	Mostly Hughes
SD	1	Deer	EHDV-1	Not done	
SD	2	Deer	No type	Not done	
SD	1	Cattle	No type	Not done	
VA	1	Yak	EHDV-2	Not done	

Partial-year 2017 data for NVSL orbivirus identifications is shown in Table 3. As of September 26, 2017, BTV has been identified in six samples from three states; EHDV has yet to be identified from samples submitted to NVSL.

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Table 3. **Bluetongue virus (BTV) isolations/PCR positives during Calendar year 2017 (January 1 through September 26)**

<i>State</i>	<i>No.</i>	<i>Species</i>	<i>PCR</i>	<i>VI</i>	
CA	1	Sheep	BTV-11	Not done	UC Davis Barn
CA	1	Sheep	BTV-17	Not done	Hemolyzed blood
CA	1	Cattle	No type	Not done	High Ct, no VI
CA	1	Sheep	BTV-13	Not done	
NV	1	Elk	No type	Not done	High Ct, no VI
TX	1	Pronghorn Antelope	No type	Not done	

*Note: Only submissions with positive results are reported for 2017. As with previous year's data, cases with negative results were not included.*

**U.S Bluetongue Surveillance Strategy: Pilot Study Update**

David His, USDA-APHIS-VS, Center for Epidemiology and Animal Health (CEAH)

Responding to resolutions from the USAHA and trading partner concerns reported by our National Import-Export Services staff, USDA-APHIS-VS has developed a proposal for a multi-faceted bluetongue virus (BTV) surveillance strategy. This strategy combines:

- Serologic surveillance using samples collected from cattle at slaughter for brucellosis surveillance with limited epidemiologic trace-backs for positive results;
- Surveillance using sentinel animals possibly in combination with vector surveillance; and
- Aggregation of BTV testing data from bulls associated with semen collection centers.

In each case, the focus will be limited to free/ low-incidence states. Through this strategy, we expect to gain a broad geographic view of the current U.S. BTV situation.

This project has four main objectives:

1. Identify low prevalence or free areas of BTV, per World Organisation for Animal Health (OIE) guidance for trade support.
2. Based upon BTV prevalence and distribution; assess current ecology and weather patterns.

## PARASITIC AND VECTOR-BORNE DISEASES

3. Begin to establish a BTV serotype distribution map to monitor future changes.
4. Help develop national BTV surveillance strategy.

Serologic surveillance is currently underway. Implementation was initially delayed due to challenges with finalizing the pilot study design, securing funding, optimizing sample selection and testing protocol, and collecting adequate sample numbers from specific States/regions. At this time, all samples have been collected and initial testing has been completed, but repeatability testing and tracebacks are still ongoing. Results are anticipated in the beginning of 2018 and will be used to help guide future surveillance activities.

### **Research Update - The Arthropod-Borne Animal Diseases Research Unit (October 2017)**

William Wilson, Lee Cohnstaedt, Barbara Drolet, D. Scott McVey, Dana Nayduch, Leela Noronha, USDA, Agricultural Research Service (ARS)

The Arthropod Borne Animal Diseases Research Unit's (ABADRU) research mission is to solve major endemic, emerging, and exotic arthropod-borne disease problems in livestock. The Unit is located at the Center for Grain and Animal Health Research (CGAHR) in Manhattan, Kansas. All ABADRU research falls under the ARS National Research Programs: NP103 and Animal Health and NP104 Veterinary, Medical, and Urban Entomology. The multidisciplinary team of nine senior scientist (four vacant) lead research ranging from vector biology to virus-vector-host interactions.

The orbiviruses that cause bluetongue (BT) and epizootic hemorrhagic disease (EHD) are of concern to livestock producers in North America because of 1) the emergence of new serotypes, 2) increased reports of spillover and clinical disease in cattle, and 3) increased spread and adaptation to new geographical areas. Current projects in ABADRU include virus genotyping of more recent isolates, virus transmission and related pathogenesis, development of fluorescent microsphere assays for detection of antibody, EHDV infection of and transmission to white-tailed deer, EHDV vaccine development, dynamics of orbiviruses within the vector, vector genetics, vector proteomics, vector transcriptomics, vector ecology/biology and vector control. The Unit is focused on the *Culicoides* vector transmission mechanisms, maintenance of infection in the vector and the characterization of host immune responses to inform improvement of animal models, diagnostics and vaccines.

The potential introduction of Rift Valley fever (RVF) virus (RVFV) is the most significant arthropod-borne animal disease threat to U.S. livestock. To address the need to develop control and prevention of RVF strategies the ABADRU has developed a collaborative team with research scientists at Kansas State University and others. This has led to a development of target livestock animal model that is being used to identify determinants of RVFV infection, pathogenesis and maintenance in mammalian and insect vector

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hosts. These studies allowed the improvement of diagnostic assays such as point of care real-time (RT) polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA) technology, immunohistochemistry methods and reagents, multiplex assays (Luminex™) and lateral flow assays. The team has also developed an effective subunit vaccine recently patented. Tools have been developed to characterize virus populations selected by the various hosts and is being expanded to provide characterization of emergent viruses. This research will provide tools to better understand the epidemiology of RVF and enhance response to outbreaks thus potentially preventing RVFV epizootics.

Research has continued in the emerging field of predictive biology. The goals of this molecular epidemiology research program are to understand how viruses differentially adapt to insect and animal hosts and how these viruses are maintained and transmitted. Improved RVF risk models for Flaviviridae, genus *Flavivirus* (West Nile virus, Japanese Encephalitis virus and Zika) and 2) Rhabdoviridae, genus *Vesiculovirus* (Vesicular Stomatitis virus) have been developed.

A common thread among the ABADRU various research program are effort to understand the mechanism related the extremely small percentage of insect species capable of transmitting disease-causing pathogens to animals and humans. This includes behavioral characteristics as well as the genetic and phenotypic characteristics of these vector insect species. Understanding these key components of the host-pathogen-vector cycle will provide new strategies to reduce or prevent pathogen transmission by the most common disease vectors: house flies, mosquitoes, and biting midges. House flies associate with bacteria-rich environments due to the nutritional requirements of their larvae. This research defines the role of bacteria in fly development, bacterial persistence during microbe and insect interactions, and pathogen dissemination. Natural selection for increased *Culex tarsalis* mosquito fitness for various habitats and animal hosts has left genetic markers (single nucleotide polymorphisms) throughout the genome. These markers can be associated with traits and used to predict regional entomological risk in a changing climate throughout the mosquito's large geographic range.

Understanding the vertebrate host response to mosquito saliva and its enhancement of virus infection will allow the development of transmission blocking approaches. The identification of biting midges or *Culicoides* saliva components that facilitate pathogen transmission will lead to improved transmission and pathogenesis models. This information will also enhance development of vaccines and other countermeasures to reduce disease transmission. Lastly, not all *Culicoides* are competent vectors and this study will determine vector species and their habitats to help estimate risk in specific geographic regions. This plan aims to limit pathogen transmission by targeting the connections between hosts, vectors, and their environments via the insects' unique characteristics using novel disease control methods.

### **Progress Update by the USDA-ARS Livestock Arthropod Pests Research Unit**

John Goolsby, USDA, Agricultural Research Service (ARS)

Cattle fever ticks (CFT) *Rhipicephalus* (=Boophilus) *microplus* and *Rhipicephalus annulatus* are invasive livestock pests that are endemic to Mexico and invasive along the Texas/ Mexico border.

Acaricide resistance, alternate wildlife hosts, and pathogenic landscape forming weeds present challenges for sustainable eradication of this pest in the U.S. CFT are the vector for bovine babesiosis, a lethal disease causing high mortality particularly in susceptible European breeds of cattle and severely affecting the beef cattle industry. Efforts to eradicate CFT from the United States have been successful; however, a quarantine area is maintained between Texas and Mexico to check its entry from the infected areas of neighboring Mexico states as wildlife and stray cattle that carry CFT can freely cross the border.

In recent years, there has been an increase in CFT infestations outside of the quarantine area in Texas. Nilgai (*Boselaphus tragocamelus*), an exotic Asian antelope widely distributed in southeastern Texas, was found to have a very large home range (20,000 acres) and has the potential to spread CFT through the landscape. Odor lures were tested to attract and treat CFT-infested nilgai. Field dressings (offal) of nilgai and other artificial lures including screwworm lure (which mimics offal) have been evaluated. We documented development of nilgai latrines at screwworm lure sites, and this tool has been combined with remotely operated field sprayers to treat nilgai as they visit common latrines. Locally occurring and mass reared entomopathogenic nematodes are being investigated as bio-acaricides, because they have shown good efficacy in laboratory and barn trials and are acceptable for use in sensitive wildlife areas. In addition, we are exploring the native ranges of cattle fever ticks for classical biological control agents to improve control on wildlife hosts, and in areas where conventional treatments are not practical.

### **Determining Competent Vectors of EHDV in Florida**

Samantha Wisely, University of Florida

Epizootic Hemorrhagic Disease Virus (EHDV) is an Orbivirus that causes die-offs in wild and farmed cervids. The virus is broadly distributed throughout the United States and is primarily vectored by *Culicoides sonarensis*. In Florida, *C. sonarensis* is rare or absent throughout most of the state, yet EHDV is endemic in wild white-tailed deer and is a major source of economic loss in farmed white-tailed deer. Determining the competent vector of EHDV in Florida is an important component to developing an integrated pest management plan on cervid farms. The University of Florida Cervidae Health Research Initiative is using the World Health Organization's (OIE) three-pronged approach to determine the competent vector of EHDV in Florida: 1) associate in time and space the insect vector and disease in hosts, 2) confirm direct contact between the suspected vector and host

## REPORT OF THE COMMITTEE

species, 3) provide evidence that the suspected vector can transmit the virus from an infected host to an uninfected vector. In addressing point 1, we found that almost half of the variation in EHDV infections in 723 white-tailed deer were attributed to the occurrence of *C. debilipalpus* and *C. venustus*. In support of point 2, DNA barcode analysis of blood meals identified *C. venustus*, *C. debilipalpus*, *C. stellifer* and *C. pallidicornis*, and *C. bigattatus* to feed on white-tailed deer. In partial support of point 3, we surveyed for the presence of virus in 14 species of Culicoides and found four individuals of *C. venustus* that had viral loads indicative of a disseminated infection. Trials are ongoing to determine if *C. venustus* is capable of transmitting the virus to white-tailed deer.

### **Advances in Sylvatic Plague Management: Not just for prairie dogs?**

Anne Justice-Allen, Arizona Game and Fish Department

Sylvatic plague, a disease exotic to North America caused by *Yersinia pestis*, has had a significant impact on the mammals of the grassland ecosystem and especially the predator/prey relationship of the black-footed ferret and the prairie dog. A recently developed oral vaccine has been found to protect prairie dogs against the infection and early results from field studies suggested that vaccinated colonies will recover from epizootics more quickly than unvaccinated colonies which should aid in the recovery of the endangered black-footed ferret. Sylvatic plague also occurs in rural communities and recreational sites posing a risk to people and pets. The newly developed vaccine is conditionally licensed for use in prairie dogs only. Additional financial support and research partners would facilitate the expansion of the conditional license to include other species and treatment sites.

### **Committee Business:**

2016 Resolution – reviewed, no comments or concerns.

2017 Resolutions

- Epizootic hemorrhagic disease (EHD) and bluetongue virus (BTV) Data – presented by Travis Lowe; motion by Charley Seale; second by Eric Mohlman; no discussion; approved unanimously.
- Development and Implementation of a Cattle Fever Tick Control Program in Mexican States bordering Texas; presented by TR Lansford; motion by Andy Schwartz; seconded by Bob Hillman; discussion; motion approved unanimously.
- Accelerated Research and Development for Support of Integrated Eradication Efforts of the Cattle Fever Tick; presented by Dee Ellis; motion by Linda Logan; seconded by Andy Schwartz; discussion and support.

Mission statement update – Revised; motion by Andy Schwartz; second by Larry Samples; motion approved. (Changes indicated in italics)

## PARASITIC AND VECTOR-BORNE DISEASES

The purpose of the Committee on Parasitic *and* Vector-Borne Diseases is to encourage investigation of, and research on, the epidemiology of new and ongoing parasitic *or* vector-borne diseases that threaten the health of the animal industry of the United States, including foreign parasitic *and* vector-borne diseases; to encourage the development of new parasiticides to control parasitic diseases; to promote the cooperation of the agencies of the United States government, including USDA, EPA, and FDA, as well as academic institutions and private industry (through the Animal Health Institute); to develop safe and cost effective preventive measures and/or treatments to control identified parasitic *or* vector-borne diseases; and to encourage regulatory agencies to restrict entry into the United States of potentially health threatening, parasitic *or* vector-borne diseases.

No additional Committee business.

## REPORT OF THE COMMITTEE ON PROGRAM

Chair: Barbara Determan, IA

Gary Anderson, KS; Marianne Ash, IN; Tammy Beckham, KS; Lisa Becton, IA; Michael Costin, IL; Tarrie Crnic, KS; Barbara Determan, IA; Donna Gatewood, IA; Colin Gillin, OR; Linda Glaser, MN; Dale Grotelueschen, NE; Kristin Haas, VT; Rod Hall, OK; Carl Heckendorf, CO; Amy Hendrickson, WY; Annette Jones, CA; Donna Kelly, PA; Lester Khoo, MS; Diane Kitchen, FL; Charlotte Krugler, SC; Dale Lauer, MN; Eric Liska, MT; Bret Marsh, IN; Patrick McDonough, NY; Paul McGraw, WI; Cheryl Miller, IN; Boyd Parr, SC; Barbara Powers, CO; Mo Salman, CO; David Schmitt, IA; Andy Schwartz, TX; Charly Seale, TX; Heather Simmons, TX; David Smith, NY; Belinda Thompson, NY; Beth Thompson, MN; Liz Wagstrom, DC; Marty Zaluski, MT.

Chair Barb Determan called the meeting to order. There were 27 members present, in addition to the Executive Committee. A dinner was provided to the chairs

Determan reviewed the Procedures for Committee Meetings, including:

- Manual of Operating Procedures for Committee Chairs and Committees
- Robert's Rules of Order
- Quorum for Committee Meetings
  - 10 members or 30%, whichever is less
- Voting and use of proxies
- Mission Statements

Ben Richey gave an overview of Committee Packets and Reports, including general procedures for reports dealing with subcommittees, resolutions and recommendations. Several questions were made, which were noted for future communication to chairs.

Richey next reviewed logistical procedures for needs of committees, including equipment and emergency protocols.

Marty Zaluski next discussed planning for Committee on Government Relations to take place in the spring, and that chairs would receive communications for input and details.

Boyd Parr then recognized the following chairs that have stepped down.

- Dustin Oedekoven, Tuberculosis
- Heather Simmons, Animal Emergency Management
- Lester Khoo, Aquaculture
- William Brown, Livestock Identification
- Patrick McDonough, Food and Feed Safety

These chairs will also be recognized at the USAHA Membership Meeting on Monday.



## PROGRAM

Further comments and questions also followed regarding the committee structure. The process has been favorable, and it was voiced that appreciation for continuing evaluation, particularly after the first year is much appreciated.

With no further business, the meeting was adjourned.

**REPORT OF THE USAHA COMMITTEE ON POULTRY AND OTHER  
AVIAN SPECIES**

Chair: Dale Lauer, MN  
Vice Chair: Yuko Sato, IA

Bruce Akey, TX; Celia Maria Antognoli, CO; Lyndon Badcoe, WA; Deanna Baldwin, MD; Jamie Lee Barnabei, MD; Justin Bergeron, ME; Richard Breitmeyer, CA; Paul Brennan, IN; Deborah Brennan, MS; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broaddus, VA; Bruce Carter, IA; Steven Clark, NC; Robert Cobb, GA; Matt Cochran, TX; Stephen Crawford, NH; Tarrie Crnic, KS; Marie Culhane, MN; Janine Davenport, MD; Thomas DeLiberto, CO; Linda Detwiler, NJ; Cristy Dice, CO; Brandon Doss, AR; Roger Dudley, NE; John Dunn, MI; Brigid Elchos, MS; Mohamed El-Gazzar, OH; Naola Ferguson-Noel, GA; Larry Forgey, MO; Tony Forshey, OH; Patricia Fox, NC; Nancy Frank, MI; Tony Frazier, AL; Samantha Gibbs, FL; Isabel Gimeno, NC; Eric Gingerich, IN; John Glisson, GA; Eric Gonder, NC; James Grimm, TX; Scott Gustin, AR; Rod Hall, OK; Steven Halstead, MI; Kate Hayes, AL; Burke Healey, CO; Julie Helm, SC; Michael Herrin, OK; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Guy Hohenhaus, MD; Danny Hughes, AR; Dennis Hughes, NE; Pamela Hullinger, CA; John Huntley, AZ; Russell Iselt, TX; Mark Jackwood, GA; Jarra Jagne, NY; Eric Jensen, AL; Deirdre Johnson, MD; Annette Jones, CA; Brian Jordan, GA; Myron Kibus, WI; Calvin Keeler, DE; Donna Kelly, PA; Bradley Keough, KY; Bruce King, UT; Michael Kopp, IN; Dale Lauer, MN; Elizabeth Lautner, IA; John Lawrence, ME; Chelsie Lawyer, IN; Chang-Won Lee, OH; Randall Levings, IA; Mary Lis, CT; Karen Lopez, DE; David Marshall, NC; Rose Massengill, MO; James Maxwell, WV; Paul McGraw, WI; Sara McReynolds, KS; Shelley Mehlenbacher, VT; Gay Miller, IL; Sarah Mize, CA; Brenda Morningstar-Shaw, IA; Lee Myers, GA; Steve Olson, MN; Kristy Pabilonia, CO; Mary Pantin-Jackwood, GA; Boyd Parr, SC; William Pittenger, MO; Lisa Quiroz, CA; Michael Radebaugh, MD; Willie Reed, IN; Mark Remick, VA; G. Donald Ritter, DE; Jonathan Roberts, LA; Keith Roehr, CO; Susan Rollo, TX; Gregorio Rosales, AL; James Roth, IA; Roxana Sanchez-Ingunza, KS; John Sanders, WV; Yuko Sato, IA; Travis Schaal, IA; Joni Scheffel, MN; David Schmitt, IA; Andy Schwartz, TX; John Shaw, DC; Susan Skorupski, OH; Diane Stacy, LA; Patricia Stonger, WI; Nick Striegel, CO; Darrel Styles, MD; David Swayne, GA; Manoel Tamassia, NJ; Lee Ann Thomas, MD; John Thomson, IA; Mia Torchetti, IA; Alberto Torres, AR; Susan Trock, GA; Shauna Voss, MN; Michelle Walsh, ME; Doug Waltman, GA; James Watson, MS; Ben Wileman, MN; Melissa Yates, AR; Andrea Zedek, SC; Bereket Zekarias, KS; Ernest Zirkle, NJ.

The Committee met on Tuesday October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00 a.m. – 6:10 p.m. There were 62 Committee members and 59 guests present for a total of 121 meeting attendees. Chair Dale Lauer presided, assisted by Yuko Sato, Vice Chair. Dr. Lauer welcomed the Committee on Poultry and Other Avian Species (CPAS) members, summarized the 2016 meeting and provided responses from USDA-APHIS-VS to the 2016 Committee.

**Resolution 6, 13, 29, 34 and 42 Combined – Laboratory Approval for Regulatory Diseases**

The USAHA urges the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to restrict commercial foreign animal disease diagnostic testing to laboratories approved by the USDA and to take regulatory enforcement action against non-approved laboratories conducting testing for foreign animal diseases. If USDA doesn't currently have authority for these actions, USAHA urges USDA to take measures to establish those authorities. Additionally, the USAHA recommends state animal health officials assess state authority or oversight over laboratories conducting diagnostic testing for diseases of regulatory importance on samples obtained from livestock and poultry.

**USDA-APHIS-VS Response:** VS has explored several regulatory options to restrict foreign animal disease diagnostic testing to laboratories approved by USDA. We are continuing to seek viable solutions and look forward to further ideas and discussions with our stakeholders. Additionally, VS is developing a regulation to clarify and standardize requirements for approval of laboratories performing official testing. The regulation will complement the rule we are drafting to codify the National Animal Health Laboratory Network (NAHLN) and the National List of Reportable Animal Diseases (NLRAD). VS has developed a draft guidance document that describes best practices to make the approval process for diagnostic tests more consistent across VS programs.

**Resolution 33 – Approval of Real Time Reverse Transcriptase Polymerase Chain Reaction (PCR) Matrix Assay for Avian Influenza (AI) Surveillance in National Poultry Improvement Plan (NPIP) Authorized Laboratories**

The USAHA urges the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to approve the use of a USDA approved RRT-PCR matrix assay for influenza A in NPIP authorized primary breeder company laboratories as outlined in the above NPIP proposed and passed change to the 9 CFR 145.14 and 146.13 (Testing).

**USDA-APHIS-VS Response:** Based on this committee's support, the National Poultry Improvement Plan (NPIP) Biennial Conference and the National Assembly of State Animal Health Officials (NASAHO), VS will be moving forward with implementing this policy. We will share a draft template memorandum of understanding (MOU) with the impacted States and primary breeder groups for review and comment prior to finalization. Actual implementation of the MOU will be dependent on the primary breeder laboratory receiving their ISO17025 accreditation.

*(Note: The reference to 9 CFR Part 146.13 is not applicable here as that deals with the commercial poultry industry, not primary breeders. The background information specifically mentions primary breeders only.)*

**Resolution 35 – Upland Gamebird Secure Poultry Supply Plan**

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The USAHA supports the current funding from USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for the Upland Gamebird Secure Poultry Supply Plan risk assessments and encourages continued funding for these risk assessments beyond the current cooperative agreement.

**USDA-APHIS-VS Response:** At this time, APHIS cannot commit additional funding to this activity. We will continue to evaluate internal resources to determine what efforts we can direct towards these risk assessments.

**USDA 2017 Highly Pathogenic Avian Influenza (HPAI)/Low Pathogenic Avian Influenza (LPAI) Report** was given by Jon Zack, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS). A summary of the report is included in these proceedings.

**2017 Tennessee Avian Influenza (AI) Report** was presented by Charles Hatcher, Tennessee Department of Agriculture. A summary of the report is included in these proceedings.

**2017 Alabama AI Report** was presented by Tony Frazier, Alabama Department of Agriculture. A summary of the report is included in these proceedings.

**Global Avian Influenza Report** was given by David Suarez, USDA, Agriculture Research Service (ARS), Southeast Poultry Research Laboratory (SEPR). A summary of the report is included in these proceedings.

**Avian Influenza Activities, a Year in Review** was presented by Mia Kim Torchetti, USDA-APHIS-VS, National Veterinary Services Laboratory (NVSL). A summary of the report is included in these proceedings.

**2017 Avian Influenza Surveillance in Wild Birds** was presented by Tom DeLiberto, USDA-APHIS, Wildlife Services, (WS). A summary of the report is included in these proceedings.

**HPAI/LPAI Epidemiology Report** was presented by Amy Delgado, USDA-APHIS-VS, Center for Epidemiology and Animal Health (CEAH). A summary of the report is included in these proceedings.

**NPIP Biosecurity Principles Report** was presented by Christina Lindsey, USDA-APHIS-VS, National Poultry Improvement Plan (NPIP). A summary of the report is included in these proceedings.

**Harmonization of Secure Poultry Supply Plans** was given by Marie Culhane, University of Minnesota. A summary of the report is included in these proceedings.

**Time Specific Paper: USDA LPAI Response Moving Forward** discussion was led by Rosemary Sifford, USDA-APHIS-VS. A summary of the discussion and comments is included in these proceedings.

**Broiler Industry Report** was given by Grace Mountainspring, Foster Farms. A summary of the report is included in these proceedings.

**Table Egg Industry Report** was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.

**Turkey Industry Report** was given by Victoria Ahlmeyer, National Turkey Federation. A summary of the report is included in these proceedings.

## POULTRY AND OTHER AVIAN SPECIES

**2017 American Association of Avian Pathologist (AAAP) Meeting Report** was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.

**AI and Newcastle Disease Virus (NDV) Subcommittee Report** was given by David Suarez, USDA-ARS-SEPRL. A summary of the report is included in these proceedings.

**National Poultry Improvement Plan/Live Bird Market System Report** was given by Fidelis Hegngi, USDA-APHIS-VS. A summary of the report is included in these proceedings.

**NVSL Avian Influenza and Newcastle Disease Diagnostic Report** was given by Mia Kim Torchetti, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.

**NVSL *Salmonella*, *Mycoplasma* and *Pasteurella multocida* Report** was given by Kristina Lantz, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.

**World Organization for Animal Health (OIE) Update – Poultry** was given by Michael David, USDA-APHIS-VS National Import Export Services. A summary of the report is included in these proceedings.

***Mycoplasma* Update** was given by Naola Ferguson-Noel, Poultry Diagnostic and Research Center, University of Georgia. A summary of the report is included in these proceedings.

**An Update on Variant Avian Reoviruses from Clinical Cases of Tenosynovitis** was given by Holly Sellers, Poultry Diagnostic and Research Center, University of Georgia. A summary of the report is included in these proceedings.

**Whole Genome Sequencing for *Salmonella*** was presented by Matthew Wise, Center for Disease Control. A summary of the report is included in these proceedings.

**USDA-funded Cooperative Agricultural Project on Poultry Respiratory Diseases (PRD CAP)** was presented by Chang-Won Lee, The Ohio State University. A summary of the report is included in these proceedings.

### **Committee Business:**

**Sub-Committee Report:** The Avian Influenza/Newcastle Disease Subcommittee Report as presented by David Suarez was approved by the Committee.

**Old Committee Business:** There was no old business.

**New Committee Business:** Dr. Lauer is completing his fourth year as Committee Chair in 2017, a replacement will be needed in 2019. USAHA Committee Chairs are limited to five-year terms.

**Recommendations:** No recommendations were proposed.

**Resolutions:** There were two Resolutions that were brought before the Committee, both were approved:

- **H5/H7 Low Pathogenic Avian Influenza Response** - The USAHA requests that the USDA-APHIS-VS provide a clear policy on H5/H7

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LPAL indemnity, compensation and Initial State Response and Containment Plans. USAHA requests that policy be developed with input, participation and feedback from NPIP Participants, Official State Agencies and the General Conference Committee (GCC). Changes will be presented to delegates for discussion and voting at the 2018 NPIP Biennial Conference. In addition, the USAHA requests that Congress appropriate new, no-year, mandatory fiscal appropriations dedicated for LPAL indemnity and compensation to ensure continued participation in NPIP H5/H7 LPAL programs.

- **H5/H7 Low Pathogenic Avian Influenza Program** - The USAHA urges Congress to increase funding for the avian health commodity line item appropriation.

There being no further business, the Committee adjourned at 6:10 p.m.

**REPORT OF THE SUBCOMMITTEE ON AVIAN INFLUENZA AND  
NEWCASTLE DISEASE**

Chair: David Suarez, GA

The Southeast Poultry Research Laboratory (SEPRL), United States National Poultry Research Laboratory, Agriculture Research Service, continues research on avian influenza, Newcastle disease virus, and endemic poultry diseases. Work continues on the modernization program to replace most of the buildings at SEPRL with groundbreaking starting late 2017.

The biological characteristics of the 2014-2015 H5N2 highly pathogenic avian influenza virus (HPAIV) from the U.S. was compared with the H7N8 HPAIV from Indiana in 2016 in commercial turkeys. These outbreaks had very different outcomes where the H5N2 outbreak affected over 200 farms, versus only one HPAIV infected turkey farm in 2016. The question was whether the biological characteristics of each strain could have contributed to the different outcomes (in addition to numerous other factors). Essentially the H7N8 strain had a lower infectious dose by a factor of at least 1,000 and a mean death time was half that of the H5N2. Finally, the H7N8 was also shed at significantly higher titers both orally and cloacally. In the field the H5N2 virus spread much more extensively, which suggests that the longer mean death time (and therefore longer time to onset of disease) may have been important in the spread of the virus. Possibly the infected flocks did not look sick, so control measures and testing were not implemented at the right time.

Studies on the pathobiology of HPAIV in diving ducks has continued. The U.S. HPAIV H7 isolates from 2016 and 2017 have each been evaluated for pathogenesis in juvenile Lesser Scaup (*Aythya affinis*) (LESC). Although sample processing is still in progress, the preliminary data suggest that similar to H5 HPAIV's from the U.S. 2014-2015 outbreak, that LESC are susceptible to infection with HPAIV, but do not exhibit any clinical signs. Similar to AIV in other species the infectious does vary by isolate.

We evaluated the pathogenicity and transmission in chickens of the Tennessee 2017 H7N9 LPAI and HPAI viruses that caused the outbreaks in poultry this year in Tennessee and surrounding states. The BID50 for the LPAIV was  $10^{3.6}$  EID50 and none of the contacts became infected. Virus was only shed by the oropharyngeal (OP) route and for less than five days. With the HPAIV, the BID50 was lower ( $<10^3$  EID50) and contacts became infected in the group that received a high dose of the virus. Virus was shed by both the OP and cloacal routes, but most birds were dead by day two. High titers of the virus were detected in many organs.

The infectivity, transmissibility, and pathogenicity of an H5N8 HPAI virus from the current outbreak in Europe (A/Tufted duck/Denmark/11740/LWPL/2016 H5N8 HPAI) were investigated in mallards. Preliminary results showed 88% mortality in mallards infected with the high doses of the virus. Compared with the U.S. H5N8 and H5N2 index viruses from 2014, which infected all ducks but caused minimal morbidity and

## REPORT OF THE COMMITTEE

mortality, the 2016 H5N8 (clade 2.3.4.4) HPAI viruses appears to replicate better in mallards causing more severe clinical disease. This could explain why the virus infects and causes mortality in many wild bird species. High virus titers were found in all mallard tissues examined (7.2-8.6 log<sub>10</sub> EID<sub>50</sub>). These titers are similar to what observed with other Gs/GD H5NX lineage viruses that cause mortality in ducks. As expected for a HPAI virus, the viral titers in the tissues from chickens infected with this virus were also high and all chickens died, but chickens required a high dose of the virus to become infected.

For the U.S. H5 poultry vaccine bank, three vaccines were developed based on updating existing registered vaccines or currently licensed technologies and were evaluated for efficacy: 1) an inactivated reverse genetics H5N1 vaccine (rgH5N1), and 2) an ribonucleic acid (RNA) particle vaccine (RP-H5), both containing the hemagglutinin gene of clade 2.3.4.4 strain, and 3) a recombinant herpesvirus turkey vectored vaccine (rHVT-H5) containing the hemagglutinin gene of clade 2.2 strain. The efficacy of the three vaccines, alone or in combination, was assessed in White Leghorn chickens against clade 2.3.4.4 H5N2 high pathogenicity avian influenza (HPAI) virus challenge. In Study 1, single (rHVT-H5) and prime-boost (rHVT-H5 + rgH5N1 or rHVT-H5 + RP-H5) vaccination strategies protected 3-week-old chickens with high levels of protective immunity and significantly reduced virus shedding. In Study 2, single vaccination with either rgH5N1 or RP-H5 vaccines provided clinical protection in adult chickens and significantly reduced virus shedding. In Study 3, double rgH5N1 vaccination protected adult chickens from clinical signs and mortality when challenged 20 weeks post-boost, with high levels of long-lasting protective immunity and significantly reduced virus shedding. These studies support the use of genetically related vaccines, possibly in combination with a broad protective priming vaccine, for emergency vaccination programs against clade 2.3.4.4 H5Nx HPAI virus in young and adult layer chickens.

Human infections with H5N1 HPAI virus occur following exposure to virus-infected poultry, often during the slaughter processes. Infectious virus within bioaerosols was detected during laboratory-simulated processing of asymptomatic chickens infected with human- (clades 1 and 2.2.1) and avian-origin (clades 1.1, 2.2, and 2.1) H5N1 viruses. In contrast, the processing of infected ducks was less efficient in generating infectious virus within bioaerosols. Naïve chickens and ferrets exposed to the same air space during the processing of virus-infected chickens became infected and died, suggesting that the slaughter of infected chickens is an efficient source of exposure to avian and mammalian hosts. In contrast, naïve ducks and ferrets exposed to the same air space during processing of virus-infected ducks produced inconsistent infections. The results support a role for airborne transmission of HPAI viruses among poultry and from poultry to humans during home or live-poultry market slaughter processes.

Current technologies for next generation sequencing (NGS) have revolutionized metagenomics analysis of clinical samples. One advantage of



## POULTRY AND OTHER AVIAN SPECIES

the NGS platform is the possibility to sequence the genetic material in samples without any prior knowledge of the viruses contained within. However, virus in clinical samples are typically available in limited concentrations thus enrichment for nucleic acids of interest is needed to increase the sensitivity of NGS technologies. A simplified, sequence-independent single-primer amplification (SISPA) technique in combination with MiSeq Platform was developed to target viral genome sequences representing negative- and positive-sense single-stranded RNA viruses belonging to Orthomyxoviridae, Paramyxoviridae and Coronaviridae families. This method allowed successful assembly of sequences into full or near full-length avian influenza virus (AIV), infectious bronchitis virus (IBV), and Newcastle disease virus (NDV) viral genomes. The detection limit depended on the viral load in the samples. Our results demonstrate complete or near complete virus genome identification was possible with titers at or above  $10^{4.5}$  EID<sub>50</sub>/ml (50% embryo infectious dose), and enough fragments of sequence to allow virus detection and identification with titers at or above  $10^3$  EID<sub>50</sub>/ml. This application can be adaptable to other RNA viruses due to non-specific nature of the amplification technique.

## REPORT OF THE COMMITTEE

### **LPAI RESPONSE MOVING FORWARD**

Rosemary Sifford, USDA-APHIS-VS

On August 22-23, 2017, APHIS hosted approximately 80 invited participants at a meeting to discuss a number of issues around avian influenza (AI), primarily low pathogenic avian influenza (LPAI). Participants included State animal health officials (SAHOs); industry participants from the broiler, layer, turkey, primary breeders, and upland game birds sectors; and subject matter experts from USDA. Presentations included a draft decision tree for APHIS use in determining if LPAI affected flocks should be deemed “low risk” or “high risk” when considering controlled marketing as well as options for paying indemnity and compensation. Topics for group discussions included indemnity and compensation for LPAI, the calculation of a flat rate for virus elimination for floor raised birds, Initial State Response and Containment Plans (ISRCP), and whether controlled marketing is a viable option for handling LPAI-affected flocks. A summary of the State/Industry comments follows:

#### **Summary of State/Industry Comments**

##### **Indemnity:**

- There should be a solid, clear Veterinary Services (VS) policy on H5/H7 indemnity. A vague, inconsistent policy increases risk; deters testing and reporting.
- Current State ISRCP assume indemnity for everything except turkeys, which can be controlled marketed.
- The decision to indemnify should first be based on science, then health, then financial considerations.
- Indemnity should always be available for flocks that cannot be controlled marketed.
- There needs to be a dedicated funding for LPAI indemnity – without it there is no incentive for producers to participate in the program.
- Some participants felt strongly that there should be no difference between the provisions of indemnity for LPAI versus highly pathogenic avian influenza (HPAI).

##### **Compensation:**

- Compensation should still be available for flocks that are controlled marketed.
- Do not try to divide premises into affected/non-affected barns – compensation should be provided for the entire premises, not just individual affected barns/houses
- Moving forward, all partners need to be onboard and understand any changes to both indemnity and compensation especially as it relates to State ISRCP.
- Participants needed more time to consider the flat rate calculation for floor raised birds.

##### **Controlled Marketing:**

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- There are certain advantages to controlled marketing, such as reduction in LPAI control costs and decreased protein loss; preservation of funding for indemnity; and demonstration of prudent use of limited funding.
- Due to broiler production density, lack of market access, trade consequences, and risk of H5/H7 spreading, many expressed that controlled marketing of broilers is not a viable option.
- Controlled marketing could be used in some layer situations but would require a protocol for segregation of birds and product.
- Consistency is needed between states that allow interstate movement of birds or products (eggs).
- Controlled marketing extends the timeframe for trade restrictions, which can be severe for some poultry commodities (i.e. broilers).
- Controlled marketing is a risky activity, as LPAI can quickly mutate into HPAI.
- Historically, certain states have used controlled marketing successfully in the turkey industry.

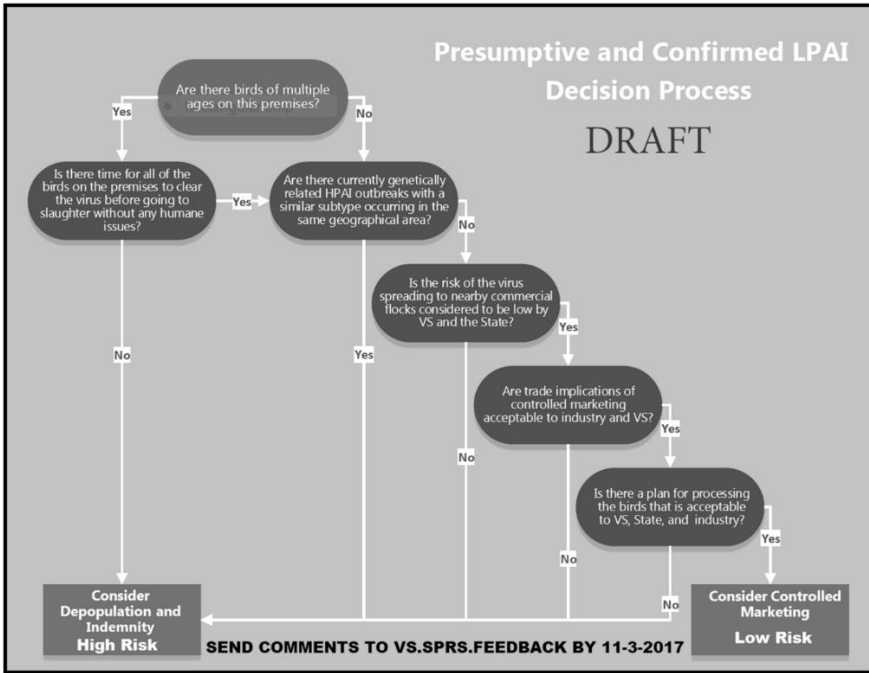
### **Other Issues:**

- Serology is a useful, economical tool; however, it should not be used to determine the status of a flock. Polymerase chain reaction (PCR) is more useful for determining if the flock is shedding virus.
- The National Poultry Improvement Plan (NPIP) infrastructure is sound. However, participants expressed a desire to harmonize AI programs between the different poultry commodities.
- State ISRCP plans lack uniformity. Several participants requested improved guidance from VS.
- Interstate movement requirements should be based on reasonable science to support or deny movement. There should never be movement restrictions on finished products.

### **Next Steps, Veterinary Services (VS) plans to:**

- Host conference calls with the National Assembly (NA), industry, and the Official State Agencies on September 26, 2017.
- Provide to industry a document explaining the calculation of the flat rate for compensation and solicit written comments.
- Provide to stakeholders a document that further details the provision of LPAI indemnity and compensation in the future.
- Provide an improved guidance document on state preparation for an LPAI case (i.e. the ISRCP).
- Engage in discussions at the 2017 United States Animal Health Association meeting.

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### LPAI Indemnity and Compensation - DRAFT

Infection	Risk	Response	Indemnity		Compensation		Response details
			Indemnity for Birds and Eggs	Depop and Disposal Costs* &	VE Payments*	Materials Destroyed*#	
LPAI	Low	Controlled Marketing; Split compensation approved	0%	75%	75%	75%	Low risk; birds control marketed, compensation approved for split with State/Industry
LPAI	Low	Indemnity and split compensation approved	100%	50%	50%	50%	Low risk; birds depopulated with indemnity due to humane issues, compensation approved for split with State/Industry
LPAI	Low	Indemnity not approved; Split compensation approved	0%	25%	25%	25%	Low risk; birds depopulated when other options possible, compensation approved for split with State/Industry
LPAI	High	Indemnity/Compensation not requested in advance	0%	0%	0%	0%	High risk; birds depopulated prior to confirmation and/or federal request.
LPAI	High	Indemnity and split compensation approved	100%	75%	75%	75%	High risk, depopulation with indemnity approved, compensation approved for split with State/Industry

Important notes:  
 \* For LPAI only, payments in these categories approved only for affected barns and materials ( those barns with confirmed LPAI)  
 # ALL payments (HPAI and LPAI) for materials destroyed must be approved in advance IN WRITING by authorized USDA personnel (AD, IC or higher)  
 & Where applicable; for birds that are control marketed, disposal may include other contaminated materials such as litter and feed

**SEND COMMENTS TO VS.SPRS.FEEDBACK@APHIS.USDA.GOV BY 11-3-2017**

## Presentations and Reports

### **USDA-APHIS-VS Summary of the 2017 Outbreak of Highly Pathogenic Avian Influenza (HPAI)/Low Pathogenic Avian Influenza (LPAI) in the Southeastern United States**

Jon Zack, USDA-APHIS-VS

#### **Incident Overview:**

After the 2014–2015 outbreak of highly pathogenic avian influenza (HPAI) in the United States, as well as the Indiana HPAI/low pathogenicity avian influenza (LPAI) outbreak in 2016, the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and poultry producers remained on high alert for HPAI in 2017. In early March, based on the appearance of clinical signs, a Tennessee commercial broiler breeder flock in Lincoln County was suspected to have HPAI. On March 3, 2017, samples from that farm were presumptive positive for the H7 influenza subtype at a National Animal Health Laboratory Network (NAHLN) laboratory. At this time, HPAI response activities in Tennessee were initiated immediately, with State and Federal agreement, as the presumptive positive case definition for HPAI had been met. The next day, the National Veterinary Services Laboratories (NVSL) confirmed HPAI on the premises. The virus was subsequently identified as H7N9 of North American wild bird lineage (unrelated to Asian H7N9 viruses). Surveillance in commercial and backyard premises began immediately. Four days later, on March 8, 2017, NVSL confirmed LPAI H7N9 in a neighboring Tennessee county, again in a commercial broiler breeder flock. In total, between March 4 and March 25, 2017, 14 premises were identified with confirmed H7 or confirmed H7N9 infection. In total, HPAI was confirmed on two premises - the index case and a second commercial broiler breeder flock, both in Lincoln County. The remaining 12 premises had confirmed or presumptive LPAI: six commercial premises and six backyard flocks.

There were no additional H7/H7N9 HPAI or LPAI detections in commercial or backyard flocks after March 25, 2017. Wild bird surveillance on and around the Infected Premises did not yield any positive H7 avian influenza (AI) results. The HPAI Infected Premises were depopulated rapidly, as were nine of the 12 LPAI Infected Premises. One LPAI infected backyard premises conducted targeted euthanasia; additionally, two other LPAI infected backyard premises with no clinical signs did not depopulate. These three premises underwent intensified surveillance to be released from quarantine. In all, nearly 253,000 birds were depopulated as part of these HPAI and LPAI detections in the southeastern United States.

This 2017 incident enabled yet another region in the United States to exercise their AI preparedness and response procedures; for APHIS, it offered a refresher of AI response and the ability to practice the improved processes and procedures that have been implemented since 2014–2015. This successful HPAI/LPAI response in the southeast United States was

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largely based on the lessons learned by APHIS, States, and the poultry industry in the prior AI incidents.

### **Summary of Response Activities:**

In response to the HPAI detections, the State Animal Health Officials (SAHOs) in Tennessee and Alabama, alongside APHIS Veterinary Services (VS), took the lead in coordinating the response. A unified State-Federal Incident Command was established for Tennessee and Alabama, the region where the HPAI detections and HPAI Control Areas were located. For the LPAI detections in Kentucky and Georgia, these SAHOs led the LPAI response effort in their respective States. Additional VS personnel supported activities, as requested by SAHOs, in response to the LPAI detections. The response to the outbreak included the following activities at the national and/or field levels:

- Planning and conducting disease surveillance
- Collecting samples and diagnostic testing
- Planning and carrying out epidemiological investigations and tracing
- Managing information from the field to the national level
- Coordinating and communicating with State, local, and industry stakeholders
- Providing guidance on personal protective equipment and responder health and safety and ensuring safety officers were in the field
- Providing guidance and supervision on biosecurity measures
- Conducting quarantine and movement control activities
- Supporting continuity of business and issuing permits for the HPAI Control Area
- Providing information and documentation for regionalization for international trade
- Conducting and providing resources and guidance for mass depopulation and euthanasia
- Safeguarding animal welfare during response operations
- Offering subject matter expertise for disposal
- Providing guidance and options for cleaning and disinfection (virus elimination)
- Managing logistics through the National Veterinary Stockpile (NVS)
- Implementing revised financial procedures for appraisal and indemnity and providing support for compensating HPAI-infected poultry owners and contract growers
- Providing overall incident management, support, and objectives

APHIS contractors supported depopulation efforts, using foam, on both HPAI Infected Premises. On LPAI premises that depopulated, the company or producer typically led depopulation efforts with the assistance of State personnel, as required by the situation. A variety of methods were used for these LPAI premises, including foam, Koechner Euthanizing Device (KEDS), cervical dislocation, and CO<sub>2</sub>. Ventilation shutdown was not implemented during this outbreak.

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In terms of disposal, premises that depopulated birds used on-site burial (12 of 12). The 11 Infected Premises (9 LPAI; 2 HPAI) that depopulated in full also conducted cleaning and disinfection activities (also known as virus elimination): 7 applied wet disinfectant, 2 conducted heat treatment, 1 elected to fumigate, and 1 underwent an extended fallow period. The previously-infected HPAI premises were approved to restock on June 4, 2017; all premises were approved to conduct restocking by June 16, 2017.

### **Organizational Response:**

A unified Incident Command was established in Nashville on March 4, 2017, comprised primarily of personnel from Surveillance, Preparedness, and Response Services (SPRS) District 2 and the Tennessee Department of Agriculture. Because the HPAI Control Area boundary also included part of Madison County, Alabama, personnel from the State of Alabama also joined the unified Incident Command. Other APHIS personnel also supported SPRS District 2 responders in the unified Incident Command, both on-site and virtually, with activities like surveillance, finance/administration, and epidemiology for the HPAI Infected Premises and LPAI Infected Premises associated with the HPAI detections. SPRS District 2 personnel supported activities associated with the LPAI Infected Premises in Kentucky and Georgia; these States were not part of the unified Incident Command.

The National Incident Coordination Group (ICG) was immediately ramped up when the presumptive positive case definition for HPAI was met; this group was prepared to support unified Incident Command operations. At the height of the response, the ICG consisted of approximately 20 people devoting significant time for the HPAI/LPAI outbreak in the southeastern United States.

### **End of Outbreak and Cost:**

The HPAI Control Areas were released on April 11, 2017, 28 days after NVSL had confirmed the second HPAI infection. Response operations, including virus elimination, environmental sampling, and restocking approvals were completed throughout late spring. The final Infected Premises quarantine (an LPAI backyard premises) was released on June 16, 2017. For the 2017 H7N9 incident, the total commitments for indemnity on the HPAI premises, as well as obligations for overall response operations, was approximately \$2.79 million. In 2017, indemnity funds were provided by APHIS for depopulated birds on HPAI Infected Premises; compensation was also provided to HPAI Infected Premises for virus elimination activities. In this incident, LPAI Infected Premises that made the decision to depopulate, in coordination with State officials, did not receive APHIS indemnity funds for depopulated birds or compensation for virus elimination activities.

### **2017 Tennessee HPAI and LPAI Outbreak and Response Summary**

Charles Hatcher, Tennessee Department of Agriculture

Tennessee is a primary breeder state and supplies poultry genetics to the world. Around the second or third week of February, a showering of virus by migratory waterfowl occurred across a wide path in the Southeastern

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United States affecting Alabama, Tennessee, Kentucky and Georgia. There were multifocal pinpoint introductions of the influenza virus into poultry flocks.

The Tennessee outbreak was managed using the Incident Command Structure (ICS) following USDA's HPAI response plan. The Co-Incident Commanders were Dr. Hatcher and the USDA Assistant District Director. A 10km control zone was set up for the HPAI locations and a 10km surveillance zone was set up for the LPAI location. Once the second HPAI location was detected extending the HPAI control zone into Alabama, a unified command was formed between Tennessee and Alabama.

Two (2) Tennessee commercial poultry operations (both broiler breeder flocks) were confirmed as having HPAI. The first was diagnosed on March 3, 2017 and the second was diagnosed on March 13, 2017. One commercial poultry operation (primary breeder flock) and two backyard flocks were confirmed as having LPAI. All confirmations were of North American wild bird lineage H7N9. At the time of depopulation of both HPAI flocks, only one house on each of the premises was affected. There was no evidence of lateral transfer between premises during the outbreak except for the two HPAI locations. The two LPAI backyard flocks showed no clinical signs and eventually tested out of quarantine. Depopulation of the two HPAI flocks was by foaming. Depopulation of the one LPAI commercial flock was by cervical dislocation. Disposal of the birds at all three (3) locations was accomplished by burial on site. Wet cleaning and wet disinfection was the method of cleaning and disinfection (C/D) at the HPAI locations (houses had dirt floors and wooden slats). The use of a lot of water in houses with dirt floors is problematic. A combination of wet and dry C/D was performed at the LPAI location (houses had concrete floors). C/D took longer than expected at the HPAI locations delaying USDA's notification of Tennessee's HPAI free status to OIE until August 11, 2017. The National Veterinary Stockpile (NVS) was instrumental in supplying equipment and contractors. EMRS was used for permitting and it worked well.

Tennessee is fortunate to have the State Veterinarian's office, National Animal Health Laboratory Network (NAHLN) Laboratory and USDA-APHIS Veterinary Services (VS) all on the same campus making communication and response much easier. The Kord Animal Health Diagnostic Laboratory (NAHLN Laboratory) played a pivotal role in the outbreak response performing over 3,400 polymerase chain reaction (PCR) tests in a timely and efficient manner working seven days a week for over a month. EMRS was used for permitting based on surveillance testing and it worked well.

Suggestions for future responses:

- Plan like it's going to happen even if you think it won't.
- Have your Incident Management Team (IMT) in place with specific names, consider back up IMT if the outbreak drags on.
- Do your National Poultry Improvement Plan (NPIP) biosecurity audits, collect site specific depopulation, C/D and disposal plans, locate response resources now.
- Target surveillance of sick and dead birds.



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- Once indemnity/compensation is approved, depopulate, dispose (compost if at all possible), C/D, all Agricultural Stewardship Assurance Program (ASAP) for what's best for that particular site.
- Collaborate and communicate with stakeholders, work with subject matter experts (SMEs).
- Avoid the use of water if you can, it's hard to wet clean/disinfect wooden slats and a dirt floor.
- Consider trained/experienced strike teams for depopulation/CD/disposal, contractors are slow and inefficient.
- Consider CO2 to depopulate, true euthanasia.
- Be Emergency Management Response System (EMRS) ready.
- Make decisions based on risk, hard to get to no risk, use common sense.

### **Alabama HPAI and LPAI Report**

Tony Frazier, Alabama Department of Agriculture

The Alabama State Veterinarian provided a brief overview of the 2017 high pathogenicity avian influenza (HPAI) low pathogenicity avian influenza (LPAI) outbreak that affected Tennessee, Alabama, Georgia and Kentucky. This included a brief report of response efforts including establishment of control and surveillance zones, monitoring commercial and backyard poultry flocks, depopulation, disposal, virus elimination and control marketing efforts. The discussion included interacting with USDA-APHIS-VS, establishing joint Command center, utilizing EMRS and outreach efforts to the state poultry industry.

### **Global HPAI Virus Characteristics**

David Suarez, USDA-ARS Southeast Poultry Research Laboratory (SEPRL)

The global assessment of avian influenza shows a severe disease year based on number of outbreaks worldwide. The major contributor for poultry outbreaks was the highly pathogenic avian influenza (HPAI) Goose/Guangdong/1996 H5 lineage of viruses. The Goose/Guangdong lineage was first identified in an outbreak in China in 1996 with mortality in a goose flock. This lineage of virus, which is strictly tracked based on the hemagglutinin gene, persisted in poultry in China until 2003-04 where the virus spread to several neighboring countries. Reassortment of the other seven genes in the Goose/Guangdong lineage is common. The biggest change in the Goose/Guangdong lineage occurred in 2005 when the clade 2.2 HPAI virus spread from poultry to wild birds where it caused some large wild bird mortality events (Qinghai Lake). The infected migratory wild birds spread the clade 2.2 virus to Europe and Africa causing many poultry outbreaks. The clade 2.2 virus persisted in wild birds for several years, but a separate Goose/Guangdong lineage virus, clade 2.3.2.1, was transmitted to wild birds starting in 2008. The 2.3.2.1 virus caused waves of outbreaks in Europe and Asia since 2008 and in 2015 this lineage was detected in Africa

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and persists through today. A new Goose/Guangdong lineage virus, clade 2.3.4.4, was found in wild birds in 2014 and was the lineage of HPAI that found its way into the Americas in 2014 resulting in the 2014-2015 outbreak. The clade 2.3.2.1 and clade 2.3.4.4 lineage viruses continue to circulate in wild birds and results in periodic outbreaks in poultry.

In Africa new outbreaks of H5N8 2.3.4.4 outbreaks have occurred in Egypt, sub-Saharan Africa, and in South Africa. Outbreaks of H5N1 2.3.2.1 has continued to persist in several sub-Saharan African countries that started in 2015. The H5N1 clade 2.2 remains endemic in Egypt after its introduction in 2006. A HPAI H7 outbreak was reported in Algeria and a H5N2 HPAI outbreak continues in ostriches in South Africa.

Europe has had a devastating year as they have had over a 1,000 poultry outbreaks of clade 2.3.4.4 H5N8 and H5N5. Over 1,500 wild bird detections of HPAI were also detected. Almost every country in Europe has been affected. Although the outbreaks have followed the standard prevalence of most detections in the winter months, sporadic outbreaks have occurred in the summer in both poultry and wild birds. This extended detection pattern suggests that outbreaks are likely to reoccur in the fall when temperatures drop and facilitate virus spread.

In Asia, endemic Goose/Guangdong H5 continues in Vietnam, Indonesia, Bangladesh, and China. Recurrent outbreaks in neighboring countries are common in India, Cambodia, Malaysia, and Laos. For the endemic countries, the situation of clade and neuraminidase subtype continues to change. In Vietnam some clade 1 virus continues to circulate, but both clade 2 H5N8 and H5N1 circulates. In Indonesia the clade 2 H5N1 continues with several sublineages being established. Bangladesh continues to be endemic after the introduction of H5N1 clade 2.3.2.1 in 2011. The virus in China continues to evolve. The clade 2.3.4.4 appears to be increasing in prevalence, with H5N8 and H5N6 being the most common subtypes reported. Vaccination continues as the major control tool in China, Indonesia, and Vietnam. In China they also are endemic for H7N9. Low pathogenic avian influenza (LPAI) H7N9 was first identified in 2013 in association with a number of human infections. In late 2016 the LPAI mutated to HPAI, and the HPAI virus was also associated with human infections and death. The H7N9, both LPAI and HPAI, appears to be widespread in China, often associated with live poultry markets. Vaccination for H7N9 has been started since the shift to HPAI. Over 1,500 human cases have been associated with H7N9 with more human cases in the last flu season than seen previously. Other notable outbreaks include the Philippines with their first poultry HPAI outbreak (H5 clade 2.3.4.4) and Taiwan which continues to deal with several different H5 HPAI viral lineages.

In the Americas, Mexico continues to deal with both endemic H5N2 LPAI and H7N3 HPAI. Vaccination continues to be commonly used with limited success. The United States also had a H7N9 LPAI and HPAI virus in poultry. The U.S. outbreak was controlled by detection and depopulation.

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The H9N2 G1 lineage of LPAI continues to be a major issue in Asia, the Middle East and North Africa. A recent outbreak in Burkina Faso represents possible the first report of H9N2 in sub-Saharan Africa. The G1 lineage of virus remains highly infectious and transmissible and is the most problematic LPAI in poultry.

Newcastle Disease virus continues to be a major problem in developing countries in poultry, but it is often under reported or not reported. Outbreaks were reported in several European countries including Sweden, Bulgaria and Romania. The pigeon paramyxovirus remains endemic in wild pigeons and doves and is likely present worldwide.

### **2017 Avian Influenza Disease Activities**

Mia Kim Torchetti, USDA-APHIS-VS-NVSL

A report on HPAI/LPAI test protocols, reporting and Part I “Year in Review” was presented. Information was obtained from and an overview provided from the following resources:

USDA Epidemiologic and Other Analyses of Indiana HPAI/LPAI-Affected Poultry Flocks 2016:

[https://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/poultry/downloads/Epidemiologic-Analysis-March-18-2016.pdf](https://www.aphis.usda.gov/animal_health/animal_dis_spec/poultry/downloads/Epidemiologic-Analysis-March-18-2016.pdf)

USDA Epidemiologic and Other Analyses of HPAI/LPAI Affected Poultry Flocks 2017:

[https://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/poultry/downloads/epi-ai.pdf](https://www.aphis.usda.gov/animal_health/animal_dis_spec/poultry/downloads/epi-ai.pdf)

Reference for LPAI > HPAI: Dennis J. Alexander, An overview of the epidemiology of avian influenza, In Vaccine, Volume 25, Issue 30, 2007, Pages 5637-5644, ISSN 0264-410X, <https://doi.org/10.1016/j.vaccine.2006.10.051>.

(<http://www.sciencedirect.com/science/article/pii/S0264410X0601187X>)

OIE Avian Influenza Portal:

<http://www.oie.int/en/animal-health-in-the-world/update-on-avian-influenza/2016/>

FAO Update on Asian lineage H7N9:

[http://www.fao.org/ag/againfo/programmes/en/empres/h7n9/situation\\_update.html](http://www.fao.org/ag/againfo/programmes/en/empres/h7n9/situation_update.html)

WHO Antigenic and genetic characteristics of zoonotic influenza viruses and development of candidate vaccine viruses for pandemic preparedness:

[http://www.who.int/influenza/vaccines/virus/201709\\_zoonotic\\_vaccinevirusupdate.pdf](http://www.who.int/influenza/vaccines/virus/201709_zoonotic_vaccinevirusupdate.pdf)

### **U.S. Interagency Surveillance for Highly Pathogenic Avian Influenza in Wild Birds Update**

Tom DeLiberto, USDA-APHIS-WS

A unique A (H5Nx) clade 2.3.4.4 highly pathogenic avian influenza virus (HPAIV) was detected in North America in late 2014. Motivated by both the alarming spread of new H5 reassortant viruses in Asia and Europe as well as

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by the detection of HPAIV in both domestic poultry in Canada, and in wild and captive birds in Washington State, initial HPAIV surveillance was conducted among wild birds in the Pacific Flyway of the United States. This effort was later expanded to include the Central and Mississippi Flyways. Positive HPAI H5 findings from wild waterfowl samples suggested that while some of these species exhibited no detectable morbidity or mortality, clinical disease was documented for other wild bird species similarly infected. Also, losses in U.S. domestic poultry were unprecedented. In July 2015, state and federal agencies initiated a national surveillance effort to provide information to guide management actions to address some of the issues associated with HPAI in birds. This includes risks to commercial poultry, backyard poultry, game bird farms, wild birds, wild bird rehabilitation facilities, falconry birds, and captive bird collections in zoos/aviaries. Specific objectives of the plan were to:

- Determine the distribution of influenza viruses of interest in the USA
- Detect spread of influenzas of interest to new areas of concern
- Provide a flexible surveillance framework that can be modified to monitor wild waterfowl populations for avian influenza, detect reassortant avian influenza viruses and estimate apparent prevalence of important influenzas once detected in an area of concern.

During 2015 and 2016, surveillance data indicated that A (H5Nx) clade 2.3.4.4 HPAI was circulating in wild birds at about a 1 % prevalence each year. No HPAI detections have been detected in wild birds since December 2016.

### **Epidemiology of Low Pathogenic and Highly Pathogenic Avian Influenza in the United States, 2017**

Amy Delgado, USDA-APHIS-VS-CEAH

The 2017 outbreak of the H7/H7N9 virus of North American lineage was limited to four States in the southeastern United States: Tennessee, Alabama, Kentucky, and Georgia. Lincoln County, Tennessee was the only location with HPAI detections (two HPAI Infected Premises). Both of the HPAI detections were in commercial broiler breeder flocks. Partial and full genetic sequences of the HPAI and LPAI viruses recovered were highly similar, excluding the insertion at the cleavage site which was responsible for the mutation from H7N9 LPAI to H7N9 HPAI.

In total, there were two confirmed HPAI detections and 12 LPAI detections (8 presumptive LPAI; 4 confirmed LPAI). Of the 14 premises, eight were commercial flocks and six were backyard producers: all commercial premises affected were broiler breeder flocks. On the 14 affected premises, approximately 253,000 birds were depopulated, or succumbed to the virus in the case of the HPAI premises. Nearly 99 percent of these birds were in commercial broiler breeder flocks. There were no Dangerous Contact Premises identified in this outbreak.

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USDA-APHIS, in collaboration with APHIS Wildlife Services (WS) and the affected States, collaborated to conduct epidemiologic, genetic, and wildlife investigations to evaluate the factors associated with the introduction and transmission of the H7N9 viruses during the 2017 outbreak. Based on molecular and epidemiological evidence, it appears that there was lateral spread between the first and second HPAI Infected Premises. In terms of LPAI, the information suggests that there were multiple, independent introductions of the H7N9 LPAI viruses. Unlike previous outbreaks, the movement of equipment and trucks on to and off the farm did not appear to be a significant risk for virus introduction. In 2017, risk factors included the presence of rodents or other wild mammals and waterfowl, condition of the poultry housing, and gaps in biosecurity protocols (specifically, allowing entry of the virus from the environment into barn structures). A comparison of this outbreak with prior outbreaks in the United States highlights the complex nature of avian influenza epidemiology in the U.S. and the importance of taking into account production systems and both environmental and farm-to-farm pathways of disease spread. For more information refer to:

- USDA-APHIS Final Report for the 2017 Outbreak of Highly Pathogenic Avian Influenza (HPAI)/Low Pathogenicity Avian Influenza (LPAI) in the Southeastern United States: [https://www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/hpai/h7-hpai-lpai-finalreport.pdf](https://www.aphis.usda.gov/animal_health/emergency_management/downloads/hpai/h7-hpai-lpai-finalreport.pdf)
- USDA-APHIS-CEAH 2017 Epidemiologic and Other Analyses of HPAI/LPAI Affected Poultry Flocks: June 26, 2017 Report: [https://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/poultry/downloads/epi-ai.pdf](https://www.aphis.usda.gov/animal_health/animal_dis_spec/poultry/downloads/epi-ai.pdf)

### **NPIP Biosecurity Principles**

Christina Lindsey, USDA-APHIS-VS-NPIP

The National Poultry Improvement Plan (NPIP) is a cooperative Federal-State-Industry program for controlling certain poultry diseases. An update to the NPIP Program Standards in March 2017 included a set of 14 industry-standard biosecurity plan principles intended to reduce the risk of introduction and spread of avian influenza (AI) and other transmissible diseases of poultry among U.S. commercial poultry flocks. Producers are encouraged to access the resources available at [www.poultryimprovement.org](http://www.poultryimprovement.org) to develop a poultry biosecurity plan compliant with NPIP Program Standard E.

Although all producers must have a biosecurity plan, not all producers are required to have that biosecurity plan audited by an official state agent (OSA) of the NPIP. The audit requirement does not apply to the following small producers:

- 9 CFR 146.22(b) - commercial table-egg layer flocks of fewer than 75,000 birds
- 9 CFR 146.52(c) - commercial upland game bird and commercial waterfowl plants that slaughter fewer than 50,000 birds annually or

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raised-for-release upland game bird flocks and raised-for-release waterfowl flocks that raise fewer than 25,000 birds annually

- 9-CFR 53.10 (g) (2) -premises on which fewer than 100,000 broilers are raised annually
- Premises on which fewer than 30,000 meat turkeys are raised annually

The NPIP OSA shall audit producer biosecurity plans against the 14 biosecurity principles once every two years, or a sufficient number of times during that period to ensure the participant is in compliance. With time and practice, we hope to reduce the risk of AI and other poultry disease outbreaks nationwide throughout the commercial poultry industry.

### **Secure Poultry Supply Plans, Update on Harmonization**

Marie Culhane, University of Minnesota

The Secure Poultry Supply Plan (SPS) is a translation of the science in the Secure Egg Supply (SES), Secure Turkey Supply (STS) and Secure Broiler Supply (SBS) plans into a harmonized permitting approach that can be used in the event of a disease outbreak such as highly pathogenic avian influenza (HPAI). When a product is moved using the SPS, the permit guidance for that product, which comes from the SES, STS or SBS, spells out the criteria that must be met to meet the movement's risk rating. The SPS helps to avoid interruptions in animal/animal product movement to commercial processing from premises with no evidence of HPAI infection. In addition, the SPS helps to assure that there will be a continuous supply of [safe and] wholesome food to consumers; and it maintains continuity of business (COB) for producers, transporters, and food processors through response planning.

The goals of the SPS are achieved through the development of rigorous science produced through the efforts of actively involved public-private partners to produce proactive risk assessments, support product movements, and harmonize the Secure Poultry Supply plan. Analysts and scientists at the University of Minnesota, together with partners at the state, federal, and industry levels, have been working towards these goals to ultimately produce thorough and clearly communicated Secure Food System (SFS) plans that contain the best available guidance to support the HPAI and other disease response while promoting COB. To make the SFS plans for the movement of products easier to use, two things are needed: permit criteria that were the same between commodities and products; and simplified requirements (where possible) for getting permits. With these things in mind, several parts of the Secure Poultry Supply plan guidance are harmonized. It is important to remember that there are many reasons why the language of the SES, the SBS and STS plans differ. The Egg, Broiler, and Turkey industries differ in their day-to-day practices, and the SES, SBS, and STS plans themselves were written by different work groups about different product movements. The plans address the mitigation of risks in unique ways. However, to successfully mitigate risk in an outbreak and prevent disease spread, state

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and federal regulators need commonality in order to manage the diversity of species and products they may be asked to permit.

The elements of the SPS plan that have been harmonized to date include the monitored premises (MP) definition, the pre-movement isolation period (PMIP), the testing requirements, and the traceability/premises identification numbers (PIN). When there is a difference between SPS criteria and those in the individual SES, SBS, or STS plans, the harmonized SPS criteria and/or element meet or add mitigation for additional pathways of exposure or add additional samples to what is in the plan. For several key risk mitigation elements and/or criteria, harmonization is not possible. This is most often because the specific product movement requires additional mitigation steps in order to reach the acceptable risk level. In those instances, the additional criteria are listed on the product guidance.

The benefits of a harmonized SPS plan are the creation of a system and processes for premises with no evidence of disease to have COB despite being within a Control Area (CA). The proactive work in these projects will contribute to the speed and efficiency of outbreak response and shortened recent outbreaks by demonstrating the value of immediate depopulation and targeting resources.

### Broiler Industry Report

Grace Mountainspring, Foster Farms

Mark Bureson, Wayne Farms

**Broiler Production:** Broiler production (lbs.) increased in 2016 (1.6%) and is projected to be slightly higher again in 2017 (1.5%). Average broiler weights decreased from 2015 to 2016 (-2.5%) and are slightly lower so far in 2017 (-1.1%). Average feed cost saw a significant reduction from 2015 to 2016 (-7.6%) and is slightly lower for the first half of 2017 (-0.88%).

**Mortality:** First week mortality is relatively unchanged from 2015 to present, although it is 29% higher than 2013. The trend towards removal of hatchery antibiotics is likely contributing to this increase. Chick quality/early mortality ranked fourth in the 2017 AVBP poll as displayed later in this report. Total mortality dropped significantly in 2016 across all weight classes; however, thus far in 2017, all weight classes are experiencing an increase in mortality. Total mortality is 22% higher than in 2013.

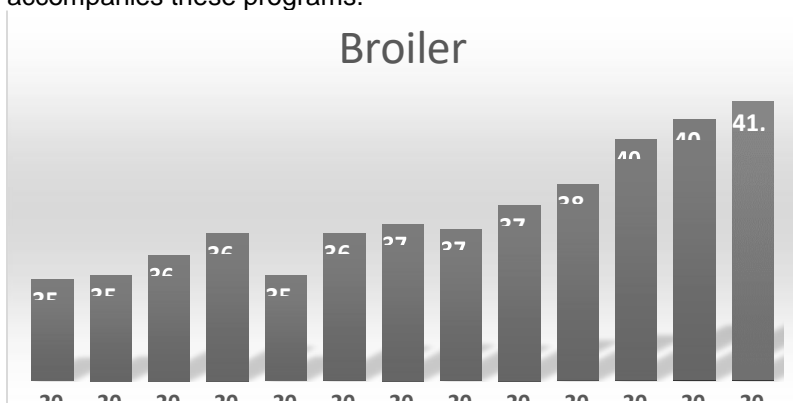
**Condemnations:** Whole Body Farm Condemnations + Parts Condemnations dropped significantly in 2016 and is slightly lower again so far in 2017. All condemnation categories have experienced a slight reduction.

**Key Broiler Disease Issues (see below):** Among the major disease-related issues that broiler production veterinarians are concerned with, coccidiosis (specifically *E. maxima*) ranked first, and necrotic enteritis was a close second. These two diseases typically operate in tandem, and restricted antibiotic-use programs have only exacerbated their impact on the broiler industry. It's important to note this ranking reflects not only the actual frequency of diagnosis but also the cost and challenge of maintaining

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effective anticoccidial programs. Several diseases have moved up in the rankings since 2016—including Infectious Bronchitis-respiratory, Gangrenous Dermatitis, Avian Influenza, and Infectious Laryngotracheitis.

**Key Non-Disease Broiler Issues (see below):** Like 2016, the highest ranked major non-disease issue was restricted antibiotic-use programs. This is due to the increased production and demand for these programs by both customers and broiler production companies. Meat quality (specifically woody breast) ranked second in our poll. Woody breast is a major issue primarily for the large bird programs. Customer complaints are driving increased grading and handling of product in processing plants. Non-disease issues moving up in the rankings since 2016 include Meat Quality and Biosecurity-HPAI threat. Of note (and like 2016 polling), when a broader list of diseases was polled on the level of importance to broiler veterinarians, USDA Food Safety Regulation – *Salmonella* was ranked as the single most important issue. This is likely due to the increase in restricted antibiotic-use programs and the subsequent increase in *Salmonella* incidence that accompanies these programs.



	2013	2014	2015	2016	2017 (Jan-Jun)
<b>Average Age</b>	49	49.3	50.2	48.52	47.85
<b>Average Broiler Weight</b>	6.44	6.52	6.66	6.49	6.42
<b>Feed Ingredient Cost/Ton (All Broilers)</b>	348.44	289.5	255.25	235.8	233.72
<b>First Week Mortality</b>	1.15	1.26	1.48	1.52	1.48
<b>Total Mortality</b>	3.92	4.36	5.23	4.61	4.79
<b>Mortality (3.6-4.4 lbs)</b>	3.32	3.59	4.16	3.62	3.8



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<b>Mortality (4.4-5.2 lbs)</b>	3	3.51	3.74	3.6	4.16
<b>Mortality (5.2-6.0 lbs)</b>	4.24	4.25	5.72	4.78	5.72
<b>Mortality (6.0-6.8 lbs)</b>	3.65	4.06	5.4	4.34	4.74
<b>Mortality (6.8-7.5 lbs)</b>	4.24	4.98	5.36	5.06	5.18
<b>Mortality (&gt;7.5 lbs)</b>	4.58	5.04	5.86	5.46	5.61
<b>WB Farm + Parts Condemns</b>	0.525	0.592	0.654	0.555	0.538
<b>Septox Condemns</b>	0.129	0.15	0.171	0.145	0.132
<b>Airsac Condemns</b>	0.099	0.125	0.127	0.107	0.115
<b>IP Condemns</b>	0.031	0.039	0.047	0.028	0.023
<b>Leukosis Condemns</b>	0.004	0.001	0.001	0.001	0.001

**2017 Disease and Non-Disease Rankings**

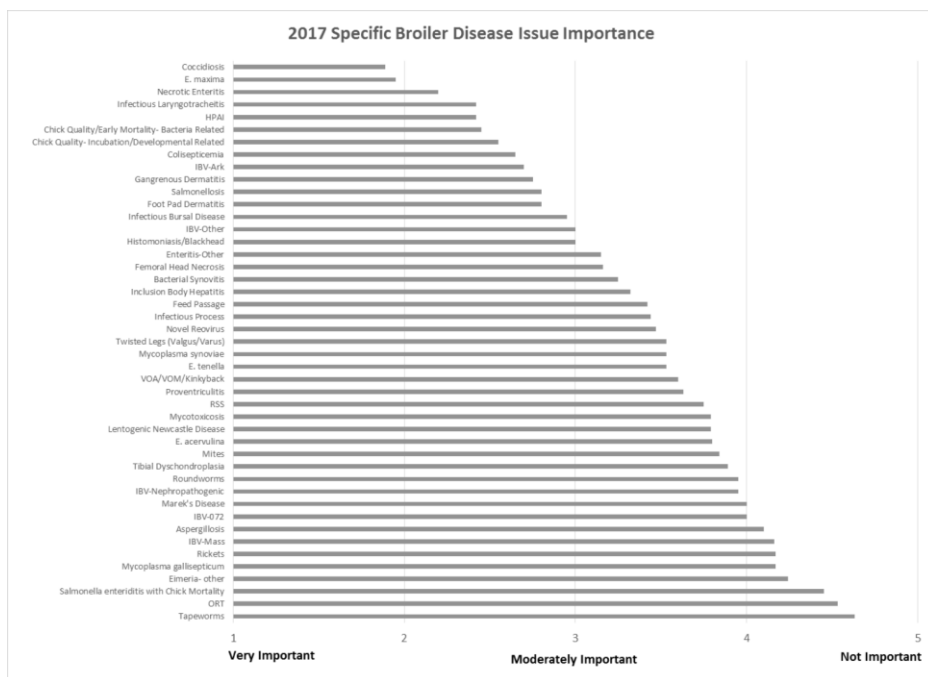
As in previous years, American Veterinarians in Broiler Production (AVBP) membership was polled concerning disease and non-disease issues. Major issues were ranked for both areas, and a further breakdown of specific disease and non-disease issues is included below. AVBP is comprised exclusively of veterinarians employed full-time by U.S broiler companies. The Veterinarians responding to the 2017 survey represented 77% of USA broiler production.

<b>Ranking</b>	<b>2017 Major Disease Issues</b>	<b>Weighted Score</b>
1	Coccidiosis	15.30
2	Necrotic Enteritis	14.20
3	Infectious Bronchitis - Respiratory	12.30
4	Chick Quality and Early Mortality	11.95
5	Infectious Laryngotracheitis	11.40
6	Gangrenous Dermatitis	10.58
7	Avian Influenza	10.16
8	Restricted Antibiotics - Health Issues	9.11
9	Novel Reovirus	8.84
10	Polyserositis	8.22
11	Bacterial Osteomyelitis of the Legs	7.89
12	Infectious Bursal Disease	7.53
13	Histomoniasis	7.25
14	Vertebral Osteomyelitis - "Kinky Back"	6.50
15	Mycoplasmosis	5.95

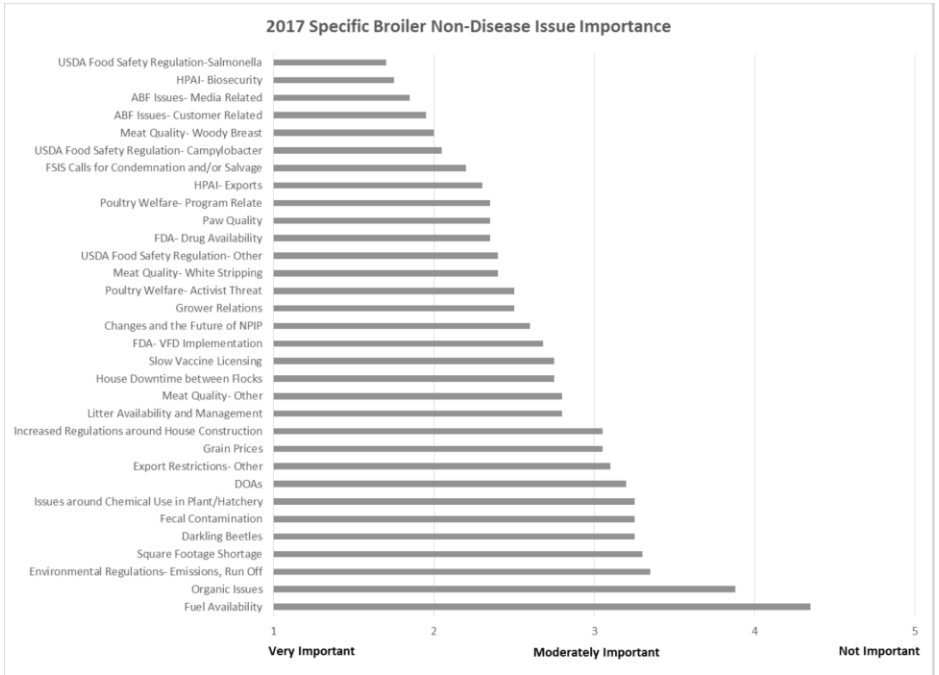
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16	Infectious Bronchitis - Nephropathogenic	5.69
17	Marek's Disease	4.17

Ranking	2017 Major Non-Disease Issues	Weighted Score
1	Restricted Antibiotics - Customer/Media	7.85
2	Meat Quality (White Stripping, Woody Breast	6.95
3	Biosecurity - HPAI Threat	6.60
4	Increased Food Safety Regulations by USDA	6.55
5	Poultry Welfare (Internal Programs/Activist)	6.25
6	FDA - Drug Availability	6.16
7	Alternatives to Antibiotics	5.79
8	CVB - Vaccine Approval	3.47
9	Increased Environmental Regulations	3.50
10	Exportation Issues (Drug MRL, Paws, AI, etc)	2.79



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## Table Egg Industry Report

Eric Gingerich, Diamond V

Overall health of the national table egg layer flock continues to be very good. There are no major clinical disease problems occurring at this time. This is due to the several resources and practices available to the industry:

- Continued availability of high quality vaccines
- Flock supervision from professional, well-trained flock service technicians
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians
- High quality nutrition provided by professional nutritionists
- Housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter. This will change with the move to cagefree facilities.
- Use of sound biosecurity practices
- Continual surveillance for foreign animal diseases or potentially highly pathogenic agents such as Newcastle and avian influenza by our state and federal laboratory system

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to rate a list of common diseases of caged and cage-free pullets (22 and 23 conditions listed respectively) and caged and cage-free layers (32 and 36 conditions listed respectively) as to their prevalence and their importance in their area of service on a scale of 0 to 3 with 0 = not seen, 1 = seen but not common, 2 = commonly seen, and 3 = seen in a majority of flocks. For the importance question, they were asked to give a value of each disease to a company in their area of service on a scale of 0 to 3 with 0 = not important issue for flock health or economics to 3 = very important issue for flock health and economics. Twenty-two members of the total membership of 115 answered the survey.

To follow are the results of prevalence and importance of chick issues:

	Caged Pullets		Cage-Free Pullets	
	Prevalence	Importance	Prevalence	Importance
<b>Yolk Infections</b>	1.50	1.45	1.33	1.48
<b>Starveouts</b>	1.68	1.50	1.38	1.24

Yolk infections and starveouts are associated with hatch egg quality, hatchery sanitation, and hatchery management of incubation, sanitation, chick processing, holding, and delivery. Compared to last year's survey, these problems continue to be present at about the same level. The removal of antibiotics from hatcheries may lead to more yolk sac infections.

The survey revealed the following top three diseases of concern occurring in U.S. for growing pullets excluding chick yolk infections and starveouts:

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Rank	Caged Pullets		Cagefree Pullets	
	Prevalence	Importance	Prevalence	Importance
1	Coccidiosis – 1.68	Coccidiosis – 2.14	Coccidiosis – 1.71	Coccidiosis – 2.19
2	E. coli – 1.22	Vaccinal Infectious Laryngotracheitis (vILT) – 1.68	Piling – 1.57	Piling – 1.71
3	Necrotic enteritis (NE) – 1.09	E. coli – 1.64	NE, E. coli – 1.19	vILT – 1.71

All disease conditions in caged and cagefree pullets are in the below “2” category of prevalence meaning that the conditions are not seen commonly but only occasionally. Coccidiosis and secondary necrotic enteritis remain as high on the lists of prevalence and concern in pullets. It is a problem in caged pullets as well with vaccine usage as an intervention on the rise. Piling issues continue to plague the cage free pullet grower. Vaccinal infectious laryngotracheitis is causing losses of pullet flocks in enzootic areas and growers continue to adjust vaccination programs and biosecurity to address the issue.

To follow are the top three diseases for caged and cage-free layers from the survey:

Rank	Caged Layers		Cagefree Layers	
	Prevalence	Importance	Prevalence	Importance
1	E. coli – 1.91	E. coli – 2.17	Cannibalism – 2.19	E. coli – 2.29
2	<i>Mycoplasma synoviae</i> (MS) – 1.65	Mg – 1.87	E. coli – 2.10	Cannibalism – 2.24
3	<i>Mycoplasma gallisepticum</i> (MG)– 1.48	Infectious bronchitis (IB) and Cannibalism – 1.65	Ascarids – 1.67	vILT and Mg – 1.86

Colibacillosis continues as the top disease problem in caged and cagefree flocks and is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing can occur. The problem appears to be on the increase in cagefree production due to the birds’ access to contaminated litter, poor feathering issues, and vent trauma. It is felt that this condition is most often secondary to upper respiratory challenges with *Mycoplasma gallisepticum* (MG), *Mycoplasma synoviae* (MS), ammonia,

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infectious bronchitis (IB), etc. in early lay. It also may be a primary problem if water lines are contaminated with *E. coli*. The overall prevalence and importance of colibacillosis was about the same as last year. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc. The live *E. coli* vaccine, introduced in mid to late 2006, has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak in most areas. Some producers are now applying the live *E. coli* vaccine by eyedrop during the growing period to assure that each bird receives a dose.

Cannibalism was shown to be an important issue in both cage and cagefree layers. In cagefree production, the 10-day or younger rule for beak trimming results in longer beaks than desired compared to a beak trim at 4 to 8 weeks and may result in an increase in incidence and severity of cannibalism. The increasing use of large colony cages may also increase the level of cannibalism. In cagefree operations, light intensity and feathering problems have led to problems.

MS continues to be highly prevalent amongst layers in multi-age facilities, but its importance is quite low as the isolates are relatively non-pathogenic.

Ascarids are increasingly being found in cagefree operations with the concern being the possibility of a consumer finding an egg with a roundworm contained inside. Most all cagefree egg producers have had such an occurrence. At this point, there is no FDA cleared product for use in layers in production for treatment. Diatomaceous earth and/or oregano products are added to the feed in an attempt to reduce problems in addition to sanitation measures.

MG continues as an issue in multi-aged facilities and is successfully controlled in most cases through vaccination. Each complex must customize its vaccination program to control the strain on the farm. Ts-11 and 6/85 live vaccines are used for controlling mild strains of MG while F-strain live vaccine is being used to control more pathogenic strains or where the Ts-11 or 6/85 vaccines are no longer effective. The live pox-vectored recombinant MG vaccine is being used in a variety of situations and appears to be useful in low challenge situations. Vaccine failures with all vaccines can occur and the unit must resort to medication programs using chlortetracycline before alterations in the immunity program are made. Most all operators are now applying the F-strain vaccine by eyedrop rather than spray in an effort to increase its efficacy.

The AVEP survey also asked about other issues and diseases of concern on a scale of 0 to 3 with 0 = no concern, 1 = some concern, 2 = moderately concerned, and 3 = very high concern. The opinions of the respondents this year and in past years is as follows:

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Issue	Average 2012	2013	2014	2015	2016	2017
Avian Influenza (AI)	1.55	2.00	2.19	3.00+	2.50	2.59
Lack of Effective Treatments	2.15	2.43	2.56	2.14	2.56	2.73
SE and FDA Egg Safety Rule	2.55	2.29	2.31	2.29	1.88	2.05
<i>S. heidelberg</i> and Egg Safety Rule	2.45	1.90	2.13	2.05	1.81	1.68
Welfare in General	2.33	2.15	2.31	2.21	2.31	2.39
Beak Trimming	1.70	1.50	1.88	1.91	1.88	1.64
Disposal of male chicks	1.40	1.25	2.00	1.64	2.13	1.91
On-Farm Euthanasia	1.95	1.80	1.88	1.73	1.88	1.68
Molting of Layers	1.60	1.35	1.31	1.27	1.25	1.23
Banning of Cages	2.60	2.35	2.69	2.27	---	---
Adoption of Enriched Cages	N/A	2.11	2.44	1.86	---	---
Move to cagefree	---	---	---	---	2.56	2.45
Supply of Useful Vaccines	1.20	1.05	1.56	1.45	1.19	1.27
Number of Responses	20	17	16	22	16	22

The concern for avian influenza (AI) continues as this disease is very unpredictable as seen with the low and high pathogenic AI outbreaks in March of this year in Alabama, Georgia, Tennessee, and Kentucky. Only one of the flocks was a commercial layer flock, a free range flock in Kentucky. Veterinarians are becoming more involved with producer’s biosecurity programs due to actions by the National Poultry Improvement Plan (NPIP) to get all producers to establish a biosecurity plan that incorporates the 14 basic principles as set forth in the proposal adopted at the NPIP 43<sup>rd</sup> Biennial Conference this year in Seattle. An audit procedure has been developed and audits will likely occur in 2018.

The lack of effective treatments for diseases such as colibacillosis, necrotic enteritis, ascarids, *Capillaria spp.*, spirochetosis, fowl cholera, etc. is a very high concern and a welfare issue for the diseases that can cause much suffering due to illness. The list of antibiotics that can be used in egg layers is quite short – bacitracin, tylosin, and chlortetracycline. Tylosin is to be withdrawn from the market in 2017. The lack of an anti-parasitic product for used in controlling ascarids during lay, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production. The industry is looking forward to the approval of fenbendazole (Aquasol) for use in pullet and layer flocks for ascarids due in early 2018. Amprolium continues to be available to prevent and treat

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coccidiosis. Hygromycin is also now approved for use in egg layers in production for roundworms, *Capillaria spp.*, and cecal worms but the supply ceased due to a factory problem in China hence Hygromycin is not available until another source can be found. There are very few effective treatments available for organic layers. There is an increase in the usage of non-antibiotic, preventative feed and water additives containing probiotics, prebiotics, and fermentation metabolites in both organic and conventional egg production.

Concern for *Salmonella enteritidis* (SE) and its consequences is waning as the prevalence of SE swab positive farms is very, very low and no egg associated outbreaks of SE in humans from flocks on the FDA program have occurred in many years. One egg-associated outbreak occurred in the upper peninsula of Michigan in a cagefree flock of 2,400 layers. Inspections by Food and Drug Administration (FDA) are ongoing in flocks over 3,000 birds. A moderate degree of concern for adding other serotypes to the plan is apparent.

The FDA Egg Safety Program entails obtaining chicks from NPIP SE Clean breeders, rodent and fly monitoring and control programs, biosecurity, cleaning and disinfection of premises, training of persons involved, testing of manure samples at 14-16 weeks, 40 to 45 weeks, and six weeks after molt. If any of the manure tests are positive for SE, egg testing must take place. The producer funds all testing and compliance efforts. Laboratories have managed to gear up to handle the increased testing load this requires. Producers with a manure positive swab test are holding eggs from the market until after the test results of eggs are obtained. The use of deoxyribonucleic acid (DNA) based tests are now being used that minimize the time of testing from the formerly required ten days for culture to as low as 27 hours with the new tests. There is no provision in the program for compensating a producer who has an egg-positive flock and does not have a pasteurization or hard-cooking plant that will take their eggs. In response to the initiation of the FDA Egg Safety Rule in 2010, producers ramped up measures to reduce risk of SE infection by increased use of vaccines, intestinal health feed additives, rodent and fly control measures, and biosecurity practices as was intended by the plan.

Poultry welfare concerns continue to be of very high concern due to continued activities by activist groups. The increase in concern over day old male euthanasia has come about by some companies stating they are going to require egg products from flocks where day old male euthanasia is not used.

The dramatic transition to cagefree egg production across the U.S. continues to cause egg farmers to struggle with management and disease issues. The transition to cagefree is due to food retailers and fast food restaurants desiring to appear compassionate and improve their markets and brand identity by announcing their switching to all cagefree eggs in the future. The animal welfare groups were very clever by pointing this marketing tool out to the corporate executives.



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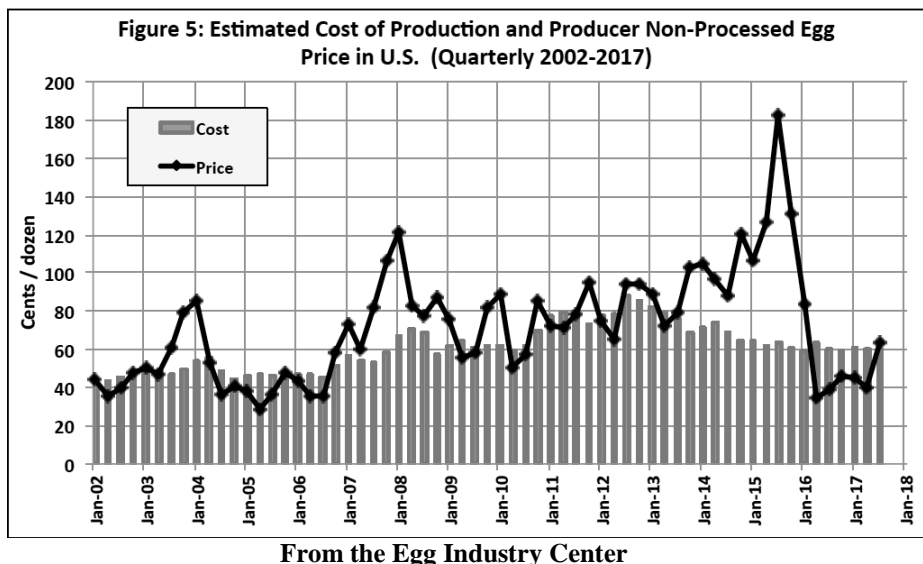
Vaccine use continues to be the mainstay of disease prevention in the egg layer industry second to biosecurity. The supply of useful vaccines continues to be adequate and appears to be keeping up with the layer industry needs. It will be interesting to see if this good supply of vaccines continues with the consolidations now occurring in the poultry vaccine business.

Emerging or re-emerging disease concerns this past year include the following:

- *Gallibacterium anatis* infection (formerly *Pasteurella hemolytica*) – This disease is becoming more commonly seen as a cause of lost egg production and higher than normal mortality. It can be confused with colibacillosis so laboratory confirmation is needed. Miliary hepatitis is often a feature of the disease which makes it appear like Spotty Liver Disease. Laboratory confirmation is therefore required to differentiate the two.
- Infectious bronchitis with false layers – IB with false layers and low peaks in production has been seen in Ontario and some farms in the U.S. associated with very early infections the first few weeks of life with variant strains of IB. Early protection from IB infection through biosecurity and vaccination with protectotype vaccines appears to be effective.
- Ulcerative dermatitis of brown, cage-free layers – This disease, if a flock is affected, can be very devastating with up to 50% mortality in as little as 15 weeks. Fortunately, it has not spread significantly from the original area it was found, western Ohio. The search for the cause of this disease continues.
- Spotty Liver Disease (SLD) – This disease has been seen intermittently in the summer during wet periods in flocks with outdoor access. New research findings from New Zealand and Australian researchers have shown this disease to be due to *Campylobacter hepaticus*. It is treatable with chlortetracycline but unfortunately, it is often seen in organic flocks, so a usable treatment is not available.
- *Pasteurella multocida* (fowl cholera) – Increasingly, more cage free flocks with outdoor access are succumbing to fowl cholera. An increasing number of flocks are receiving vaccinations during the grow period.

This year in the egg industry continued to struggle with very low profitability since last year as seen below in the cost of production vs farm egg price. Reasons are 1) a higher number of egg layers due to an increase in cagefree houses with no reduction in caged layer numbers, 2) continued use of egg substitutes in baked and processed goods that were reformulated during egg product shortages due to AI in 2015, and 3) a 4.2% 8-month average higher rate of lay compared to last year. Luckily, feed prices and the cost of production remain relatively low.

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Iowa #1 (53.5 million) continues to be the lead state in egg layer numbers. Iowa is followed by #2 Indiana (31.3 million), #3 Ohio (29.6 million), #4 Pennsylvania (25.3 million), #5 Texas (17.1 million) and #6 California (11.4 million) according to the National Agricultural Statistics Service for August 2017. Total commercial egg layer numbers in flocks over 30,000 birds in August 2017 were 3.3 million higher than August 2016, 311.4 million vs 308.1 million.

**Turkey Industry Report**

Victoria Ahlmeyer, National Turkey Federation (NTF)  
 Steven R. Clark, NTF and Devenish Nutrition, LLC

In preparation for this report to the Committee, the subcommittee chairman, Dr. Clark, surveyed turkey industry professionals and veterinarians representing (n=23) the U.S. turkey production regarding the health status of turkeys produced in August 2016 through August 2017. The turkey industry reports several disease challenges for this 12 months varying by geographic regions within a state and across the United States. This report will list, Table 1, the challenges by disease and issues. Of particular interest in 2017 are issues with lack of efficacious drugs, colibacillosis, ORT, clostridial dermatitis, coccidiosis, Bordetella, and blackhead.

The “lack of approved efficacious drugs” continues to be the top health issue (Table 1). The withdrawal of the New Animal Drug Application (NADA) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #2, up from #3 since 2009-2015), or fowl cholera (ranked #12 from #11). In July 2011 the sale of roxarsone was suspended; September 30, 2013, the Food and Drug Administration (FDA) marketing authorization NADA was

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withdrawn. The sponsor of Penicillin-100 Type A medicated article (in feed administration) withdrew the approval (NADA) June 30, 2015. Nitarsone (see blackhead) approval was withdrawn December 31, 2015. Issues over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), also referred to as Cellulitis, remains a major disease issue across all geographic regions; as the survey average changed slightly to a score of 3.4 (from 3.3 in prior year) and slipped to a #4 rank (from #3 in 2016 and #2, 2008-2015). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. *Clostridium septicum*, *C. perfringens* type A, or *C. sordelli* is isolated from fluid or affected tissue samples of affected or dead birds. Affected turkeys present with two or more of the following clinical signs: subcutaneous emphysema (crepitus); serous or serosanguineous subcutaneous fluid; vesicles on the skin, especially on the breast/inguinal area; moist, dark, wrinkled skin, especially breast/inguinal area; cellular necrosis (microscopic); organ involvement (spleen/liver); vesicles on the skin, and/or moist, dark, wrinkled skin, on the tail area. The affected flock will have mortality greater than or equal to 0.5 dead per 1,000-birds, fitting the individual bird definition, for two consecutive 24-hour periods. Opinions vary as to risk factors and potential causes of the problem. Some of the key areas to control of CD include: early recognition; removal of mortality 2-3 times per day; medicating affected flocks with appropriate antimicrobials; promptly managing all water spills and wet litter, feed outages and do not compost litter within 200 feet of poultry barn. There has been limited success with vaccinating at-risk flocks with autogenous bacterins and toxoids.

*Ornithobacterium rhinotracheale* (ORT) ranked #3 versus #4 in 2016 (#7, 2015), is a highly contagious respiratory disease in poultry caused by a gram-negative pleomorphic rod-shaped bacterium. It has been isolated from chickens, ducks, partridges, and guinea fowl. It was originally recognized in Europe and South Africa. ORT was first confirmed in the U.S. from turkeys in 1993. Horizontal transmission (such as, bird-to-bird, contaminated people and equipment) by direct and in-direct contact is the primary route of spread. However, vertical transmission is suspected (Hafez, 2000). In the fall of 1995 it was a major cause of respiratory disease in midwestern states and since has become endemic across most of the USA. Management systems, such as brood-and-move have increased the exposure of ORT-naive birds to ORT in the finisher barns, resulting in respiratory disease and mortality in some operations. Biosecurity procedures must be taken. Proper water sanitation can minimize the severity and spread. Vaccination is limited, and results are varied (toxoids, bacterins). Bacterins are used in breeders. No commercial vaccine is approved. Recently, controlled exposure efforts on individual flocks have shown value. ORT in turkeys is an identified research need.

Coccidiosis increased from #13 to #6 most likely reflects the industry increasing raised without antibiotics (RWA) and no antibiotics ever (NAE) market. RWA and NAE programs do not permit the use of ionophore

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anticoccidials and many programs prohibit FDA approved chemical anticoccidials, so anticoccidial programs consist of alternatives or vaccination. An effective coccidiosis control program in turkeys involves the use of anticoccidial medications and/or phytonutrients (alternatives) and/or live vaccines and the subsequent development of immunity. Table 6 summarizes the U.S. turkey production coccidia control products (n=265.9 million head) and ionophores represent the majority, 55% of heads for an average use of 7.5 months during the 12-month survey period. Chemical anticoccidials account for 33% head and 4.5 months. Coccidia vaccination was limited to 7% head; the low incidence might be in part due to the limited availability of the only USDA approved commercial turkey coccidiosis live vaccine. Nutritional dietary supplementation with phytonutrients (alternatives) is becoming more popular, reported at 14% head, either via in-feed application or drinking water administration. Programs may utilize phytonutrients in addition to the current anticoccidial program, to potentiate the possible benefits. Some phytonutrients have purported activity against coccidia. Phytonutrients may include, plant extracts (yucca, etc.), prebiotics (beta glucans, yeasts), essential oils (oregano, carvacrol, thymol, cinnamaldehyde, capsicum oleoresin, turmeric oleoresin).

Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR) was recognized as a newly emerging disease in 2011. A unique reovirus has been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research continues into pathogenesis, virus characterization, diagnostics and epidemiology. Research indicates that the turkey arthritis reovirus is distinct from the recently identified novel reovirus causing arthritis in chickens, and most similar to the turkey enteric reovirus. TR-DFTR was added to the survey in 2011 and ranked #11 (Table 1) with 106 “confirmed” cases or flocks (Table 2). In 2016 TR-DFTR ranked #11 with 182 cases; prior year it ranked #26 with 31 cases. A breeder company has implemented an autogenous reovirus vaccination program to induce the maximum production of antibodies and resulting transfer of maternal antibodies. Historic results originally showed a significant reduction in associated clinical signs in those poults placed from vaccinated flocks. A commercial turkey lighting program of 4-8 hours of continuous dark in a 24-hour period has also been recommended. The combined efforts of breeder vaccination, commercial farm biosecurity and flock management once appeared to be controlling this disease. Increased recognition of TR-DFTR in 2016 - 2017 suggest that the reovirus has again mutated. TR-DFTR is also called Turkey Arthritis Reovirus (TARV). Dunn (2015) defines Viral Arthritis in Turkeys as lameness in mid to late grow turkeys in which diagnostic findings include gross and microscopic lesions of tenosynovitis that are consistent with a viral etiology (non-suppurative),

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significant seroconversion to reovirus has been demonstrated, and preferably, with confirmation by positive reovirus isolation from tendon tissues, and characterization of the virus (serotypic and genotypic). Owen (2016) prioritized industry research needs:

- 1) Development of more accurate and less cumbersome diagnostic tests
  - a) Enzyme-linked immunosorbent assay (ELISA) based and serotype specific serologic assays
  - b) Genotyping that accurately reflects antigenic and pathotype differences in isolates
- 2) Development of safe and cross protective live reovirus vaccines
- 3) Develop a reliable and reproducible model for vertical transmission to enable study of pathogenesis, seroconversion, and persistence
- 4) Impact of age on susceptibility
- 5) Determine titers needed to prevent vertical transmission
- 6) Determine impact of vaccination and exposure on antigenic changes

Blackhead, also known as Histomoniasis, changed to position #8 (#9 prior year; #13, 2015). There were 109 reported cases of blackhead (Table 2), an increase from 101 the prior year, and more than the record 108 in 2010. Histomoniasis occurs regionally and seasonally in turkeys and can result in significant mortality. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for Histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. Nitarsone FDA approval was withdrawn December 31, 2015, leaving the industry with no drugs approved with indications against Histomoniasis. Nitarsone was approved for the prevention of Histomoniasis (blackhead disease) in turkeys and chickens and was the only approved animal drug for this indication. Table 2a lists some additional blackhead responses, including 30% have been associated break(s) with preceding enteritis, looseness, or flushing, suggesting loss intestinal integrity might be a risk factor. Seventy-four percent (74%) of survey reported one or more cases of blackhead. Of the 109 cases reported at least 5% were destroyed to alleviate animal suffering and due to excess morbidity and mortality. Two recent peer reviewed publications of industry include Clark and Kimminau summary of current blackhead situation in the field and also Regmi details FDA considerations for antihistomonal drug approvals.

Poult enteritis of unknown etiologies has changed in importance, to position #10 from #14. Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #31 (Table 1), changed from #32 previously, with 12 reported cases, up from six the previous year (Table 2).

Protozoal Enteritis, attributed to flagellated protozoa, *Cochlosoma*, *Tetratrichomonas* and *Hexamita*, ranked #12, changed from #17; protozoal

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enteritis remained relatively unchanged over past years until 2016 and associated with the loss of Nitarsone. Several types of protozoa are associated with enteric disease of turkeys. Protozoal enteritis can present with general signs, including dehydration, loss of appetite (off-feed), loose droppings (diarrhea) and watery intestinal contents. Flagellated protozoa include *Cochlosoma*, *Tetratrichomonas* and *Hexamita*. *Eimeria* and *Cryptosporidia* are non-flagellated protozoa. *Cochlosoma* and *Hexamita* are associated with enteritis, primarily in young turkeys, especially in the summer months. There are field reports of co-infections with *Cochlosoma* and *Tetratrichomonas*, or *Cochlosoma* and *Hexamita*, or flagellated protozoa and *Eimeria*.

Single age brooding has been implemented during the last several years to assist in managing diseases on turkey farms, especially enteric diseases. Historically, production systems included 2 - 3 different ages on a single farm site reared in separate barns, from day-old to market age. The trend is to isolate, specialized brooding facilities. All production is separate hen and tom rearing. The brooding phase for commercial turkeys is rearing about 0 – 5 weeks of age, then the flock is moved to specialty finisher or grow-out barns. Single age brooding may be termed all-in/all-out or single-age or brooder hub. Single age brooding systems can operate in two ways. One option rears the turkeys to slaughter age at the same farm site, without other ages on the farm. Another system of single age brooding involves farm sites dedicated to brooding, then at five weeks of age birds are moved to a separate site for finishing; some systems may move birds 0.25 miles up to 20 miles away. In 2017, 63% of brooding was single age, compared to 39% in 2009. Single age brooding is more common in the Southeastern U.S. than the Midwest states. Conversion to single age brooding started in late 1990 following the emergence of Poulter Enteritis and Mortality Syndrome (PEMS) in North Carolina; advantages became obvious and it has expanded to other areas of the U.S. Tunnel ventilation of finisher (grow-out) barns is becoming more popular method to minimize heat stress; in 2017, 29% of the industry finisher production is tunnel ventilated, compared to 12% in 2009.

Late mortality ranked #14 health issue and changed from #7 the prior year. Late mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Excess cumulative mortality of 5 – 10% in toms prior to slaughter has been reported. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; cannibalism; leg problems and/or hypertension.

Leg problems (#6, prior year was #5) are ranked among the top concerns of the turkey industry. Leg problems are a common complaint, such as, spiral fractures of the tibia or femur. Leg Problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including, pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial

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dyschondroplasia (TDC), spondylolisthesis, “Shaky Leg”, etc. The year 2017 was particularly noted increased incidence of valgus and varus leg deformities across much of the U.S. industry due to undetermined etiology; the issue contributed to increased mortality in affected flocks.

Heat stress ranked #26 following a moderate summer, compared to #18 the prior year. PEMS ranked #30 versus #29 previously. Avian Metapneumovirus (AmPV) ranked #34 versus #33, with a few atypical cases limited to the Midwestern U.S. *Bordetella avium* continued as a significant respiratory disease challenge in several geographic regions; bordetellosis ranked #7 compared to #8 the prior year.

*Mycoplasma synoviae* (MS, infectious synovitis) infections, ranked #27 (#27 prior year), are one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 33 cases of MS reported (Table 2). The primary breeders have remained free of *Mycoplasma gallisepticum* (MG), *Mycoplasma meleagridis* (MM) and MS. Sporadic, but increasingly frequent infections with *Mycoplasma*, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed. There were 52 cases of MG reported (Table 2).

Twenty of twenty-three participants responded to rank the shortage of veterinarians trained in the diagnosis and treatment of diseases, and welfare of turkeys. The issue ranked 2.9 and ranged from 1 to 5 (1= no issue to 5 = severe problem). It is duly noted that most post-DVM poultry medicine training programs have little to no exposure to the turkey industry.

Threat of the reoccurrence of Highly Pathogenic Avian Influenza (HPAI) continues to be a focus for the industry. Thankfully, prevention, detection and response for the virus has greatly improved since the devastating 2015 outbreak. During that outbreak, both H5N8 and H5N2 strains of HPAI affected turkey flocks in eight states, with H5N2 accounting for the majority of cases. In total, 153 farms commercial turkey or turkey breeder flocks were infected, resulting in the loss of over 7.75 million turkeys, in addition to over 40 million chickens (layers and broiler breeders). To date, USDA has classified this outbreak as the worst incident of animal disease in U.S. history.

In March 2017, industry efforts prevailed as the HPAI virus was contained in Lincoln County, Tennessee. The North American wild bird lineage H7N9—not to be confused with the China H7N9 virus that impacted poultry and humans in Asia—was detected on two commercial broiler breeder farms in Lincoln County. The industry worked closely with Tennessee’s State Board of Animal Health, Tennessee’s State Veterinarian, USDA’s Animal and Plant Health Inspection Service (APHIS) and National Veterinary Services Laboratory (NVSL) to rapidly confirm, report and respond to these cases, as well as depopulate infected flocks. In combination to the two HPAI cases, subsequent cases of Low Pathogenic Avian Influenza (LPAI) were also reported beginning in March throughout south central

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Tennessee, northern Alabama, southern Kentucky and western Georgia. Six commercial broiler breeder operations and six backyard flocks were found positive with notifiable H7 or H7N9 LPAI. In total, approximately 253,000 birds died from disease or were depopulated to control the combined LPAI and HPAI incidents. Epidemiologic, genetic and wildlife investigations surrounding the outbreaks continue in order to provide a better understanding of factors associated with avian influenza virus transmission and its introduction into poultry flocks.

In addition to HPAI, the turkey industry has been faced with numerous turkey health issues this year. As previously mentioned in the report, Turkey Arthritis Reovirus (TARV) and other leg issues have become an industry-wide concern throughout the 2016-2017 production year. In May 2017, The National Turkey Federation distributed a Turkey Leg Health Survey to assess the need for research, the regional trends and the economic impacts of TARV on the industry. The survey results were shared with industry members at numerous turkey-specific meetings. Moving forward, it was determined by key industry veterinarians and professionals that an additional survey be created to better evaluate TARV and other turkey-specific leg health issues as it related to U.S. and global turkey production. Aside from leg issues and TARV, Blackhead has had a significant prevalence this year in turkey flocks across the country. Discussions that have taken place throughout this year at various state association meetings, live production seminars and turkey health symposiums have shown unified concerns with the disease. Efforts to uncover prevention and treatment methods for this specific protozoal disease continue to be a focus of industry members. Additionally, allocation of funding for key blackhead research to take place is of the utmost importance to industry members and academics alike.

The Secure Turkey Supply (STS) Plan is undergoing additional updates by industry members ([www.secureturkeysupply.com](http://www.secureturkeysupply.com)). STS includes Federal and State Transport (FAST) Plan for Movement of Commercial Turkeys in a HPAI Control Area, and Turkey Risk Assessment. Permit guidance for Turkey Hatching Eggs, Day-old Poults and Turkeys to Market were updated as of May 2017. These guidance documents are the operational component of the more detailed science-based risk assessments. The current versions of the STS Plan continue to be utilized in regions affected by HPAI and LPAI, and have been instrumental keeping the movement and shipping of turkeys and turkey products underway. The purpose of putting the STS Plan in place is to facilitate business continuity and economic survival of participating non-infected turkey operations in a Control Area after a detection of HPAI, and to help make certain that a continuous supply of safe turkey meat is available to consumers.

The health of turkeys remains to be of utmost importance to the industry. The ability to utilize approved, efficacious drugs, in a judicious manner has been heavily stressed in all aspects of the industry, especially considering the heightened amount of conversations and questions surrounding antibiotic resistance. The ability to control and prevent animal disease and/or treat



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those that are sick is critical to any animal's wellbeing. Increased outside pressure to reduce and even eliminate the use of antimicrobial drug use in animals continues, which poses a large threat to the industry in the case of a bacterial disease outbreak, similar to that of a viral disease outbreak (i.e. avian influenza). The industry has been working tirelessly in the realm of product innovation and research to reduce any consequences that could result from such an outbreak. The National Turkey Federation (NTF) continues conversations with other protein associations to ensure that agency and practices and implementations align with the industry.

Antibiotic resistance, also referred to as AMR, in the context of antibiotic use in food-producing animals, has gravitated to a new level of attention in recent years. The "One Health" approach has been taken up by multiple agencies, including FDA/CVM and National Academies, in an increased effort to combat and reduce AMR. Food and Drug Association (FDA) Guidance that have recently gone into effect to address AMR include:

- Final Guidance #152, "Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to their Microbiological Effects on Bacteria of Human Health Concern": The first animal related guidance in regards to drug utilization, published in 2003.
- Guidance for Industry (GFI) #209 "The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals": A GFI written to reduce and eliminate the use of antibiotics for the sole purpose of growth promotion, published in 2012.
- Guidance #213, "New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209": A guidance that detailed how FDA expected to implement guidance #209, published in 2013.
- Veterinary Feed Directive (VFD): A directive that established the rules and responsibilities for licensed veterinarians in prescribing and administering medically important antimicrobials in animal feed, published in 2015.

The NTF supported the guidance documents listed above even though they questioned the underlying science indicating a direct link between animal use of antibiotics and human antibiotic resistance. Guidance #213 established procedures for phasing out the use of medically important antimicrobials for production purposes in alignment with Guidance for Industry #209 and proposed changes to VFD drug regulations. Final implementation of all changes took effect December 2016 and no drugs listed as "medically important" that are exclusively labeled for production purposes can be used moving forward. On January 1, 2017, the change from over-the-counter (OTC) to prescription (Rx) status for drugs administered through drinking water or to VFD for drugs administered in medicated feeds went into effect. Drug sponsors were expected to complete the necessary label changes of their affected products and distributors or retail

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establishments that handle these products were required to meet all applicable State and Federal regulations for Rx and VFD drugs when dispensing these products. Changes in drug use practices are now being discussed by FDA and industry groups.

In an attempt to collaborate and address antibiotic resistance from the national level with the Presidential Administration and with USDA agencies, the Presidential Advisory Council run by Health and Human Services (HHS) in consultation with the Department of Defense, was established in 2015. The Obama-era White House released a National Action Plan to ultimately achieve (by the implementation date in the year 2020) five goals laid out by the Administration. USDA's Food Safety Inspection Service (FSIS), Agricultural Research Service (ARS) and Animal and Plant Health Inspection Service (APHIS) continue to work with FDA, Center for Veterinary Medicine (CVM) to collect better data to inform these goals as each year passes. Discussions surrounding what data should be collected and exactly how the data will be collected have been continuing at the industry level. In May 2017, the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB) held its sixth public meeting which was dedicated to the topic of infection prevention and control as it relates to animal health. It was emphasized that limiting the judicious use of antibiotics could have a negative impact on animal welfare, and as such, should not be the sole focus of the effort. Additionally, a key theme expressed in both human and animal health, was the need for funding to incentivize and support the approval of alternatives. The next scheduled PACCARB meeting is likely to take place in the fall of 2017. As Trump Administration officials get in place at USDA and other involved agencies, NTF will be meeting with agency staff and leadership to voice the turkey industry's perspective as well as gain a better understanding of how the agencies intend to move forward in this arena. Coordination among animal producer groups to promote positive change and limit burdensome and potentially harmful demands on the animal agricultural industry as a whole is of the utmost importance.

In the international domain, the World Health Organization's (WHO) Global Action Plan (GAP) was endorsed in 2015 as a cross-sectoral approach to address antimicrobial resistance (AMR). Political leaders in the United Nations General Assembly further endorsed the plan in September 2016. As a reminder, the GAP sets out responsibilities for national governments, for the World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO), and WHO, and for other national and international partners involved in the global response to AMR. To ensure action is being taken, and to assess whether those actions are having the intended results the "One Health" tripartite organizations - WHO, FAO and OIE - have come together to develop a proposed approach for the Monitoring and Evaluation of the GAP. The proposal includes reporting back to the global health community, including the governing bodies of WHO, FAO and OIE, and the Interagency Coordination Group (IACG) on AMR that was established by the U.N. General Assembly. Currently, a web-based

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consultation has been posted by the WHO to seek feedback from Member Countries and other stakeholders, including human health, animal health, plant health and environmental health sectors, with comments due the end of September 2017. NTF is working in various coalitions to ensure the turkey industry perspective is included.

Working on the congressional front, NTF, along with many other key groups and associations, pioneered the Animal Pest and Disease Prevention Program (APAD) with the hopes of its inclusion in the 2018 Farm Bill. The program was modeled after the Plant Pest and Disease Management and Disaster Prevention Program and will revolutionize animal disease prevention and response. Mandatory funding for the program will ensure the sufficient development and timely deployment of all tools to prevent, identify and mitigate animal disease outbreaks and to limit the impacts of foreign diseases on American livestock and poultry producers. The two-tiered program would be administered by APHIS and build upon the 2014 Farm Bill's authorization of the NAHLN network that provides crucial resources to prepare and prevent a crisis and brings together the federal government, states, industry, and universities to:

- Provide rapid detection and response capabilities
- Develop mitigation technologies including vaccines
- Identify and support critical research needs

In 2016, turkey production increased to 7,486,978,000 from 7,038,136,000 pounds (live weight). Overall, domestic per capita consumption for turkey products increased from 16.00 in 2015 to 16.50 in 2016 which is the highest level since 2010. Live production in 2016 increased to 244,000,000 head with an average live weight of 30.35 lbs. In 2015, 233,100,000 head were produced with an average live weight of 30.19 lbs. (Reference: National Turkey Federation Sourcebook, pending publication October 2017).

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**Table 1. Turkey health survey (August 2016 - 2017) of professionals in U.S. turkey production ranking current disease issues (1= no issue to 5 = severe problem). n=23.**

Issue	Score Avg. (1-5)	Score Mode (1-5)
Lack of approved, efficacious drugs	4.8	5
Colibacillosis	3.8	5
<i>Ornithobacterium rhinotracheale</i> (ORT)	3.7	3
Clostridial Dermatitis (Cellulitis)	3.5	5
Coccidiosis	3.3	2
Leg Problems	3.2	3
<i>Bordetella avium</i>	3.2	2
Blackhead (Histomoniasis)	3.1	4
<i>Salmonella</i>	2.9	2
Poult Enteritis of unknown etiologies	2.8	3
TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture)	2.7	1
Protozoal Enteritis (Flagellated)	2.7	1
Cannibalism	2.7	2
Late Mortality	2.6	4
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.5	3
Cholera	2.5	2
Osteomyelitis (OM)	2.3	2
Avian Influenza	2.2	1
Round Worms ( <i>Ascaridia dissimilis</i> )	2.0	2
Bleeders (aortic, hepatic ruptures)	2.0	2
Shaky Leg Syndrome	2.0	1
<i>Mycoplasma gallisepticum</i> (MG)	1.9	1
Necrotic enteritis	1.9	1
Newcastle Disease Virus (NDV)	1.9	2
Breast Blisters and Breast Buttons	1.8	1
Heat stress	1.8	1
<i>Mycoplasma synoviae</i> (MS)	1.8	1
H3N2 (H1N1) Swine Influenza	1.8	1
Fractures	1.7	2
PEMS (Poult Enteritis Mortality Syndrome)	1.6	1
Turkey Coronavirus	1.4	1
Erysipelas	1.3	1
Spondylolisthesis (Kinky-Back)	1.3	1
Avian Metapneumovirus	1.2	1
<i>Mycoplasma iowae</i> (MI)	1.2	1
<i>Mycoplasma meleagridis</i> (MM)	1.0	1

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**Table 2. Turkey health survey (August 2016 - 2017) of professionals in U.S. turkey production. \*One respondent noted that their operation processed over 300 flocks with varying degrees of severity, but not included in the reporting of 2011 confirmed cases; Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR). n=23.**

Cases (##) of	20	20	20	20	20	20	20
	17	16	15	14	13	12	11
Blackhead (Histomoniasis)	10	10	55	61	52	80	89
<i>Mycoplasma synoviae</i> (MS)	9	1	24	41	75	49	39
			11	43	42	22	70
Turkey Coronavirus (TCV)	12	6	9		0	1	
Turkey Reovirus Digital Flexor Tendon Rupture	18		14	15	39	13	10
	2	31	6	0		1	6*
<i>Mycoplasma gallisepticum</i> (MG)	52	29	31	17	45	n/a	n/a

**Table 2a. Turkey Blackhead (Histomoniasis) survey (August 2016 - 2017) of professionals in U.S. turkey production.**

Blackhead	2017
If you reported blackhead cases, have you associated break(s) with preceding enteritis, looseness or flushing? (n=Yes)	5
How many respondents reported blackhead cases? (n=23)	17
How many cases of blackhead reported?	109
How many cases of blackhead destroyed (euthanized)?	5

**Table 3. Turkey research priorities (August 2016 - 2017) of industry professionals in turkey production (1= low to 5 = high). n=22.**

Issue	Score Average (1-5)	Score Mode (1-5)
Disease	4.5	5
Food Safety	3.7	5
Poultry Management	3.5	3
Welfare	3.4	3
Nutrition	3.3	3
Processing	2.6	2
Environmental	2.4	2
Waste Disposal	2.3	2

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**Table 4a. Percentage (%) of brooding (commercial; farm) production is all-in/all-out (single-age; brooder hub); average of respondents (n=20).**

Year	Industry	Southeast/ East US	Midwest/ West US
2017	63.0	82.3	54.8
2009	38.8	69.0	24.8

**Table 4b. Percentage (%) of finisher (grow-out; farm) production is tunnel ventilated; average of respondents (n=20).**

Year	Industry	Southeast/ East US	Midwest/ West US
2017	29.3	35.2	26.8
2009	12.4	16.2	10.7

**Table 5. Sixteen (16) in-feed and eleven (11) in-water FDA approved medications for turkeys.** ^ = Not currently marketed. G = Includes label claim for improved weight, gain and feed conversion. ® All trademarks or trade names are property of their respective owners. \*CAUTION: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian. \*Extralabel Drug Use (EDLU) is not permitted in feed. \*\*CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. Species can vary, observe label indications. ®™ All trademarks or trade names are property of their respective owners.

VFD Medications*	Non VFD Medications
Aureomycin® (Chlortetracycline)	Albac® (Bacitracin Zinc) <sup>AG</sup>
ChlorMax® (Chlortetracycline)	Amprol® (Amprolium)
Neo-Oxy® (Neomycin + Oxytetracycline)	Avatec® (Lasalocid)
Neo-Terramycin® (Neomycin + Oxytetracycline)	BMD® (Bacitracin Methylene Disalicylate) <sup>G</sup>
Pennchlor® (Chlortetracycline)	Clinacox® (Diclazuril) <sup>A</sup>
Pennox® (Oxytetracycline)	Coban® (Monensin)
RofenAid® (Sulfadimethoxine + Ormetoprim) <sup>A</sup>	Coyden® (Clopidol) <sup>A</sup>
Terramycin® (Oxytetracycline)	Flavomycin® (Bambermycin) <sup>G</sup>
	Safe-Guard® (Fenbendazole)
	Stenorol® (Halofuginone) <sup>A</sup>
	Topmax™ (Ractopamine) <sup>A</sup>
	Zoamix® (Zoalene)

Prescription Medications**	Non Script Medications
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Aureomycin® Soluble (Chlortetracycline)	Amprol (Amprolium)
Di-Methox® (Sulfadimethoxine)	BMD® Soluble (Bacitracin Methylene-Disalicylate)
Gallimycin® PFC (Erythromycin)	
Neo-Sol® (Neomycin)	
NeoMed® (Neomycin)	
Oxytet® Soluble (Oxytetracycline)	
PenAqua Sol-G® (Penicillin G Potassium)	
Pennchlor 64® (Chlortetracycline)	
Pennox 343® (Oxytetracycline)	
PoultrySulfa® (Sulfamerazine, Sulfamethazine, Sulfaquinoxaline)	
R-Pen® (Penicillin G Potassium)	
TetraMed® 324 HCA (Tetracycline)	
Tetroxy® HCA Soluble (Oxytetracycline)	
Tet-Sol™ 324 Soluble (Tetracycline)	
Tylan® Soluble (Tylosin Tartrate)	
Tylovet® Soluble (Tylosin Tartrate)	

**Table 6. Turkey health survey (August 2016 – August 2017) of professionals in U.S. turkey production coccidia control programs (n=265.9 million head).**

<b>Program</b>	<b>How many months (average)</b>	<b>How many head (count divided by total survey count)?</b>
Ionophore	7.5	55%
Chemical	4.2	33%
Alternative (Phytonutrients)	4.0	14%
Vaccine	2.3	7%

**American Association of Avian Pathologists 2017 Annual Meeting Report**

Eric Gingerich, Diamond V  
John Smith, Fieldale Farms

The American Association of Avian Pathologists (AAAP) is an international organization whose mission is to promote scientific knowledge to enhance the health, well-being, and productivity of poultry to provide safe and abundant food for the world. Membership is open to anyone engaged in some phase of poultry health and avian diseases. Our approximately 800 members include veterinarians and scientists engaged in providing health care to domestic poultry and researching solutions to poultry disease issues in the Americas and around the world, including over 100 student members.

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The AAAP publishes the quarterly journal *Avian Diseases*, one of the world's premier scientific journals devoted to the health and diseases of domestic poultry, as well as the standard text on poultry diseases, *Diseases of Poultry*, now in its 13th edition. AAAP also publishes a variety of manuals such as *Isolation, Identification, and Characterization of Avian Pathogens*, symposium proceedings, slide study sets, and other educational and resource materials.

AAAP's 16 task force committees and interest groups offer members a forum for discussion and action on specific poultry topics and issues. Via the work of these committees, AAAP publishes white papers and position statements on important public issues involving the poultry industry. Recent papers and statements include *Hormone Use in Poultry*, *Stunning of Commercial Poultry in North America*, *Breast Muscle Abnormalities in Broiler Chickens*, *Poultry Welfare and Careful Use of Antibiotics*, *Antiviral Pharmaceuticals in Poultry*, *Antibiotic Feed Additives*, *Judicious Use of Drugs Fed to Poultry and Risks to Human Health*, and *Guidelines for Judicious Therapeutic Use of Antimicrobials in Poultry*. AAAP also works closely with a variety of other animal agriculture organizations as a constituent member of organizations such as the American Veterinary Medical Association (AVMA), the Council on Agricultural Science and Technology (CAST), the United States Animal Health Association (USAHA), the Animal Agriculture Coalition (AAC) and others. Through the AAAP Foundation, scholarships and awards are given each year to support those who are striving for careers in poultry medicine and to acknowledge outstanding achievements in the area of poultry medicine.

Each year AAAP conducts a scientific program and symposium in conjunction with the AVMA Annual Convention, where the latest findings and issues regarding diseases in poultry are shared and discussed. This meeting also serves as the business meeting for AAAP and is an excellent venue for networking with colleagues in the industry. Each year the meeting features a half-day symposium on a current prominent issue in the poultry industry sponsored by one of our task force committees, a keynote address, a history lecture, scientific poster presentations, cutting-edge scientific presentations in sessions arranged by disease topic, an awards banquet, and numerous organized networking and social events. The 2017 Annual Meeting was held July 21-25, 2017 in Indianapolis, Indiana, and featured 68 scientific posters and 149 scientific presentations. The Symposium this year was "Poultry and Policy: A Melee of Science, Agriculture, and Politics", and featured ten presentations including the AVMA Governmental Relations Division, FDA regulatory processes, veterinarians in Congress, and current legislative issues. The Keynote address by Mr. Brett Stuart of Global Agritrends was entitled "Global Competitiveness Focusing on Broilers, Turkeys, and Table Eggs". The History Lecture by Dr. John Donahoe reviewed "Early Poultry Vaccine Company Development; the Era of Entrepreneurs". Among the wide variety of diseases and topics covered in the poster and scientific sessions were the ever-popular case reports as well as sessions on Avian Influenza,



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Coccidiosis, Marek's Disease, *Mycoplasma*, *Salmonella* and Food Safety, Infectious Bronchitis Virus, Newcastle Disease, Reovirus, Bacteriology, new Diagnostic Technology, Vaccine Technology, Management, Welfare, and a variety of other poultry diseases and issues.

The 2018 meeting will be July 13-17 in Denver, Colorado, and this year will be preceded by the Second International Conference on Necrotic Enteritis in Poultry, to be held July 11 – 12, 2018.

### **National Poultry Improvement Plan 2017 Annual Report**

Denise Brinson, USDA-APHIS-VS-SPRS-NPIP

The National Poultry Improvement Plan (NPIP) is a Federal-State-Industry cooperative program. There are 49 Official State Agencies, one U.S. Territory Official Agency and 99 Authorized Laboratories. Official NPIP disease monitoring classifications include: U.S. Pullorum Typhoid Clean, U.S. *Mycoplasma Gallisepticum* Clean and Monitored, U.S. *Mycoplasma Synoviae* Clean and Monitored, U.S. *Mycoplasma Meleagridis* Clean, U.S. *Salmonella Enteritidis* Clean and Monitored, U.S. Sanitation Monitored, U.S. *Salmonella* Monitored, U.S. Avian Influenza Clean, U.S. Avian Influenza Clean Compartment, U.S. H5/H7 Avian Influenza Clean, and U.S. H5/H7 Avian Influenza Clean Compartment for poultry breeding flocks, and U.S. H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

Pullorum-Typhoid Status: There were no isolations of *Salmonella pullorum* in commercial poultry in FY2013, FY2014, FY2015, FY2016, or FY2017. There were no isolations of *Salmonella pullorum* in backyard birds in FY2015, FY2016, or FY2017. There have been no isolations of *Salmonella gallinarum* since 1987 in any type of poultry in the U.S. U.S. Pullorum-Typhoid Clean participating hatcheries include: 254 egg and meat-type chicken hatcheries, 49 turkey hatcheries, and 665 waterfowl, exhibition poultry and game bird hatcheries.

### **NPIP U.S. Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are listed below:**

- Egg-Type Chickens
  - 291 Flocks with 6,998,694 birds
- Meat-Type Chickens
  - 5,169 Flocks with 107,420,261 birds
- Turkeys
  - 386 Flocks with 4,301,448 birds
- Waterfowl, Exhibition Poultry, and Game Birds
  - 9,134 Flocks with 2,989,785 birds
- Meat-Type Waterfowl
  - 118 Flocks with 400,625 birds

**Avian Influenza Status:** From July 1, 2016-June 30, 2017, there were seven isolations of confirmed Low Pathogenicity Avian Influenza (LPAI) in commercial poultry in the U.S.:

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**Table 1: 2017 NPIP U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:**

<b>Subpart</b>	<b>Flocks</b>	<b>Birds</b>	<b>Tests</b>
<b>Egg-Type Chicken Breeders</b>	293	7,117,010	28,741
<b>Table-Egg Layers-Commercial</b>	5,846	381,517,944	140,175
<b>Chicken Breeders</b>	8,437	134,073,718	553,147
<b>Chickens-Commercial</b>	107,101	9,185,334,073	1,465,230
<b>Turkey Breeders</b>	982	8,328,948	52,920
<b>Turkeys-Commercial</b>	14,925	177,753,196	168,128
<b>Waterfowl, Upland Game birds, Ex. Poultry</b>	5,808	2,396,768	92,437
<b>Upland Game birds, Waterfowl, Raised for Release Upland Game birds, Raised for Release Waterfowl-Commercial</b>	3,214	33,546,859	36,418
<b>Total</b>	146,606	9,930,068,516	2,537,196

<b><i>Mycoplasma gallisepticum</i>, <i>Mycoplasma synoviae</i>, and <i>Mycoplasma meleagridis</i> positive breeding flocks - National Poultry Improvement Plan FY2017</b>				
	WEGBY	Egg-Type	Meat-Type	Turkeys
<i>M. gallisepticum</i>	27	0	5	10
<i>M. synoviae</i>	37	0	37	3
<i>M. meleagridis</i>	0	0	0	0

**Authorized Laboratories Activities:** The National Veterinary Services Laboratories (NVSL) issue a group D *Salmonella* check test, *Salmonella* serotype proficiency check test, and an Avian Influenza check test for the

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Agar Gel Immunodiffusion test annually for Authorized Laboratories of the NPIP. Laboratory training provided to the authorized laboratories included a *Salmonella* Isolation and Identification Workshops, a Mycoplasma Diagnostic Workshop, and an Avian Influenza Diagnostic Workshop during FY2017.

### **Live Bird Marketing System (LBMS) Working Group Report**

Fidelis N. Hegngi, USDA-APHIS-VS-SPRS

In February 2017, the annual LBM Working Group business meeting was held in San Antonio, Texas. More than 71 participants representing 30 States attended the meeting including APHIS field, regional, and headquarters staff; State Department of Agriculture representatives; and LBMS industry stakeholders. Participants discussed the program's progress, shared ideas for continued program implementation, and agreed on further advancement of the program. In addition, the working group discussed:

- Final and approved additions to the 2016 LBMS Uniform Standards
- Update on indemnity procedures
- New Jersey, New York, and Pennsylvania avian influenza (AI) incidents in FY2016, overview, challenges and lessons learned
- Finding consensus and maintaining flexibility-discussion of 2016 H5 low pathogenic avian influenza (LPAI) response in NJ, NY and PA LBMS
- FY2017 Avian Health Line Item Budget update
- An update on the NVSL AI surveillance testing that included current nationwide findings and status of current diagnostic for avian influenza and vAPMV-1
- H7N2 LPAI in Feline populations
- Update on Mass Depopulation, Euthanasia/Technologies
- Update on Mass Disposal Methods and Cleaning and Disinfection
- National Veterinary Stockpile (NVS) update and accomplishments
- Observations on global occurrences of HPAI around the world and other influenza A virus (IAV) of interest
- An update on the Zoetis Flu Detect AI rapid test
- An update on the National Poultry Improvement Plan (NPIP) program and the announcement of the 2017 Official State Agency (OSA) and the General Conference Committee (GCC) meeting in Portland, Maine
- NPIP authorized laboratories system update
- Update on AI Vaccines and Research
- Field Level Financial Management Process for AI Incidents
- HPAI - Role of Wild Birds and Update on Wild Bird AI Surveillance projected for 2016 and beyond
- LBMS and Public Health-An Update of Human Salmonella Infections Associated with Live Poultry
- FY2016 Biosecurity for Birds (BFB) website/webinar and other outreach/education successes

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- The 2017 Bird Health Awareness Week Webinar and Twitter entries
- Social media/advertising/Purina and Tractor Supply Partnership/education /outreach needs and future of BFB educational materials;

The annual Live Bird Marketing System Continuing Education (LBMS-CE) Training Course was held at Texas A&M University, College of Veterinary Medicine, College Station, Texas, October 25-27, 2016. A total of 66 participant attended from 23 States and six international participants from Brazil, Honduras, Panama, Surinam and Thailand. The LBMS-CE Training Course is designed to provide veterinary medical officers (VMOs), animal health technicians (AHTs), and other regulatory personnel who are involved with the live bird marketing system program with the basic information and skills they need to successfully carry out their job responsibilities. The goals and objectives of the course are to provide participants with the ability to:

- Evaluate and define LBMS stakeholder activities and ensure compliance with applicable state laws, program standards, and licensing/registration requirements through consistent audit and evaluation of paper records within the LBMS
- Identify and evaluate biosecurity and disease risks in auction markets, swap meets, small sales, fairs, shows, and flea market segments of the LBMS
- Provide education and outreach information to bird marketers on appropriate mitigation techniques (e.g., cleaning, disinfection, best biosecurity principles and practices, and transport to retail market)
- Communicate knowledge regarding biosecurity issues and best practices to various stakeholder groups via pre-prepared presentations
- Define the different components of the LBMS
- Understand the essential symptoms of poultry respiratory diseases
- Learn the basic information and skills required for LBMS AI surveillance activities
- Identify where the U.S. LBMS AI surveillance program fits within the context of a State's avian influenza response and containment plan
- Identify the roles of VMOs and AHTs in supporting the implementation of activities and standards proposed by the LBMS working group subcommittees
- Develop evaluation tools for risk assessment and risk communication, and determine what type of biosecurity certification system is appropriate for extending training to LBMS stakeholders
- Define poultry-related issues involving social cultures within the various LBMS
- Perform proper techniques of bird restraint, swabbing, blood collection, necropsy, rapid field diagnostic test (Zoetis Flu Detect Avian Influenza Rapid Test), and euthanasia techniques.

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The training also included field trips to evaluate biosecurity and records auditing at several retail live bird markets in Houston, Texas. Participants while visiting these markets conducted an emergency scenario exercise.

In FY2017, USDA's BFB campaign continued its efforts to educate the backyard poultry community about ways they can help protect and maintain the health of their birds. The campaign released its annual bilingual calendar in mid-summer instead of late fall to better accommodate partner requests and continued to provide fair packages of materials. We partnered with CDC to host a webinar and twitter chat during Bird Health Awareness Week in February. Our social media outreach grew once again. The Healthy Harry Facebook page has more than 11,500 likes (an increase of just over 2,500 likes) and the Healthy Harry Twitter account has more than 1,900 followers (an increase of just over 150 followers). We solicited photos for the annual calendars through a social media push and received more than 1,500 entries. We also launched a series of six new videos in both English and Spanish. They are located on our YouTube site and were also promoted through social media channels.

In FY2017, surveillance in the LBMS remains a high priority. In FY2017, there was no detection of H5/H7 LPAI in the U.S. LBMS.

### **NVSL Avian Influenza and Newcastle Disease Report**

Mia Kim Torchetti, USDA-APHIS-VS-NVSL

The National Veterinary Services Laboratories (NVSL) in Ames Iowa, in coordination with the National Animal Health Laboratory Network (NAHLN), received avian samples for detection of reportable avian diseases such as avian influenza (AI; caused by influenza A viruses [IAV]) and Newcastle disease (ND; caused by virulent avian paramyxovirus serotype-1 viruses [APMV-1]). Samples from National Poultry Improvement Plan (NPIP) and Live Bird Market (LBM-BYD) surveillance programs, foreign animal disease (FAD) investigations, import and export activities, wild bird surveillance, and other diagnostics are tested (Figure 1; >7000 samples tested domestically during FY2017). While the majority of the samples are received for confirmation testing, first line testing is also conducted, as well as diagnostic support to other countries as a World Organisation for Animal Health (OIE), Food and Agriculture Organization of the United Nations (FAO) Reference Laboratory for AI and ND.

North American lineage H7N9 (unrelated to Asia H7N9 viruses) caused outbreaks in poultry in Alabama, Georgia, Kentucky, and Tennessee during March 2017 (Table 1). Also, during March 2017, H5N2 LPAI was detected in commercial turkeys in Wisconsin; and in April 2017 an unrelated H5N2 LPAI virus was detected in a single backyard flock in Idaho. Although globally the goose/Guangdong lineage H5 clade 2.3.4.4 viruses continue to circulate and significantly impacted Europe, Africa, and Asia, the IAV viruses identified from U.S. poultry during October 2016-September 2017 arose from North American lineage with no evidence of the Eurasian H5 lineage gene segments. There have been no further detections of the Eurasian H5 in

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poultry in the U.S. and no reports of the Eurasian-North American reassortant H5N2 virus outside the U.S. For wild birds, the last detection was from a mallard sampled in Montana on December 27, 2016. In December 2016, an H7N2 LPAI virus was detected in shelter cats in New York and the surrounding states. While the virus was highly similar to those that circulated in Northeastern live bird markets during the early 2000s, the source of the virus remains undetermined and no birds were found to be infected; one veterinarian working closely with the shelter cats was infected and recovered uneventfully.

There have been no detections of virulent Newcastle disease viruses (vNDV) in U.S. poultry. The species-adapted pigeon paramyxovirus serotype-1 continues to be detected in pigeons and wild Eurasian collared doves in many states the U.S. Wild cormorants have been affected by a different species-associated lineage; a virulent avian paramyxovirus serotype-1 was detected in wild cormorants from Oregon. This lineage was last reported in cormorants from Illinois, Minnesota, and Wisconsin during 2016.

Import testing for the U.S. is conducted by virus isolation and the majority of the samples received are from pet birds such as passerines and psittacines coming through quarantine stations in California, Florida, and New York. Export testing is performed according to the requirements of the receiving country and samples from a variety of species are tested. Of samples tested during FY2017 (Figure 1; 19% of samples received), all were negative for IAV and vNDV; avian paramyxovirus (APMV-2) was detected in six submissions (California and Florida stations), and APMV-3 was detected from one submission (California).

The Uniform Standards for testing in the Live Bird Marketing System (LBMS) were implemented as a State-Federal-Industry cooperative program in 2004 for the prevention and control of H5 and H7. Most of the LBMS testing is conducted by approved laboratories at the state level and non-negative samples are forwarded to NVSL for confirmation, with a small proportion going directly to NVSL. The LBM/BYD testing represented 31% of samples received during FY2017 from 36 states (AK, AL, AR, AZ, CA, CT, DE, FL, GA, IA, ID, IL, KS, KY, LA, MA, ME, MI, MN, NC, ND, NH, NJ, NV, NY, OH, OR, PA, RI, SC, TN, TX, VA, WA, WI, WV). There were two North American lineage H5/H7 events; H5N2 LPAI was detected in a mallard duck from a backyard flock in Idaho with no further spread, and North American H7N9 LPAI affected backyard poultry from Alabama, Kentucky, and Tennessee during the H7N9 HPAI/LPAI outbreak in March 2017. Antibody to H7 was detected in backyard chickens from Pennsylvania, however, all follow up testing was negative (no virus).

An H2N2 virus first detected in late 2014 continues to circulate in northeastern LBMs (Table 2 and Figure 2); ongoing circulation is concerning due to the potential for poultry adaptation and reassortment where other IAV are present. The virus has been recovered from ducks, gallinaceous birds, and the environment in four states (CT, NJ, NY, and PA), most commonly

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from Muscovy ducks in New York. Since June 2017 the virus has only been recovered from New York samples. Other viruses recovered include an H3N2 from a duck in Pennsylvania, H6N2 from chickens in Florida, H9N2 from chickens in Pennsylvania, and an H10N9 from an environmental sample in California. Antibody was detected in backyard flocks to H1 in New Jersey, Pennsylvania, and New York, and H6 in Massachusetts, and New Jersey. Antibody to H9 was detected in California game birds; follow-up testing for virus was negative in all backyard and game bird cases.

Vaccine and wild bird lineage APMV-1 viruses of low virulence (n=71) were isolated from environmental, poultry, and domestic waterfowl samples in 11 states (AL, CA, CT, DE, FL, MA, NJ, NY, PA, RI, VA). Pathogenicity and lineage were determined by the intracerebral pathogenicity index (ICPI) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site. Pigeon paramyxovirus serotype-1 (PPMV-1: species-adapted APMV-1 variant) identified in seven states (CA, CT, KS, MN, NC, PA, WI) from pigeons. An APMV-2 was recovered from a guinea fowl in New York.

Surveillance for IAV in commercial poultry is described under provisions of the National H5 and H7 LPAI Control Program which was implemented in September 2006. Testing is conducted by approved laboratories at the state level and non-negative samples are forwarded to NVSL for confirmation. Samples were received from 24 states (AL, AZ, CA, CO, DE, FL, GA, IA, IL, KY, MD, MI, MN, MO, NC, NE, NY, OH, PA, SC, TN, TX, VA, WI) representing 34% of FY2017 samples tested at NVSL (Figure 1). There were two North American lineage H5/H7 events in commercial poultry during FY2017 (Table 1). In March 2017, H7N9 LPAI and HPAI affected commercial and backyard birds in four states (AL, GA, KY, TN). Molecular and epidemiologic data suggest the potential for multiple point source introductions with limited lateral spread; mutation to HPAI occurred at a single site with secondary spread to one site. An H5N2 LPAI was detected in Wisconsin turkeys affecting a single site with no further spread. For other IAV, H6N8 infected turkeys in Michigan, and swine lineage H1/H3 IAV was recovered from in turkeys in North Carolina (vaccination to swine lineage viruses is common among breeder turkeys).

Vaccine and wild bird lineage APMV-1 viruses of low virulence (n=71) were isolated from environmental, poultry, and domestic waterfowl samples in 11 states (AL, CA, CT, DE, FL, MA, NJ, NY, PA, RI, VA). Pathogenicity and lineage were determined by the intracerebral pathogenicity index (ICPI) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site. Pigeon paramyxovirus serotype-1 (PPMV-1: species-adapted APMV-1 variant) identified in seven states (CA, CT, KS, MN, NC, PA, WI) from pigeons. And an APMV-2 was recovered from a guinea fowl in New York.

NAHLN laboratories participating in the Wildlife Services wild bird surveillance program forward only H5/H7 detections to NVSL as they are tested; non-H5/H7 IAV samples are forwarded to the NAHLN laboratory at Colorado State University for the Wildlife Services repository. Testing for

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other wild bird efforts such as routine mortality event testing, other research projects, and characterization of archived H5/H7 viruses submitted by independent researchers was conducted. For FY2017, 106 isolates were recovered at NVSL from all efforts. Of these, virus was recovered and/or characterized from samples in 27 states representing subtypes: H1-11 (Figure 3). There have been no further detections of the Eurasian H5 in poultry in the U.S. and no reports of the Eurasian-North American reassortant H5N2 virus outside the U.S. The last detection of Eurasian H5 HPAI was from a mallard sampled in Montana on December 27, 2016. Other viruses detected in wild birds include pigeon paramyxovirus type 1PPMV-1 in Eurasian collared doves from western states (AZ, CA, TX, UT), a virulent APMV-1 virus in wild cormorants in Oregon (this species-associated lineage was last reported in cormorants from Illinois, Minnesota, and Wisconsin during 2016), and APMV-4, 6, and 8 from various wild bird samples.

For FY2017 (1 Oct-30 Sept), 77 NPIP-authorized laboratories from 41 states participated in the IAV agar gel immunodiffusion (AGID) panel and passed with a score of 90% or better. The NAHLN-approved laboratories conducting molecular testing for AI and/or ND are required to have one or more diagnosticians pass an annual proficiency *test* (PT) to perform official rRT-PCR testing. In FY2017, IAV PTs were distributed for 319 diagnosticians in 54 laboratories, and for 275 diagnosticians in 52 laboratories for APMV-1 (Newcastle disease) rRT-PCR; currently, 57 laboratories from 42 states are approved for IAV and/or APMV-1.

The following reagents were distributed for rRT-PCR testing and support of NPIP and LBM surveillance during FY2017 (1 Oct-30 Sept):

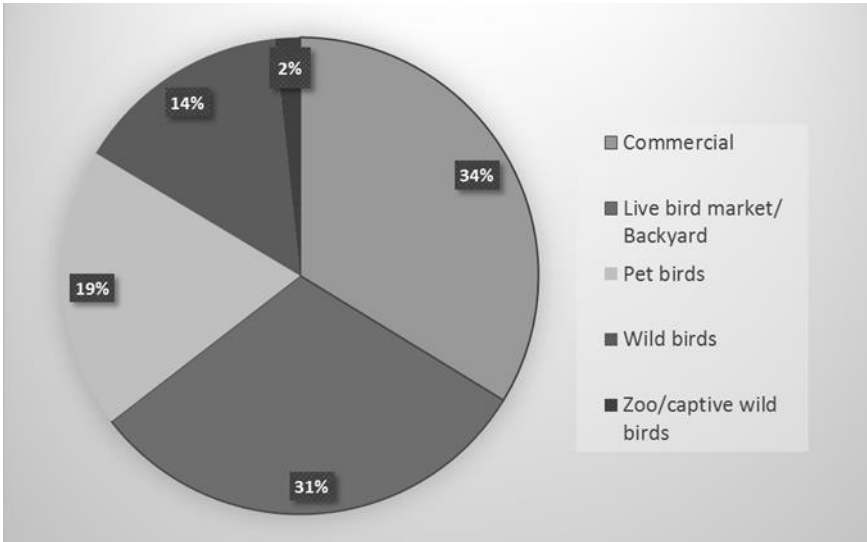
- AGID Diagnostic Reagents:
- 10,226 units of AGID reagents (antigen and enhancement serum) were shipped to 62 state, university, and private laboratories in 39 states (>1.2M AGID tests)
- Internationally, 947 units (sufficient for >11K tests) were shipped to 9 countries (Belize, Brazil, Canada, Chile, El Salvador, Honduras, Jamaica, Panama, and Peru)
- AIV rRT-PCR Controls:
- 56 vials of positive amplification control (M, H5 & H7) to 12 states; 33 internationally to 5 countries
- 262 vials of positive extraction control to 30 states; 8 internationally to 5 countries
- 336 vials of negative extraction control to 32 states; 8 internationally to 3 countries
- APMV-1 Diagnostic Reagents:
- LaSota Antigen (inactivated); 99 vials (2 ml) to 5 national and 51 vials to 5 international laboratories
- APMV-1 Antiserum; 7 vials (2 ml) to 4 national and 44 vials to 4 international laboratories



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- APMV-1 rRT-PCR Controls
- 17 vials of positive amplification control to 10 states; 6 vials internationally to 3 countries
- 82 vials of positive extraction control to 21 states; 4 vials internationally to 3 countries

Figure 1. FY2017 (1 Oct-30 Sept) samples received at NVSL by sector (>7000 samples tested domestically; >75% for PCR/VI). Commercial, live bird market/backyard, and wild bird samples are predominantly confirmatory testing from NAHLN and NPIP laboratories.



**Table 1. H5/H7 events by sector and date.**

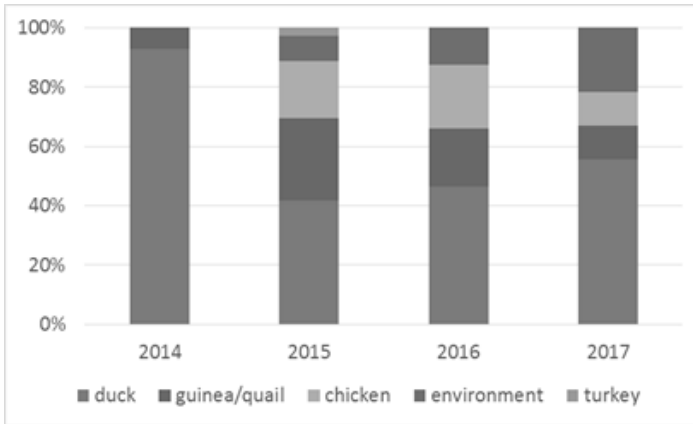
Commercial				
TN, KY, GA, AL	Chicken	2017 (Mar)	HPAI/LPAI AM H7N9	
WI	Turkey	2017 (Mar)	LPAI H5N2	
LBM/BYD				
AL	Chicken	2017 (Mar)	LPAI AM H7N9	
ID	Duck	2017 (Apr)	LPAI H5N2	

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**Table 2. H2N2 detections in northeastern LBM-BYD by calendar year and state.**

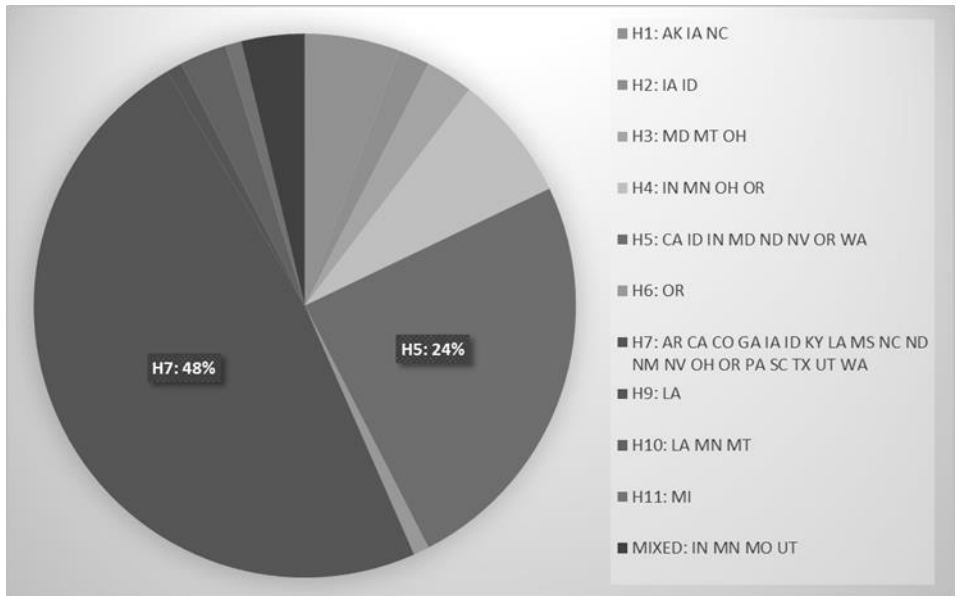
LBM H2N2	2015	2016	2017
CT	3	4	8
MA	0	1	0
NJ	7	13	6
NY	8	5	80
PA	3	0	21
RI	0	1	0

**Figure 2. H2N2 detection in northeastern LBM-BYD by species/sample type and calendar year.**



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**Figure 3. IAV subtypes from wild bird samples tested in FY2017 (n=106); and state(s) were detected. NOTE: collection date may be earlier than date of testing/characterization.**



### **Poultry *Salmonella*, *Mycoplasma*, and *Pasteurella* Diagnostics at the NVSL**

Kristina Lantz, USDA-APHIS-VS-NVSL

#### ***Salmonella* serotyping**

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely performs serotyping of *Salmonella* isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes *Salmonella* serotyping submissions to the NVSL from January 1 through December 31, 2016 originating from poultry.

*Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (flock monitoring programs, environmental sources or feed). Serotyping data from isolates submitted for research purposes are not included in the summary.

*Salmonella* serotyping at the NVSL is an International Organization for Standardization (ISO) 17025 accredited test. *Salmonellae* are typed via classical serotyping using polyvalent and single factor antisera to determine the O and H antigens and/or via molecular typing using the xMAP *Salmonella* serotyping assay. Approximately 60% of the sera used at the NVSL are produced in-house as previously described (Ewing, 1986). The remaining antisera are purchased from commercial vendors. All sera are subject to

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extensive quality control testing prior to use. *Salmonella* antigenic formulae are determined as previously described (Ewing, 1986) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont, 2007). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

From January 1 to December 31, 2016, 13,295 isolates were received for *Salmonella* serotyping. Of those, 3,593 isolates were from chicken sources and 1,415 isolates were from turkey sources. The most common isolates from chickens and turkeys are listed in Tables 1 and 2 respectively.

The NVSL provided a *Salmonella* Group D proficiency test to 98 individuals in 85 different laboratories. The purpose of the proficiency test (PT) was to assess the ability of laboratories to detect or isolate *Salmonella* Group D and/or *Salmonella enteritidis* (SE) from simulated environmental samples. The test consisted of ten lyophilized cultures containing various combinations of *Salmonella* and common contaminants typically found in environmental swabs. The 2016 test included *Salmonella* serotypes Anatum, Enteritidis, Heidelberg, Javiana, Newport and I 9,12:non-motile. Contaminant bacteria included *Citrobacter sedlakii*, *Citrobacter amalonaticus*, *Citrobacter freundii*, *Enterobacter cloacae*, *Enterobacter* species, *Klebsiellae pneumoniae*, *Providencia rettgeri*, and *Pseudomonas aeruginosa*. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained 13% of the test kits and tested them blindly for quality assurance (QA) purposes. The results of the proficiency test are shown in Table 3.

### ***Salmonella enteritidis***

From January 1 to December 31, 2016, 3,539 *Salmonella* isolates were received from chickens and their environment for identification of serotype. This was a 22% decrease in chicken submissions from 2015. *Salmonella enteritidis* was isolated in 9.7% of these isolates and remains in the top five serotypes observed in both clinical and non-clinical submissions. A summary of the number of Enteritidis isolates identified from chicken during the previous five years is shown in Table 4. The most common SE phage types observed at the NVSL are shown in Table 5.

### ***Salmonella Pullorum and Gallinarum***

The NVSL tested 808 sera samples for *Salmonella Pullorum* and *Gallinarum* in 2016. This was almost a 2-fold increase from 2015. No isolates of *Salmonella Pullorum* or *Gallinarum* were identified in 2016. The NVSL provided 2,255 mL of *S. Pullorum* tube antigen, 1,275 mL of *S. Pullorum* stained microtiter antigen, and 384 mL of antisera to testing laboratories between January 1 and December 31, 2016.

### ***Pasteurella***

The NVSL received 186 isolates for *Pasteurella multocida* Gel-Diffusion Precipitin testing. A summary of the results is provided in Table 6. Additionally, 134 isolates were received for *P. multocida* DNA fingerprinting. The NVSL also supplied 45 mL of *P. multocida* typing sera and three reference isolates to testing laboratories.

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***Mycoplasma***

The NVSL received 246 samples for avian *Mycoplasma* hemagglutination inhibition testing in 2016. In addition, 728 mL of *Mycoplasma* control antisera and 570 mL of *Mycoplasma* hemagglutination antigen was supplied to testing laboratories. Information on *Mycoplasma* reagents provided is shown in Tables 7 and 8.

**Table 1: Most common serotypes in 2016: Chicken**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
Enteritidis	129	Senftenberg	490
Typhimurium	32	Mbandaka	363
Kentucky	31	Worthington	237
Heidelberg	15	Enteritidis	213
III 13,23:g,z51:-	8	Thompson	198
All others	72	All others	1,751
<b>Total</b>	<b>287</b>	<b>Total</b>	<b>3,252</b>

**Table 2: Most common serotypes in 2016: Turkeys**

Clinical		Non-Clinical	
Serotype	No. Isolates	Serotype	No. Isolates
Senftenberg	38	Hadar	291
Ouakam	25	Senftenberg	239
Bredeney/Albany	21	London	194
Typhimurium	19	Muenchen	95
Uganda	17	Uganda/Albany	51
All others	118	All others	235
<b>Total</b>	<b>259</b>	<b>Total</b>	<b>1,156</b>

**Table 3: Summary of the NVSL *Salmonella* Group D proficiency test**

	2012	2013	2014	2015	2016
<b>Participants</b>	73	61	80	94	98
<b>Mean Score</b>	92%	94%	98%	98%	97%
<b>Score Range</b>	100%-29%	100-68%	100-80%	100-68%	100-80%
<b>Below Passing</b>	7	4	0	1	0

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**Table 4: Number of *Salmonella enteritidis* isolates in chicken per calendar year at the NVSL**

	2012	2013	2014	2015	2016
No. chicken isolates	3,502	3,912	4,688	4,593	3,539
No. chicken SE isolates	507	400	377	513	342
SE percent of all isolates	14.5%	10.2%	8.4%	11%	9.7%

**Table 5: Most common *Salmonella enteritidis* phage types from chicken per calendar year**

Rank	2012	2013	2014	2015	2016
1	8	8	8	8	8
2	13	13	RDNC	13	RDNC
3	RDNC	13a	2	RDNC	13
4	13a	RDNC	13a	13a	13a
5	23	23	13	2	2

RDNC = reacts, does not conform

**Table 6: Somatic types of *Pasteurella multocida* observed at the NVSL per calendar year**

	2012	2013	2014	2015	2016
Type 3	38	28	18	4	8
Type 3,4	33	17	36	28	22
Type 1	10	10	10	18	34
All other	100	90	62	99	122
<b>TOTAL</b>	<b>181</b>	<b>145</b>	<b>126</b>	<b>149</b>	<b>186</b>

**Table 7: *Mycoplasma antisera* (mL) provided by NVSL per calendar year**

Antisera	2012	2013	2014	2015	2016
<i>M. gallisepticum</i>	274	532	246	290	192
<i>M. meleagridis</i>	40	108	34	68	42
<i>M. synoviae</i>	342	672	212	260	172
Negative	175	344	156	250	322
<b>Total</b>	<b>831</b>	<b>1656</b>	<b>648</b>	<b>868</b>	<b>728</b>

**Table 8: *Mycoplasma antigen* (mL) provided by NVSL per calendar year**

Antigen	2012	2013	2014	2015	2016
<i>M. gallisepticum</i>	175	245	170	70	275
<i>M. meleagridis</i>	80	40	85	45	80
<i>M. synoviae</i>	245	290	230	205	215
<b>Total</b>	<b>500</b>	<b>555</b>	<b>485</b>	<b>320</b>	<b>570</b>

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## World Organization for Animal Health Chapter updates

Michael J. David, USDA-APHIS-VS

Every year, the World Organization for Animal Health (OIE) updates existing terrestrial animal health code chapters or drafts new ones. At its May 2017 General Session, the World Assembly of Delegates adopted both certain new chapters as well as new text for several existing chapters. Pertinent to the poultry industry are the following updated and new Code chapters:

**Infection with avian influenza (AI) virus.** This existing chapter received updates to the parameters for inactivating AI virus in eggs and egg products. In addition, some countries expressed a desire to revise the chapter because many OIE Member countries are placing unjustified barriers to international trade on live poultry and poultry products. Some countries have asked the OIE to very explicitly distinguish backyard poultry from commercial production poultry, further define zoning, and clearly state the risk differences between low pathogenic and highly pathogenic AI when trading in poultry and poultry products.

**Animal welfare.** The OIE updated the definition for *animal welfare* found in the existing chapter on General Principles for Animal Welfare. Clarity was sought to the existing definition.

**Vaccination.** This year the OIE adopted a new short chapter on vaccination. The chapter is meant to provide some general guidance to veterinary authorities on the use and good implementation of vaccination to support disease prevention and control programs.

**Criteria applied for assessing the safety of commodities.** This is also a newly adopted chapter which provides guidance on what constitutes a commodity that is safe to trade (i.e. either the pathogen is not found in the commodity or the commodity has been processed in a manner which inactivates the pathogen).

**Harmonization of national antimicrobial resistance surveillance and monitoring programs.** This is an existing OIE Code Chapter which was slightly updated to provide added clarity to Member country surveillance and monitoring AMR recommendations.

## *Mycoplasma* Update

Naola Ferguson-Noel, University of Georgia

The current situation in the United States has been fairly stable with relatively low incidence of both *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) in broiler-type chickens and turkeys, although

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the numbers are higher for layer-type birds and non-commercial poultry. Recent (2017) increases in the detection of MG can be attributed to the detection of live mycoplasma vaccine strains in non-vaccinated flocks. Strain typing (genotyping by targeted sequencing) is important to indicate whether the MG detected is a vaccine strain or field challenge. Proficiency tests sent to U.S. diagnostic laboratories in 2016 indicated that serological testing is fairly uniform but there was great variability in the procedure that the laboratories used to process and extract nucleic acid from swabs. In an effort to standardize sampling for real time PCR, we have evaluated the optimal site for swabbing for various respiratory pathogens in poultry and found that the choanal cleft appeared to give the most consistent results for MG, MS and infectious laryngotracheitis virus. We have also been using whole genome sequencing to identify better strain differentiation targets, virulence factors and antimicrobial resistance genes.

### **Variant Avian Reoviruses from Clinical Cases of Tenosynovitis**

Holly Sellers, Poultry Diagnostic and Research Center, University of Georgia

The number of clinical cases of tenosynovitis/viral arthritis in broiler chickens has increased rapidly since early 2012 in the U.S. and elsewhere in the world. Affected broilers were progeny from reovirus-vaccinated breeders. During this same time, similar clinical disease has been observed in commercial turkeys in the upper mid-west. Variant reoviruses were isolated from a majority of the tendons submitted to Poultry Diagnostic and Research Center (PDRC) and were genetically characterized by sequencing the S1 region encoding the Sigma C protein. Five major genotypes were identified based on phylogenetic analysis of the amino acid sequence of Sigma C. Genotypic characterization of reovirus field isolates is a universal platform used by laboratories around the world. Sigma C sequences can be shared between laboratories, as well as, in the public domain (GenBank, NCBI). Commercial reovirus vaccines belong to one subgroup within genotype 1 and their Sigma C sequences are at least 97% similar to each other and less than 50% similar to commercial vaccine strains. From 2012-2014, field isolates belonging to genotype 5 were the most prevalent. The genotype 5 field isolates form a homogeneous subgroup within genotype 5 and are 80% similar to amino acid sequences of several isolates from Australia and the European ERS strain. A second group of reoviruses belonging to a distinct subgroup within genotype 1 emerged in late 2012-2014. Isolates in this subgroup were homogenous compared to each other and shared 80% amino acid similarity to commercial vaccine strains.

Experimental studies with representative field isolates from both genotype 5 and genotype 1 were evaluated in day-old commercial broilers with low and high levels of reovirus-specific maternal antibodies (as measured by ELISA). Genotype 5 isolates were most pathogenic causing significant lameness, swollen tendons and footpads and hydropericardium. The variant subgroup in genotype 1 caused clinical signs but severity of disease was less than what was observed with genotype 5. Clinical disease



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was observed in birds with low and high levels of reovirus antibodies suggesting that current commercial vaccines did not provide sufficient protection against field challenge with new reovirus variants. Since 2012, field isolates belonging to genotypes 2, 3 and 4 were also isolated from clinical cases but in fewer instances compared to genotype 5 and 1. Serological studies in our laboratory have determined that genotypes represent different serotypes and in at least two genotypes, several serotypes exist. Field isolates belonging to genotype 5 and the subgroup within genotype 1 were included in autogenous vaccines starting in 2012. A decreased incidence of genotype 5 isolation was observed in the years following the use of autogenous vaccines containing these strains.

Despite the widespread use of reovirus autogenous vaccines, the incidence of tenosynovitis/viral arthritis has not decreased but rather new variants have emerged. In fact, several new genotype 1 subgroups have emerged. At least four distinct subgroups within genotype 1 have emerged since 2015. The subgroups share 80% Sigma C amino acid similarity with commercial vaccines and approximately 90% with the original genotype 1 subgroup and each other. Several representative isolates from at least two of the new variant subgroups were evaluated in day-old broilers (antibody negative for the genotype 1 subgroup as determined by virus neutralization assays) and found to be pathogenic based on clinical signs and gross lesions.

As new variants emerge, they are included in new serials of reovirus autogenous vaccines. The characterization of field isolates is important for poultry companies as new variants emerge and for assessment of current autogenous vaccine isolates. Current commercial vaccines do not provide adequate protection against challenge by the new variants and therefore at this time, autogenous reovirus vaccines are the only tool available to help control disease.

### **Whole Genome Sequencing in *Salmonella* Outbreaks**

Mathew Wise, Center for Disease Control (CDC)

Multistate foodborne outbreaks linked to chicken products can be difficult to solve. Chicken is a commonly consumed product and many of the most common *Salmonella* strains are found in chicken, undermining some of the key epidemiologic and laboratory tools to solve outbreaks. Even when investigators suspect chicken, it can be difficult to identify the specific source because many different chicken brands may be produced by the same company, different slaughter facilities may share raw material, and *Salmonella* can be passed from hen to chick in flocks that may supply facilities. Whole genome sequencing is now routinely being used in multistate outbreak investigations, making them more effective by refining case definitions and increasing the confidence that clinical, food, and environmental isolates are likely to share a common source. Following a 2014 outbreak of *Salmonella heidelberg* infections, CDC and USDA, Food Safety and Inspection Service (FSIS) collaborated to sequence isolates from

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the outbreak identified from ill people, foods, and animals. The WGS analysis not only helped confirm that illnesses in this outbreak were likely linked to chicken consumption, but also raised questions about the ecology of Salmonella within the poultry production system.

### **USDA-NIFA Funded Poultry Respiratory Disease Coordinated Agricultural Project (PRD-CAP)**

Chang-Won (Charles) Lee, Ohio State University

Respiratory diseases continue to be a major concern to poultry producers because losses induced by respiratory diseases have significant local and national economic impact to the industry. Protection of poultry by effective prevention and control of diseases is critical to maintain wholesome poultry products, which is the number one animal protein consumed in the United States (U.S.). Our goal is to develop knowledge-based integrated approaches to control and prevent endemic, emerging, and re-emerging poultry respiratory diseases in the U.S. In this project, the efforts of multiple institutions across the country are concentrated on the following four specific objectives:

- 1) Understand the ecology of poultry respiratory diseases;
- 2) Investigate the multifactorial etiology involving poultry respiratory diseases;
- 3) Develop new and improved diagnostic tools, vaccines, and novel preventive measures;
- 4) Educate stakeholders for prevention and control of respiratory diseases.

In this project, the efforts of multiple institutions across the country are on-going on the following areas described below.

1. The coordinated and centralized effort is essential for disease prevention, control, and eradication. Experiences from the 2015 and 2016 avian influenza outbreaks emphasized the importance of reporting, coordination, and collaboration between industry and regulators in poultry disease control efforts. Better communication and coordination could have significantly reduced the direct costs incurred during the 2015 outbreak. This multistate collaborative project is facilitating a much needed coordinated approach to research and disease control and establishing a strong basis for national poultry disease network.
2. It is well established that the normal bacterial populations inhabiting an animal are key to its health and predisposition to disease. We are defining the baseline “healthy” microbiome in the respiratory tract of broilers, layers, and turkeys. We will use this baseline to determine which bacterial and other communities promote health and growth of the bird, as opposed to communities that predispose the bird to respiratory disease. We will translate this information into improved diagnostics that can be used by the producer to determine their flock health according to microbiome content, and the most effective mitigation strategies to prevent disease. In addition to testing flock surveillance samples, we are collaborating with the investigators in this

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project to sample the respiratory microbiome using models of respiratory infection. We expect to determine the changes that microbial communities undergo over the course of respiratory pathogen infection. We also expect to identify specific microbial populations that might be favored, altered, or reduced during the infection.

3. There are so many respiratory pathogens that have been neglected because of limited funding which resulted in limited research of very small scale. Respiratory diseases involve multiple pathogens, and they interact with each other. Researchers cannot study one pathogen but must look at how the host reacts; that can vary depending on the health condition of the host. The environment, including the air quality on the farm might affect the disease. Our coinfection studies in different environmental conditions will provide important and much needed information on the interaction of respiratory pathogens in poultry, which will help improve diagnostics and vaccination strategies needed to control respiratory syndromes in poultry. Specifically, these studies will provide practical information on what to expect in regards to clinical outcomes of co-infections with respiratory pathogens and will help improve control of the diseases by understanding patterns of shedding and transmission of these pathogens when co-infecting birds. In addition, understanding how the administration of multiple live attenuated vaccines currently used in the poultry industry impacts the development of immunity and protection from challenge will contribute key information leading to improved vaccination programs that achieve maximum immune protection from field challenge in long-lived birds.

4. The prompt identification of pathogens and antibodies in flocks is essential for early detection and the initiation of an appropriate response to limit the extent of the disease. Although the current detection methods are effective, respiratory pathogens continue to evolve and novel strains with changes in genetic sequences emerge. Thus, existing assays require frequent validation and update. For example, primer and probes for conventional polymerase chain reaction (PCR) and real-time PCR should be tested with new strains. In response to recent HPAI outbreaks in the U.S., we have worked with the National Veterinary Services Laboratories (NVSL), USDA and evaluated and improved the existing assays to better detect emerging influenza strains. Once bench validated, the test will be transferred to NVSL, USDA. These kinds of improved and validated tests will be incorporated to the respiratory panel for molecular detection and diagnosis of different pathogens including infectious bronchitis virus (IBV), Newcastle disease virus (NDV), avian influenza virus (AIV), infectious laryngotracheitis virus (ILT), and mycoplasma, etc.

5. Vaccination has been a widely used tool in the poultry industry to prevent or control diseases caused by infectious disease agents. Both inactivated and live vaccines have been successfully applied against major respiratory pathogens. However, in spite of extensive vaccination programs, respiratory pathogens continue to evolve and cause enormous economic losses. For this reason, generation of a broadly reactive vaccine that can confer protection

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across serotypes or variants has been a long sought goal for pathogens that continuously evolve. Three different vaccine platforms are being successfully developed: nanoparticle-based subunit vaccine and two different types of live virus-vectored vaccines. All three approaches target Infectious Bronchitis (IB) which makes it easier for comparative evaluation using similar challenge protocol. Considering the flexibility of each system, once validated with IB, the platform can quickly be utilized to develop vaccines against different respiratory pathogens of interest.

6. Antibiotics such as in-feed chlortetracycline (CTC) administration have been used to control mycoplasma and other bacterial pathogens. However, because of the rise in antibiotic resistant bacteria, current efforts are directed to phase out antibiotics from poultry production. To overcome these problems and reconcile the demand of antibiotic withdrawal with maintaining animal health and food security, there is urgent need to develop antibiotic independent approaches to control respiratory diseases. We have identified several novel non-antibiotic compounds that inhibit avian pathogenic *E. coli* (APEC) and *Mycoplasma gallisepticum* which show low toxicity. Identification of small novel molecules that attenuate virulence mechanisms represents novel therapeutics for the control of colibacillosis and mycoplasma. These small molecules are highly suitable for commercial application because of their small size, specificity, and stability. In addition, since they target specific virulence mechanisms, the pathogen is less likely to develop resistance.

7. A major obstacle in the control of infectious diseases in poultry is non-science based management practices and lack of proper understanding of the real issues and practical control strategies among the stakeholders including poultry industries and small backyard flock owners. Science-based information on control and prevention of poultry respiratory diseases needs to be disseminated effectively and in a timely manner to our stakeholders. Our extension group is conducting a comprehensive and effective educational training program on the importance of controlling respiratory diseases including HPAI for veterinarians, extension educators, gamebird producers, small organic and pastured poultry operations and backyard, hobby, and exhibition growers, state and federal government stakeholders, and the general public. We expect that some of the proposed research and extension effort will be highly successful and have merit to be expanded to regional and national level. In addition, we expect to identify need for additional extension effort as new findings accumulate from the proposed researches. Coordinated efforts are made among participants for effective generation and validation of extension and education materials and approaches.

The overall impact of a successful outcome will be improved understanding of the pathogens, diagnosis and control of respiratory diseases that will benefit the poultry industry. Impact of the research will be derived from identification of microbiome in different poultry species and factors involved in pathogenicity and transmission of pathogens to poultry, the development and implementation of molecular diagnostics, evaluation

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and development of new and novel vaccines, and the design and implementation of eradication protocols for a selected or group of respiratory pathogens. The overall outcome of the project will help the poultry industry to remain competitive and profitable and it will help to ensure that poultry and poultry products in the U.S. are wholesome and secure.

## **COMMITTEE ON SHEEP, GOATS AND CAMELIDS**

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The Committee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 1:00 – 5:30 p.m. There were 28 members and 23 guests present. The meeting was brought to order at 1:02 pm. All in attendance were reminded to sign the attendance sheets and if not a member, be sure to indicate so and any interest in being a member. 2016 resolutions were presented, and it was noted that some of them had either been responded to tepidly while one had not been responded to at all. It was reported that USAHA leadership is aware of the issue of non-response to some resolutions and is planning a follow up. Action regarding the resolutions that were responded to were postponed until the business meeting. An explanation was given about the combination of the Committee on Camelids with the Sheep and Goat and Dr. Long was introduced as co-chair. The Committee agreed to look at the committee mission and add camelids to it during the business meeting.

### **Presentations and Reports**

### **Report of the Subcommittee on Scrapie**

Cheryl Miller presented the report of the Subcommittee on Scrapie. The report, in its entirety, is included at the end of this report.

### **Ecology and Epidemiology of Bluetongue Viral Infections in the Northwest U.S. Update 2017**

J. F. Evermann, Washington State University

Dr. Evermann's presentation explored the ecology and epidemiology of bluetongue virus (BTV) in the Northwest United States. The ecology of BTV focused on the question of where the virus is when not actively causing disease and the epidemiology of BTV focused on the chronological time frame that BTV associated disease has occurred in the Northwest, primarily in Washington.

### **Accuracy of a Temperature Sensing Radio Frequency Identification (T-RFID) Subcutaneous Implant for Assessment of Rectal Temperature in Goats**

**Joan Dean Rowe, Jan L. Carlson**, Jonathan Berkowic, Rachel Conway, Philip Kass, University of California, Davis

A prospective cohort study examined the accuracy and feasibility of two sites of temperature sensing radio frequency identification (T-RFID) implants in dairy and meat goats. The objectives were to assess the accuracy of T-RFID in two implant sites in goats, and to predict rectal temperature by use of T-RFID implant, adjusting for significant goat and environmental factors. One hundred eight goats were implanted with T-RFID in one of two sites, the ventral aspect of the tail or the base of the right ear. For each goat, temperature was measured by a rectal thermometer, and then by three readings from the microchip. Temperature measurements were repeated in the same goats on four different days: cool (39-46°F), intermediate (68-78.8°F), warm (84.2-91.4°F), and hot (93.2-100.4°F). Bland-Altman plots were used to assess the agreement between rectal and microchip thermometry, and regression analysis was used to predict rectal thermometry by T-RFID adjusting for ambient temperature, age, breed, implantation site, and body condition score (BCS). Without adjustment for goat and environmental factors, there was poor agreement between T-RFID readings and rectal thermometry. Ear implants readings were in greater agreement with rectal thermometry compared to tail implants. Regression models could be fitted using the ear implants only. There was a good agreement between temperature determined by the T-RFID ear implant and rectal temperature ( $\pm 1^\circ\text{F}$ ) as predicted by the regression model adjusting for age (kid vs. adult), breed type (Boer, dairy Swiss type, La Mancha type), body condition, and ambient temperature when ear implants were in use. Both the ear and tail sites of RFID implant were reliable for animal identification purposes. The tail implants did not reliably predict rectal temperature under the conditions in the study. Practical and accurate application of the T-RFID implants in this study required transformation of the implant reading using the regression model.

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For practical application, the ability to detect, read and/or store animal and environmental factors for computation of the adjusted temperature readings would be needed. Successful development of this technology could lead to earlier detection and treatment of diseased goats and potentially help to offset the cost of RFID devices as a form of permanent traceable identification.

### **Small Ruminant Internal Parasites: Take control**

Dave Scott, National Center for Appropriate Technology (NCAT)

Why small ruminants? One word: Production. Sheep and goat females have the potential to produce offspring equal to dam body weight in one grazing season.

Why not small ruminants? Two words: Predation and parasites

Internal parasites, especially the Barber Pole Worm (*Haemonchus contortus*), are becoming increasingly recognized as a threat to sheep, goat, and camelid production efficiency on irrigated, sub irrigated, and riparian pastures in the West. However, they can be effectively combatted with practical deworming, grazing, and genetic selection strategies. Reducing parasitic infection clearly will increase flock profitability.

Animal performance losses include reduced milk production, decreased gain, and an increased susceptibility to disease. In young stock, these losses can extend further, affecting reproductive maturity and permanent damage to lungs from secondary pneumonia infection. For those flocks that depend upon their young stock to produce offspring at the age of 12 months, parasites constitute a major production constraint.

#### The Life Cycle

The life cycle of *Haemonchus* has three critical components from a producer's perspective. First is the sheer number of eggs shed by the female worm. One female can shed 5,000 eggs per day (Machen, 1998) and will do so constantly until there is no more abomasal blood available to feed upon. A 150-pound ewe will produce three percent of her body weight of feces per day, or about 2000 grams. If you have a moderate rate of 200 eggs per gram in the feces, that translates to roughly 400,000 eggs per day that are shed per ewe on to the pasture. Intensively managed sheep operations on irrigated pastures are running upwards of 200 ewes per acre, changing paddocks on a daily basis. The worm pressure that these livestock are facing is phenomenal. Additionally, sheep operations that are grazing irrigated or sub irrigated pastures with lower stocking densities are not below the threshold for economic damage. This is of critical concern with the rise in irrigated sheep production in the West.

Secondly, it takes between four and ten days for larvae to emerge from the feces and position themselves on the leaves in the grass (Wormboss, 2017). One can readily see that animals that are grazed in paddocks for two weeks are ingesting the latest crop of L3 larvae produced by the adult worms that they host. The additive effect is substantial.



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Last, the L3 larval populations from a given hatch peak at three weeks from shedding and gradually diminish. The rate of attrition depends largely upon temperature and humidity. In general terms, 80 percent of L3 larvae have died at 45 days in an environment with an average temperature of 70 degrees F. (Barger, 1972). This is an important factor in managing grazing paddock recovery intervals.

### Infection Introduction

The Barber Pole Worm can be introduced into a flock by purchasing animals that are infected by the adult worm or by grazing owned or rented pastures that are infected with parasite larvae. Of particular importance is not only the number of adult parasites harbored in a purchased animal but also their resistance to anthelmintics. These two criteria are rarely considered when purchasing animals, particularly in the western U.S. Irrigated and sub irrigated pastures have by far the greatest potential for parasite infection. Riparian pastures, even if they are only occasionally grazed must also be considered.

Additionally, producers that run the majority of their sheep on dry range often forget the hazard of continuously grazing their rams and orphan lambs on irrigated pastures conveniently close to the ranch headquarters.

### Tools to Control Barber Pole Worm Infection

*Haemonchus contortus* populations can be controlled through the use of three strategies: refugia, grazing, and selection for host resistance.

Refugias are created through the use of the FAMACHA© eye score system. Typically, 70 to 80 percent of the parasites are harbored in 20 to 30 percent of the flock (Kaplan, 2017). FAMACHA© scoring allows you to identify and treat these primary parasite hosts and leave the remainder of the flock untreated. This creates a refugia of parasite genetics that concentrates genes that are less effective in causing infection. In contrast, a lack of refugia (treating all animals) fixes a gene pool of organisms that are predominately resistant to the anthelmintic utilized. Refugias significantly lengthen the useful lifetime of dewormers. Thus, by using the FAMACHA© system, producers can save money by deworming only infected animals while simultaneously increasing the long-term efficacy of modes of treatment.

Grazing strategies are singularly the most important sustainable method to control internal parasites in small ruminants. It is quite possible, at least in the northern tier of the U.S., to almost eliminate the use of anthelmintics with multi-paddock grazing: short paddock grazing periods, paddock residuals of six to eight inches, and 45-day rest periods. As previously mentioned, these strategies address critical control points in the life cycle of the Barber Pole Worm, i.e., the interval required for the L3 larvae to emerge from fecal pellets, their relatively low position (2-3 inches) on the leaves of plants, and the attrition of pasture L3 larvae. Grazing in accordance to these rules avoids infection and consequently is very sustainable. Grazing pastures that have been previously hayed and the adoption of fence-line weaning practices are further methods that can reduce production losses to parasites. It is no quirk of nature that these grazing strategies also increase the sustainability the

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pasture resource; rather, it is due to the biological design of the natural process itself. Smart grazing is more than a tool; it is a powerful weapon.

Genetic selection in the ewe flock and in ram sires offer a third tool to combat small ruminant internal parasites. Culling on the basis of high fecal egg counts in pastured females improves flock resistance. However, most flock managers do not have the labor nor the financial resources to do this, especially in flocks greater than 20 or 30 ewes. FAMACHA© scoring provides a fast and effective means of determining who to cull in the ewe flock, based on repeated lack of resistance and resiliency to parasite infection. Likewise, replacement ewe lambs can be selected from dams that exhibit high resistance and resilience to *Haemonchus*. Furthermore, as more rams are offered with estimated breeding values for parasite resistance, the sheep producer can subsequently advance flock genetics.

The synergistic effect of incorporating refugia, grazing, and selection practices furnishes the modern small ruminant producer with an arsenal that is unprecedented and will result in a level of control of *Haemonchus contortus* that substantially increases profitability. The two “P’s”, parasites and predation, largely limit the high potential of small ruminant production. Practical, sustainable control of internal parasites will significantly help propel the sheep, goat, and camelid industries forward.

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### NAHMS Goat 2019 Needs Assessment

Amy Delgado, USDA-APHIS, Veterinary Services (VS), Science, Technology and Analysis Services (STAS)

A second National Animal Health Monitoring System (NAHMS) Goat study is planned for 2019. The objectives for this study will be prioritized based on the results of a needs assessment process. One aspect of this process is a needs assessment survey which was conducted from August 1 – September 8, 2017. Thanks to the support of industry groups and USAHA, we received

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1,272 responses from all 50 states and three countries. Respondents included producers, academics state and federal government and animal health professionals. Goat owners represented 80% of the survey respondents. All respondents were asked to rank their top three management priorities from an extensive list that included 21 perceived management priorities. The top ranked priority was availability of approved pharmaceuticals and vaccines. Respondents were also asked to rank their top disease priority. Internal parasites were the number one disease priority. Results from this survey will be evaluated and shared with producer groups, researchers and universities and will be used to help prioritize NAHMS Goat 2019 study objectives. A complete summary of the needs assessment survey results will be available at [www.aphis.usda.gov/nahms](http://www.aphis.usda.gov/nahms). NAHMS is still looking for input to the study development and can be reached at the same url.

### **What's Up Doc? Update on the Minor Use Animal Drug and Food Animal Residue Avoidance and Depletion Programs**

Lisa A. Tell and Krysta Martin, University of California, Davis

Medicating animals that are used to produce food for human consumption is a worldwide phenomenon. Some indications for veterinarians to use animal health products include treating illnesses, producing healthier animals, and prevention or reduction of morbidity and/or mortality caused by diseases. In recent years, the potential impacts of drug residues are of heightened concern for consumers, regulators, and legislators. In order to protect public health, it is important for veterinarians to have resources available to them to avoid drug residues in food products derived from animals and to be able to work closely with their clients to help minimize drug residues from entering the human food chain. This presentation will provide an overview of the current status of the Minor Use Animal Drug Program and the activities of the Food Animal Residue Avoidance and Depletion Program with regards to avoiding drug residues in human food products derived from sheep and goats. The organizational aspects of the programs will be covered, in addition to how the programs are developing new strategies, methods or resources to serve veterinarians.

### **Fostering Antimicrobial Stewardship in Animals**

Michael Murphy, Food and Drug Administration (FDA)

The presentation summarized policy and rule changes regarding the use of medically important antibiotics in food-producing animals, including minor species, and offers some next steps. The presentation is available at: <https://www.fda.gov/downloads/AnimalVeterinary/DevelopmentApprovalProcess/UCM572948.pdf> and is included at the end of this report.

### **Committee Business:**

The Committee discussed the responses to the 2016 resolutions and approved a motion to recommend that 2016 resolutions 16, 17, and 18

## REPORT OF THE COMMITTEE

remain a priority for the USAHA as more work needs to be done beyond the responses provided by USDA APHIS.

The Committee then discussed a resolution from 2015 that urged the proposed scrapie rule be finalized in 2016. Rather than put forward a new resolution, the Committee voted to recommend that the USAHA keep the 2015 Resolution #13 a priority and urge USDA-APHIS, Veterinary Services (VS) to finalize the proposed Scrapie Rule in 2018. The Committee further agreed that because of widespread industry support and demand the final rule should be exempt from the Presidential Order requiring regulatory offset.

Three resolutions were presented for consideration and approved by the Committee:

**Minor Use Animal Drug Resolution** is a reiteration of a 2013 resolution that urged permanent funding for the Minor Use Animal Drug program. Since that time, the authorization of the program has expired so the committee resolved that USAHA should urge Congress to authorize the program and the Secretary of Agriculture to request funding to carry out the program.

**Scrapie Eradication Funding Resolution**, which asked for new money to support the eradication of scrapie in the U.S., was approved. The Committee felt strongly that we are so close to being able to request that the U.S. be declared free of the disease that it is essential for the USAHA's support for the program to remain steady.

**Committee on Animal Emergency Management (CAEM) Foot and Mouth Disease (FMD) Farm Bill Funding Resolution**, which urges substantial funding for an FMD Vaccine bank be included in the 2018 Farm Bill, was passed in support.

## SHEEP, GOATS, AND CAMELIDS

### REPORT OF THE SUBCOMMITTEE ON SCRAPIE

Chair: Cheryl Miller, IN

Vice Chair: Larry Forgey, MO

The Subcommittee met on October 18, 2017 at the Town and Country Hotel in San Diego, California from 9:00 a.m. to 12:35 p.m. There were 21 members and 14 guests present. Meeting was called to order by the chairman, Dr. Cheryl Miller. All attendees were asked to sign in.

#### Presentations and Reports

##### Scrapie Program Updates

Diane Sutton, USDA-APHIS-VS

##### Scrapie Eradication Program Results\*

- The National Scrapie Eradication Program made tremendous progress in FY2017.
- Other than a goat that resided in a herd that was under quarantine since 2005 there have been no classical scrapie positive animals in the United States since April 2016. This goat herd was depopulated in July and the remaining goats moved to the Agricultural Research Service (ARS).
- There were two Nor98-like cases confirmed by the National Veterinary Services Laboratory (NVSL) one from Colorado and one with a Montana tag pending trace back.
- The last two known scrapie infected/source flocks have been depopulated and the premises are pending disinfection. No high-risk animals exist in the United States outside of research facilities.

##### Surveillance\*

- As of September 30, 2017, 42,030 animals had been sampled for scrapie testing in FY2017:
  - 6 percent were collected on-farm and 94 percent through Regulatory Scrapie Slaughter Surveillance (RSSS)
  - 19 percent of the samples collected were from goats and the 81 percent from sheep
- Implementation FY2018
  - States with RSSS collection sites will continue to sample targeted sheep and goats.
  - The State sampling minimums for FY2018 have been provided to the States and will be made public in the October monthly report. **Note:** These are minimums. The plan is to continue to collect samples from the maximum number of targeted animals given the available budget.

### **Scrapie Surveillance Evaluation and Plan Revision**

- APHIS is conducting an evaluation of scrapie surveillance with the intention of updating the National Scrapie Surveillance Plan in 2018. Items being evaluated:
  - Targeting criteria including:
    - Age – what ages should be sampled for RSSS and routine On-farm surveillance.
    - Face color – should black-faced sheep still be preferentially sampled?
    - Clinical signs – what clinical signs indicate increased risk?
    - Traceability – now that we have been free of cases for 18 months should we sample untraceable sheep of all face colors and goats or is the benefit not worth the cost?
  - Should one surveillance component be prioritized over another?
  - Would a point system based on relative risk improve the effectiveness of the program? If so what would it look like?

### **Official Eartags**

- Since a funding reduction in FY2012, APHIS has used no-year scrapie or animal disease traceability (ADT) funding to purchase plastic and metal tags and applicators for producers. This funding was expended in FY2017. Due to budget constraints, beginning in FY2018, APHIS is only offering metal tags to producers at no cost.

### **Scrapie Flock Certification Program (SFCP)**

- At the end of August FY2017 there were 335 producers enrolled in the program – 44 Export Certified, 69 Export Monitored and 222 Select Monitored

*\*As of September 30, 2017. FY 2017 numbers are not final and may change.*

### **Goat PRNP alleles S146 and K222 Result in Long Disease-Free Periods Following Scrapie Inoculation**

Stephen White, USDA, Animal Research Service (ARS)

Scrapie is the transmissible spongiform encephalopathy of sheep and goats. While sheep with the ARR haplotype have strong resistance to classical scrapie, there has been considerable discussion about degrees of resistance provided by naturally occurring goat genetics. Goats with S146 or K222 amino acid substitutions in prion protein (PrP) have been significantly underrepresented in scrapie cases even though present in herds with disease. We conducted an oral scrapie challenge of goats with different genotypes, and all controls homozygous for the most common goat haplotype showed clinical scrapie by an average of 24 months post-inoculation. In contrast, no S146 and K222 heterozygotes have had lymphoid biopsy tests with positive results or confirmed scrapie at long incubation times approximating or exceeding many goat commercial lifespans. These

## SHEEP, GOATS, AND CAMELIDS

results are consistent with many other studies, most of which have been performed outside the U.S. Overall, these results contribute to understanding of the degree of classical scrapie resistance conferred by the S146 and K222 goat alleles.

### **Sheep Scrapie Tag Status and the Future**

Cindy Wolf, University of Minnesota

Overview of industry concerns with the recent policy decision by USDA-APHIS, Veterinary Services (VS) to discontinue providing “free” plastic scrapie tags.

- Plastic tags are easier to read than the metal tags
- Plastic tags are easier to apply correctly than metal tags
- Plastic tags are safer in animals that will be sheared
- Plastic tags are less prone to infection

She encouraged USDA-APHIS-VS in partnership with industry to consider all options before making a final decision.

### **Update on Scrapie Research at the National Animal Disease Center (NADC)**

Justin Greenlee, NADC, ARS, USDA

The Virus and Prion Research Unit at the NADC has ongoing research projects with the agents of scrapie, bovine spongiform encephalopathy (BSE), and chronic wasting disease (CWD). Several scrapie studies were completed this year and reports are submitted or prepared for submission to scientific journals. The first report is on the results of assessment of ante mortem diagnostic techniques in a herd of goats naturally infected with scrapie. These animals were depopulated from an infected farm in 2014 and brought to the NADC for continued monitoring, serial testing by rectal biopsy and optical coherence tomography, and submission of postmortem samples to APHIS, National Veterinary Services Laboratory (NVSL) for final scrapie diagnosis. Out of 11 does and 17 kids obtained, abnormal prion protein was detected in nine. Of the positive goats, four were born to positive dams and four born to negative dams (one from a separate premise with no parentage information available). In our study, we found that positive results were obtained from ante mortem rectal mucosal biopsies from four goats with known parentage and only when born to does that eventually tested positive. Despite showing great promise in detecting BSE in cattle, the optical coherence tomography technique was not able to distinguish scrapie positive goats prior to the onset of clinical signs.

Further work elaborates on the differences in two scrapie strains present in the U.S. In previous studies we used two scrapie isolates: No. 13-7 that was isolated from ARQ/ARQ black-faced sheep and x124 that has a rapid incubation time in sheep with the V136 allele. The No. 13-7 scrapie agent transmits to white-tailed deer after intracranial or oronasal challenge, but previous and ongoing studies at the NADC suggest that the CWD agent transmits poorly to sheep. We conducted a study to determine if deer

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infected with the scrapie agent could serve as a reservoir of infectivity to sheep. The scrapie agent from deer did transmit to sheep, but with more rapid incubation periods in sheep with the V136 genotype and with lesions consistent with x124 scrapie rather than the original No. 13-7 inoculum. Very low incidence of scrapie in the U.S. suggests that exposure of deer to the scrapie agent is unlikely. If sheep were exposed to the scrapie agent from deer, current genotype-based methods for scrapie eradication would remain effective.

### **Subcommittee Business:**

- Dr. Cheryl Miller presented the purpose of the Committee on Scrapie.
- The response by USDA to last year's resolution was presented to and discussed by the committee.
- A motion was made and seconded recommending that USAHA maintain priority on the 2016 resolutions: 16, 23, and 40 combined, 17 and 41 combined, and 18 for the coming year.
- A discussion regarding the status of the final scrapie rule occurred. The decision was made to create a recommendation for the Committee on Sheep, Goat, and Camelid to urge USDA to promptly pass the final rule.
- A discussion concerning the recent policy decision by USDA-APHIS-VS to discontinue providing "free" plastic scrapie tags ensued. Membership felt that USDA-APHIS-VS should be encouraged to partner with industry to explore all options before making a final decision.
- Dr. Paul Rodgers moved that the meeting be adjourned. Dr. Barry Pittman seconded this motion.

### **Other Notes:**

Dr. Jack Shere and Dr. Burke Healey were present during Dr. Cindy Wolf's presentation to respond to questions concerning the recent policy decision by USDA-APHIS-VS to discontinue providing "free" plastic scrapie tags.



## **REPORT OF THE COMMITTEE ON SWINE**

Acting Chair: Harry Snelson, NC

Vice Chair: Maryn Ptaschinski, IA

Bobby Acord, NC; Paul Anderson, MN; Gary Anderson, KS; Celia Maria Antognoli, CO; Marianne Ash, IN; James Averill, MI; Karen Beck, NC; Karen Becker, DC; Lisa Becton, IA; Kevin Blake, ND; Philip Bradshaw, IL; Becky Brewer-Walker, AR; Nancy Brown, KS; Tom Burkgren, IA; Robert Cobb, GA; Jim Collins, MN; Joseph Corn, GA; Susan Culp, TX; Thomas DeLiberto, CO; Barbara Determan, IA; Roger Dudley, NE; Dee Ellis, TX; Tony Forshey, OH; Nancy Frank, MI; Donna Gatewood, IA; Cyril Gay, MD; Michael Gilsdorf, MD; Timothy Goldsmith, MN; Larry Granger, CO; Patrick Halbur, IA; Rod Hall, OK; Steven Halstead, MI; Beth Harris, IA; Greg Hawkins, TX; Michael Herrin, OK; Sam Hines, MI; Russell Iselt, TX; Ellen Kasari, CO; Marcus Kehrl, Jr., IA; Daniel Kovich, DC; Charlotte Krugler, SC; Elizabeth Lautner, IA; James Leafstedt, SD; Donald Lein, NY; Tsang Long Lin, IN; Bret Marsh, IN; David Marshall, NC; Chuck Massengill, MO; Paul McGraw, WI; Gay Miller, IL; Richard Mock, NC; Megin Nichols, GA; Jerome Nietfeld, KS; Sandra Norman, IN; Dustin Oedekoven, SD; Barbara Porter-Spalding, NC; Maryn Ptaschinski, IA; David Pyburn, IA; Susan Rollo, TX; James Roth, IA; Mo Salman, CO; Roxana Sanchez-Ingunza, KS; Joni Scheffel, MN; David Schmitt, IA; Richard Sibbel, IA; Harry Snelson, NC; Fred Soltero, PR; Paul Sundberg, IA; Brad Thacker, GA; Lee Ann Thomas, MD; Beth Thompson, MN; Sarah Tomlinson, CO; Susan Trock, GA; Jeff Turner, TX; Paul Ugstad, NC; Liz Wagstrom, DC; Patrick Webb, IA; Margaret Wild, CO; John Williams, MD; Nora Wineland, MO; Jennifer Wishnie, IA; Raquel Wong, HI.

The Committee met on Tuesday October 17, 2017 at the Town and Country Hotel in San Diego, California from 8:00 a.m. to 12:10 p.m. There were 25 members and 28 guests present. Introductions and housekeeping items including a review of the committee's mission were covered by Harry Snelson, who chaired the Committee in place of Dr. Lisa Becton this year. There was one 2016 resolution reviewed.

### **Presentations and Reports**

#### **Modeling the Transboundary Survival of Foreign Animal Disease and Endemic Disease Pathogens in Contaminated Feed Ingredients**

Scott Dee, Pipestone Veterinary Services

Dr. Dee presented a summary of his research in the area of modeling the transboundary survival of foreign animal disease and endemic pathogens via contaminated feed ingredients.

Foreign animal disease (FAD) surrogate project:

The purpose was to evaluate the transboundary survival of viral pathogens in feed ingredients shipped via both trans-Pacific and trans-Atlantic routes. Twelve viruses including both endemic pathogens and FAD surrogates were tested. Trans-Atlantic and Trans-Pacific shipping conditions were simulated.

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Various feed ingredients were tested with positive results (VI and Bioassay were performed) in at least one type of feed ingredient for “foot-and-mouth disease (FMD)” Senecavirus A [SVA]), African swine virus (ASFV), “swine vesicular disease virus (SVDV)” (porcine sapelovirus [PSV]), porcine epidemic diarrhea vaccine (PEDV), “vesicular exanthema of swine virus (VESV)” (feline calicivirus [FCV]), porcine circovirus type 2 (PCV2), porcine reproductive and respiratory syndrome virus (PRRSV 174), and “pseudorabies (PRV)” (Bovine herpesvirus-1 [BHV-1]). Influenza A virus in swine (IAV-S), “classical swine fever virus (CSFV)” (Bovine viral diarrhea virus [BVDV]), “Nipah virus (NIV)” (Canine distemper virus [CDV]), and vesicular stomatitis virus (VSV) did not survive in any of the tested situations.

Conclusions: Viruses can survive in feed but survival was highly variable. Certain ingredients enhanced viral survival while others did not. Other than with ASFV, a feed matrix appears to enhance survival of viruses.

Discussion: Suggestions for further work include looking at oral infectious dose of viral pathogens in feed and determining appropriate mitigation strategies. There is also a need to have further discussion about raising awareness of this risk factor, sourcing ingredients according to country of origin health status and collaboration across global ag industries.

Follow up work that will be undertaken includes a mitigation study funded by Swine Health Information Center (SHIC) and the industry.

### **USDA Swine Health Program Update**

Tom Ray, USDA-APHIS-VS

Dr. Ray presented an update on USDA Swine Health Programs and issues surrounding swine disease surveillance. Classical swine fever (CSF) and pseudorabies virus (PRV) testing funding of target laboratories has been reduced from 22 to ten National Animal Health Laboratory Network (NAHLN) laboratories. Changes to PRV and Swine Brucellosis Surveillance programs include a reduction in the number of slaughter samples collected along with further refinement and targeting of sample collection including from certain states as well as higher risk samples. Oral fluids validation testing is also in progress and the hope is to have something more concrete within the next year.

### **USDA Influenza Surveillance Program Update**

Ellen Kasari, USDA-APHIS-VS

Dr. Kasari presented an update on the USDA Influenza Surveillance Program. The presentation provided current information on data from the swine influenza virus (SIV) plan and also highlighted other reporting initiatives including swine enteric coronavirus diseases (SECD), Trichinella, and Enhanced Passive Surveillance. A brief discussion of monitoring of feral swine was also included.

### **Swine Health Information Center Update**

Paul Sundberg, Swine Health Information Center

Dr. Sundberg presented a summary of activities and gave an update on the Swine Health Information Center. Activities include continuing work on virus survival, transmission, and mitigation in feed ingredients as well as a project focused on establishing the viability of monitoring dust samples at feed processing plants, supporting veterinary diagnostic laboratory (VDL) data standardization, domestic disease monitoring and risk prediction tools, and international disease monitoring efforts. An update on the swine disease matrix and associated projects was also given. Swine Health Information Center (SHIC) is also continuing to support the Morrison Swine Health Monitoring Project. A summary of a meeting sponsored by Institute for Infectious Animal Diseases (IIAD) at Texas A&M University focused on biosurveillance was also discussed. SHIC also highlighted efforts in the area of response including serving as a supplemental source of funding for diagnostic investigations as well as supporting oral fluids and other testing needs. All information can be viewed at [www.swinehealth.org](http://www.swinehealth.org).

### **Industry Emerging Disease Preparedness Update**

Patrick Webb, National Pork Board

Dr. Webb presented a summary and update of the Industry Emerging Disease Preparedness Plan.

#### **Swine Disease Response Council (SDRC):**

In 1998 USDA published a final report of the Swine Futures Project (SFP) which “represented a unique partnership between industry and government to develop a shared vision of future industry service needs and how to best address those needs collaboratively” (Swine Futures Project, Final Report, page iii, USDA APHIS 91-51-048). The report included a chapter on identifying and responding to Emerging Animal Issues (EAI’s) of which emerging swine production diseases (ESPD) are a subset. The recommendations from the SFP were to establish a system for the rapid detection of emerging animal issues and develop a collaborative process to respond to emerging animal issues.

The pork industry has implemented through the Swine Health Information Center (SHIC) and the SDRC a standardized process that coordinates state-federal-industry cooperative efforts to identify, characterize, prioritize and respond to ESPD of concern. Identification, characterization and prioritization of ESPD’s can currently be facilitated by the SHIC and USDA’s Risk Assessment Unit (RIU) within the Center for Epidemiology and Animal Health. The SDRC is an industry led cooperative effort between industry and state/ federal animal health officials to facilitate development of response recommendations after the detection of an ESPD of concern to the pork industry.

The Council is made up of pork producers, swine veterinarians and State Animal Health Officials (SAHOs) with USDA-VS serving and advisory role. The Council met for the first time in June of 2017. The first objective of the

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meeting was to increase member's knowledge of the ESPD plan including disease identification, investigation, characterization, communications and response actions. The second objective was to apply the knowledge using historical emerging disease outbreaks (porcine circovirus type 2 [PCV2], porcine epidemic diarrhea vaccine [PEDV] and Senecavirus A [SVA]) as test cases for the emerging swine production diseases (ESPD) plan.

If the determination is made to activate the SDRC, the members will be notified, and regular communications initiated. The Council provides a mechanism for shared analysis and development of recommendations for actions. Recommendations do not carry regulatory authority however, development of the recommendations will occur with input from regulators familiar with the industry. The SAHO from the state(s) in which cases have been identified will be included in the development of recommendations. Additionally, the State Executive of the State Pork Producers Association in the state(s) will also be included on the SDRC. The SHIC and other state, federal, diagnostic laboratory, academic, and industry subject matter experts will be included based on need.

The SDRC will meet, at minimum, every year to consider emerging disease issues that are relevant to swine health in the United States, discuss and practice response scenarios or, as needed, to make recommendations for response to an ESPD suspected or identified in the United States. Funding for meetings and calls of the SDRC will be provided by the industry organizations.

### **Secure Pork Supply Update:**

Foot-and-mouth disease (FMD), classical swine fever (CSF) and African swine fever (ASF) are three animal diseases not currently present in the United States. If these diseases are discovered in animal populations in the U.S., federal and state animal health officials will enact disease control measures to prevent spread to other areas of the country. While these diseases are not of human health significance and do not affect food safety, the measures put in place to protect animal health will affect the ability of animals to move for production purposes and to harvest.

A primary mechanism used by officials to contain diseases quickly is creation of one or more disease control areas. When implemented, all farms will be quarantined, and all movements will stop for susceptible livestock in that area. It is highly likely that disease control areas will contain many more farms that do not have the disease but are affected by the disease control measures. Animal movements will not resume until officials can link together premises information, animal movements and the disease status for all farms in the area. The challenge is that this process will take a long time unless a mechanism to speed up the process is in place prior to an outbreak. That's why the Secure Pork Supply (SPS) plan, a swine business continuity plan for the U.S. pork industry, has been developed.

USDA's Veterinary Services was the primary financial underwriter of the SPS plan's development with secondary funding coming from the Pork Checkoff. The SPS is a voluntary, workable business continuity plan for pork

## SWINE

premises located in disease control areas that is credible to regulatory officials.

Key components of the SPS plan include standardized, controlled, and secure sharing of premises, movement and laboratory data with officials and implementation of standardized plans and practices for site biosecurity and disease surveillance. Having the SPS plan in place prior to a foreign animal disease (FAD) outbreak will facilitate better coordination and communication with animal health officials to speed up a response and will support continuity of operations for pork producers and associated industries.

The National Pork Board (NPB) is currently working with the Center for Food Security and Public Health (CFSPH) to develop a producer implementation guide slated for completion in late 2017. A SPS implementation task force will provide input into the implementation process. An educational outreach strategy to help build awareness of the SPS plan and how its implementation would work is under development for a 2018 launch. Likewise, a formal enrollment process and the technology that will deliver permissioned producer data to officials for review prior to permitting movements also is under development. The basic system should be available in the fall of 2018.

The SPS plan functions as an industry-driven cooperative approach to risk management. Having a high level of participation will improve preparedness, improve situational awareness, and enhance recovery efforts. Most importantly, implementing the SPS plan will stabilize the nation's agriculture sector and pork industry by allowing for the supply of wholesome pork and pork products to continue to reach U.S. pork customers around the world with limited interruption.

### **Senecavirus A virus Updates and Discussion: Recommendations to reduce disruptions to commerce in the pork industry**

Bret Marsh, Indiana Board of Animal Health

Dr. Marsh presented a report from the state animal health official (SAHO) Senecavirus A (SVA) working group. The group included representatives from production, private veterinary practice, packers, industry organizations, markets, laboratories, SAHOs, and USDA Veterinary Services (VS). Education on recognizing and reporting vesicular lesions, importance of tracing animals and premise identification numbers (PINs) was emphasized. Some of the recommendations from this group for traceability purposes included requiring premise registration and validate all sites associated with swine, require PIN tags, enforce animal identification (ID) rules, require electronic certificates of veterinary inspection (eCVI's) when a CVI is required, electronically encode premID's into laboratory accessions, and share data electronically among states. Suggested diagnostic needs include developing rapid pen-side tests for FMD diagnosis, developing algorithms for testing, and utilizing National Animal Health Laboratory Network (NAHLN) laboratories for diagnosis. Research needs were highlighted as well with some being addressed currently and some still outstanding. Suggested

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policy revisions included revisions surrounding sample collection protocols at both sites and markets/slaughter and surrounding the reshipment of animals. Suggestions for making response more rapid were also discussed.

### **SVA Industry Efforts**

Patrick Webb, National Pork Board

Dr. Webb presented an update on industry efforts regarding Senecavirus A (SVA). Research priorities have been developed and a call has gone out to address these. Producer education efforts have been undertaken to help raise producer awareness for lesion recognition and understanding of reporting procedures as well as to improve biosecurity measures in general for prevention.

### **USDA Update on SVA**

Julianna Lench, USDA-APHIS-VS

Dr. Lench presented an update on field epidemiology studies regarding swine vesicular foreign animal disease investigations. A summary of both farm/site and market/slaughter epidemiological surveys assessing case numbers and trends were discussed.

### **Committee Business:**

No old business was brought forward.

### **New Business:**

Three Resolutions were presented and approved by the Committee:

1. State Animal Health Official and Submitting Veterinary Diagnostic Lab Access to Veterinary Diagnostic Laboratory Records Reported from the National Animal Health Laboratory Network Labs and the National Veterinary Services Laboratory to the United States Department of Agriculture's Laboratory Messaging Service
2. Adequate Funding for Prevention, Diagnosis, and Response for Foreign Animal Disease Outbreaks
3. A Nationally-Coordinated Bio-Surveillance System that Rapidly Delivers Real-Time Data for Analysis to Improve Foreign Animal Disease Detection

Dr. Wagstrom moved to adjourn Webb seconded.

## **COMMITTEE ON WILDLIFE AND CAPTIVE WILDLIFE**

Chair: Colin Gillin, OR

Vice Chair: Peregrine Wolff, NV

Gary Anderson, KS; Paul Anderson, MN; Kay Backues, OK; Bill Barton, ID; Karen Beck, NC; Warren Bluntzer, TX; Tom Bragg, NE; Rhonda Brakke, IA; Paige Brock, SC; Beth Carlson, ND; Christine Casey, GA; Shelly Chavis, IN; Matt Cochran, TX; Tim Condict, TX; Walter Cook, TX; Joseph Corn, GA; Donald Davis, TX; Thomas DeLiberto, CO; Jacques deMoss, MO; Barbara Determan, IA; Linda Detwiler, NJ; Bob Dittmar, TX; Mark Drew, ID; Roger Dudley, NE; Hank Edwards, WY; Dee Ellis, TX; James Evermann, WA; Anna Claire Fagre, CO; Heather Fenton, GA; John Fischer, GA; Richard French, NH; Francis Galey, WY; Tam Garland, TX; Donna Gatewood, IA; Robert Gerlach, AK; Paul Gibbs, FL; Samantha Gibbs, FL; Colin Gillin, OR; Linda Glaser, MN; Michael Greenlee, WA; Nicholas Haley, AZ; Rod Hall, OK; Greg Hawkins, TX; Julie Helm, SC; Kristi Henderson, IL; Melinda Hergert, TX; Warren Hess, IL; Linda Hickam, MO; Maggie Highland, WA; Robert Hilsenroth, FL; Bruce Hoar, WY; Donald Hoenig, ME; Dennis Hughes, NE; Noah Hull, WY; David Hunter, MT; Gabe Jenkins, KY; Isabel Jimenez, NY; Beth Johnson, KY; Anne Justice-Allen, AZ; Alison Keggan, NY; Susan Keller, ND; Diane Kitchen, FL; Patrice Klein, DC; Terry Klick, OH; Darlene Konkle, WI; Todd Landt, IA; T.R. Lansford, TX; Delorias Lenard, SC; Anne Lichtenwalner, ME; Rick Linscott, ME; Mitch Lockwood, TX; Jim Logan, WY; Linda Logan, TX; Lindsey Long, WI; Karen Lopez, DE; Travis Lowe, MN; Mark Luedtke, MN; Margie Lyness, GA; David Marshall, NC; Chuck Massengill, MO; James Maxwell, WV; Bob Meyer, CO; Andrea Mikolon, CA; Myrna Miller, WY; Mendel Miller, SD; Michele Miller, WI; Eric Mohlman, NE; Yvonne Nadler, IL; Alecia Naugle, MD; Cheryl Nelson, KY; Danielle Nelson, WA; Sandra Norman, IN; Gary Olson, MN; Mitchell Palmer, IA; William (Steve) Parker, GA; Janet Payeur, IA; William Pittenger, MO; Kate Purple, TN; Jennifer Ramsey, MT; Jack Rhyan, CO; Justin Roach, OK; Jonathan Roberts, LA; Susan Rollo, TX; Mark Ruder, GA; Shawn Schafer, OH; Jack Schlater, IA; David Schmitt, IA; Dennis Schmitt, MO; Krysten Schuler, NY; Brant Schumaker, WY; Marc Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Allison Siu, AL; Iga Stasiak, KY; Kelly Straka, MI; Manoel Tamassia, NJ; Patrick Tarlton, TX; Robert Temple, OH; Lee Ann Thomas, MD; Beth Thompson, MN; Brad Thurston, IN; Tracy Tomascik, TX; Susan Trock, GA; Michele Walsh, ME; Skip West, OK; Margaret Wild, CO; Richard Willer, HI; Michelle Willette, MN; John Williams, MD; William Wilson, KS; Kyle Wilson, TN; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN; Peregrine Wolff, NV; Mary Wood, WY; Marty Zaluski, MT; Glen Zebarth, MN.

The Committee met on October 17, 2017 at the Town and Country Hotel in San Diego, California from 1:00-6:30 p.m. There were 55 members and 31 guests present. The new structure of the two committees (Committee on Wildlife Disease and Committee on Captive Wildlife and Alternative Livestock) was explained.

## REPORT OF THE COMMITTEE

The Vice-Chair introduced our first speaker, Jennifer Bloodgood who was this year's recipient of the USAHA student travel award. This monetary award is matched each year by the American Association of Wildlife Veterinarians (AAWV).

### Presentations and Reports

#### **From Bloodwork to Microbiome: How nutrition plays a role in health and recovery of rehabilitating green sea turtles**

Jennifer Bloodgood, University of Georgia

Sonia Hernandez, Lisa Hoopes, Thomas Waltzek, Patrick Thompson, Terry Norton)

The study of the gastrointestinal microbiota (GIM) is a growing area of research because of its complex association with health. The GIM of green sea turtles (*Chelonia mydas*) has been shown to change with the ontogenetic shift from pelagic to neritic habitats and the associated shift from an omnivorous to a primarily herbivorous diet of seagrass and algae. However, the effect of diet offered in rehabilitation facilities, and its implications for release of successfully rehabilitated animals, remains unstudied. Food items high in animal protein (e.g. fish) are often offered early in rehabilitation to combat poor appetite and emaciation, but this may result in gastrointestinal pathologies and obesity. To understand the impact of diet on the GIM, we analyzed fecal samples from green sea turtles in rehabilitation (N=19) at the Georgia Sea Turtle Center on Jekyll Island, Georgia. Samples were collected at admission (fed primarily animal protein diets), mid-rehabilitation (consumed at least 25% vegetables), and recovery (consumed at least 75% vegetables).

Fecal samples were extracted and sequenced using the Illumina MiSeq next generation sequencing platform. The dominant phyla across all timepoints were Firmicutes and Bacteroidetes. At admission, turtle GIMs were dominated by Firmicutes (55.0%) with less Bacteroidetes (11.1%), while recovery samples were primarily Bacteroidetes (45.3%) and much less Firmicutes (32.5%). The relative abundance of Firmicutes in admission animals is likely reflective of their herbivorous wild diet, as this phylum plays an important role in metabolizing plant polysaccharides. An increase in the bile-tolerant Bacteroidetes has been noted with other species fed animal-based diets. Despite turtles being switched to an herbivorous diet during the rehabilitation period, the GIM at recovery still reflected the phyla expected of animals consuming a seafood diet, likely because of their low metabolic rate. When successfully rehabilitated animals are released, a higher ratio of Bacteroidetes to Firmicutes in the GIM may result in underutilization of wild diet items. The role of the GIM in health is only recently being investigated, and it is important to consider impacts that rehabilitation diets can have to ensure individuals are released with optimum probability of survival.



### **Update on the U.S. Interagency Surveillance for Highly Pathogenic Avian Influenza in Wild Birds**

Thomas.J.DeLiberto, USDA-APHIS, Wildlife Services (WS), National Wildlife Research Center (NWRC)

A unique A(H5Nx) clade 2.3.4.4 highly pathogenic avian influenza virus (HPAIV) was detected in North America in late 2014. Motivated by both the alarming spread of new H5 reassortant viruses in Asia and Europe as well as by the detection of HPAIV in both domestic poultry in Canada, and in wild and captive birds in Washington State, initial HPAIV surveillance was conducted among wild birds in the Pacific Flyway of the United States. This effort was later expanded to include the Central and Mississippi Flyways. Positive HPAI H5 findings from wild waterfowl samples suggested that while some of these species exhibited no detectable morbidity or mortality, clinical disease was documented for other wild bird species similarly infected. Also, losses in U.S. domestic poultry were unprecedented. In July 2015, state and federal agencies initiated a national surveillance effort to provide information to guide management actions to address some of the issues associated with HPAIVs in birds. This includes risks to commercial poultry, backyard poultry, game bird farms, wild birds, wild bird rehabilitation facilities, falconry birds, and captive bird collections in zoos/aviaries. Specific objectives of the plan were to: 1) determine the distribution of influenza viruses of interest in the U.S.; 2) detect spread of influenzas of interest to new areas of concern; and 3) provide a flexible surveillance framework that can be modified to monitor wild waterfowl populations for avian influenza, detect reassortant avian influenza viruses, and estimate apparent prevalence of important influenzas once detected in an area of concern. During 2015 and 2016, surveillance data indicated that A(H5Nx) clade 2.3.4.4 HPAIV was circulating in wild birds at about a 1% prevalence each year. No HPAI detections have been detected in wild birds since December 2016. An update on the current year's wild bird HPAIV surveillance program will be provided.

### **Disease Surveillance in Feral Swine**

Tom Gidlewski, USDA-APHIS, Wildlife Services (WS), National Wildlife Research Center (NWRC)

Feral swine (*Sus scrofa*) have been repeatedly introduced to locations around the world. Aided by both an adaptable biology and deliberate introductions by people, the range of invasive feral swine in the United States has expanded from 17 to 38 states over the past 30 years. The swine's generalist diet combined with high population densities can complicate efforts to conserve threatened and endangered species, and losses from crop damage and livestock predation in the United States alone are estimated to be more than \$2.5 billion. In addition, feral swine can be a reservoir for multiple pathogens, some of which are zoonotic. Management responses to mitigate these threats by reducing population numbers face resistance from groups that value feral swine for subsistence or sport hunting, which results

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in complicated policy actions that are extremely divisive and difficult to implement.

USDA-APHIS-WS, NWDP has been conducting disease surveillance in feral swine since 2006. In 2014 the Feral Swine Damage Management Program was initiated to mitigate feral swine damage. The two programs are now partners in feral swine disease surveillance. This originally started out as one of the surveillance streams for Classical Swine Fever (CSF) and has expanded to cover many other diseases. It has been discovered that serious diseases eradicated from domestic swine such as Brucella suis and pseudorabies (PRV) persist in these wild pigs as well as toxoplasmosis and trichinosis. There is widespread serologic evidence of leptospira exposure. Surveillance has been initiated to detect evidence of exposure to porcine epidemic diarrhea (PED) as well as Seneca Valley virus (SVV).

These animals are excellent samplers of the environment and as such they can be important sentinels of disease or environmental conditions. This is especially important for transboundary diseases such as African swine fever (ASF), classical swine fever (CSF) and food and mouth disease (FMD).

### **Chronic Respiratory Infections in Bighorn Sheep**

Karen Fox, Colorado Parks and Wildlife

Mary Wood, Wyoming Game and Fish Department

Respiratory disease remains a significant concern for bighorn sheep (*Ovis canadensis*) management westwide. Here we provide data from captive and free-ranging populations on chronic respiratory infections in bighorn sheep. Further consideration is needed on the relative role of pathogens and diagnostic techniques in identifying chronic respiratory infections in bighorn sheep.

### **BVDV in Captive Bighorn Sheep**

Karen Fox, Colorado Parks and Wildlife

In August 2017, the Colorado Parks and Wildlife Foothills Wildlife Research Facility experienced an outbreak of bovine viral diarrhea in captive Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). The predominant clinical sign was hemorrhagic diarrhea, and necropsy confirmed necrohemorrhagic typhlocolitis. Of 14 animals with detectable clinical signs, six died. For all six mortalities, serum neutralization demonstrated seroconversion to bovine viral diarrhea virus (BVDV) and BVDV was detected by polymerase chain reaction (PCR) and/or immunohistochemistry (IHC) in tissues post-mortem. This outbreak provides the opportunity for description of BVD in bighorn sheep and for discussion of probable source(s) of exposure.

### **Bovine TB surveillance in Indiana Deer: The end is no longer clear**

Nancy Boedeker, Indiana Department of Natural Resources

The Indiana Department of Natural Resources (IDNR), with support from our partners at the Indiana State Board of Animal Health, USDA-APHIS,

Veterinary Services (VS), and USDA-APHIS, Wildlife Services (WS), has been conducting surveillance for bovine tuberculosis in white-tailed deer in southeastern Indiana since 2009, after the disease was identified from cattle and elk farms in this area. In 2015, after affected farms had been depopulated and there had been several years with no new cases detected in livestock and no cases ever detected in wild deer, the plan had been for surveillance in deer to be brought to an end.

However, the discovery in 2016 of new cases of bovine tuberculosis in cattle from the same region, including at one property that is not yet fully depopulated, elicited a dramatic change to that plan. Surveillance efforts in deer were significantly increased in 2016 and 2017. So far, no hunter-harvested deer have tested positive, but one wild deer removed during wildlife culling from the affected properties was culture positive for *Mycobacterium bovis*. Whole genome sequencing strongly suggests that all positive bovine tuberculosis cultures traced to or identified in Indiana since 2008, both in livestock and in the single wild deer, were infected with the same strain and that infection in the wild deer occurred due to spillover from livestock. The partially depopulated farm remains a potential source of infection to wildlife.

The IDNR continues to put significant resources toward bovine tuberculosis surveillance in deer. However, to continue surveillance at similar levels into the future will present real challenges as other IDNR priorities, including the need for expanded surveillance for chronic wasting disease (CWD) in wild deer, place increasing demands on limited resources.

### **Update on 2017 Hemorrhagic Disease Activity in Wild Ruminants**

Mark G. Ruder, Clara Kienzle, Rebecca L. Poulson, and David E. Stallknecht, SCWDS, University of Georgia

Annually, the Southeastern Cooperative Wildlife Disease Study (SCWDS) receives tissue samples from throughout the United States from wild ruminants suspected to have orbiviral hemorrhagic disease. Virus isolation and identification is performed and findings from the 2016 and 2017 transmission seasons are reported here. During 2016, 49 viruses were isolated from 161 tissue samples, representing 6 species of wild ruminant (138 white-tailed deer, 9 mule deer, 5 pronghorn, 4 bighorn sheep, 4 elk, and 1 nilgai) from 22 states. Isolations of epizootic hemorrhagic disease virus (EHDV)-1 (1), EHDV-2 (27), EHDV-6 (6), bluetongue virus (BTV)-2 (1), BTV-3 (10), BTV-13 (1), and BTV-17 (3) were made from white-tailed deer or mule deer (see Table). As of October 6, 2017, there have been 110 viruses isolated from 192 tissue samples, representing 22 states and 6 species (185 white-tailed deer, 2 mule deer, 1 elk, 1 bighorn sheep, 1 cow, and 1 domestic goat). To date, isolations of EHDV-1 (2), EHDV-2 (92), EHDV-6 (8), BTV-2 (1) and untyped pending (7) were made from white-tailed deer or cattle (see Table).

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**2016 SCWDS EHDV & BTV Diagnostics**

Virus Isolations

<b>STATE</b>	<b>SPECIES</b>	<b>VIRUS</b>
Arkansas	white-tailed deer	EHDV-2
Florida	white-tailed deer	EHDV-6
Georgia	white-tailed deer	EHDV-2
		BTV-13
Illinois	white-tailed deer	EHDV-6
Kansas	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	BTV-2
		BTV-3
		EHDV-6
Nebraska	white-tailed deer	BTV-17
	white-tailed deer	EHDV-2
	mule deer	
New Mexico	mule deer	EHDV-2
		EHDV-6
North Carolina	white-tailed deer	EHDV-2
South Carolina	white-tailed deer	EHDV-2
Virginia	white-tailed deer	BTV-3
		EHDV-2
West Virginia	white-tailed deer	BTV-3
		EHDV-1
		EHDV-2

**2017 SCWDS EHDV & BTV Diagnostics**

Virus Isolations

*as of October 6, 2017*

<b>STATE</b>	<b>SPECIES</b>	<b>VIRUS</b>
Alabama	white-tailed deer	EHDV-6
Arkansas	white-tailed deer	EHDV-1
Connecticut	white-tailed deer	EHDV-6
Kansas	white-tailed deer	EHDV-1
		EHDV-2
		EHDV-6
Kentucky	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	BTV-2
Maryland	white-tailed deer	EHDV-2
		EHDV-6
Michigan	white-tailed deer	EHDV-6
Mississippi	white-tailed deer	EHDV-2
Nebraska	white-tailed deer	EHDV-2
North Carolina	white-tailed deer	EHDV-2
Ohio	white-tailed deer	EHDV-2

## WILDLIFE AND CAPTIVE WILDLIFE

	COW	
Pennsylvania	white-tailed deer	EHDV-2 EHDV-6
Tennessee	white-tailed deer	EHDV-2
Virginia	white-tailed deer	EHDV-2
West Virginia	white-tailed deer	EHDV-2 EHDV-6

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During 2017, SCWDS has been supporting multiple state wildlife agencies in the investigation of a hemorrhagic disease outbreak that appears to be centered on the Cumberland Plateau physiographic region. The outbreak is primarily associated with EHDV-2 and extends from the Alabama-Tennessee border north to Ontario. Investigation of the outbreak is ongoing. Although the 2017 outbreak does not appear to be as geographically widespread as the severe outbreaks observed during 2007 and 2012, it represents the third prominent outbreak in parts of the Northeast over the past ten years. The continuing trend of increased frequency and intensity of hemorrhagic disease in this part of the country continues to be a concern for wildlife managers. An additional noteworthy observation from 2017 was the isolation of EHDV-6 from deer in Alabama, Connecticut, Pennsylvania, and West Virginia. EHDV-6 had not been previously documented in these states and the Connecticut isolate represents the northeastern most detection of this serotype in the United States. Further, BTV-2, a serotype historically only sporadically isolated from white-tailed deer, was detected in Louisiana in both 2016 and 2017.

### Revisiting Brucellosis in the Greater Yellowstone Area

Dustin Oedekoven, South Dakota Animal Industry Board

The following is the “Summary” chapter excerpted from the report referenced below. Readers are encouraged to download the entire report for additional information.

SOURCE: National Academies of Sciences, Engineering, and Medicine. 2017. *Revisiting Brucellosis in the Greater Yellowstone Area*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24750>.

#### Summary

#### BACKGROUND

Brucellosis is a nationally and internationally regulated disease of livestock with significant consequences for animal health, public health, and international trade. In cattle, the primary cause of brucellosis is *Brucella abortus*, a zoonotic bacterial pathogen that also affects wildlife, including bison and elk. While *B. abortus* can cause both acute febrile and chronic relapsing brucellosis in humans, it is no longer a major human health concern in the United States due largely to public health interventions such as the pasteurization of milk and the successful efforts of the Brucellosis Eradication Program that began in 1934.

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As a result of the decades long eradication program, most of the country is now free of bovine brucellosis. The Greater Yellowstone Area (GYA), where brucellosis is endemic in bison and elk, is the last known *B. abortus* reservoir in the United States. The GYA is home to more than 5,500 bison that are the genetic descendants of the original free-ranging bison herds that survived in the early 1900s, and home to more than 125,000 elk whose habitats are managed through interagency efforts, including the National Elk Refuge and 22 supplemental winter feedgrounds maintained in Wyoming.

Since the National Research Council (NRC) issued the 1998 report *Brucellosis in the Greater Yellowstone Area*, brucellosis has re-emerged in domestic cattle and bison herds in the GYA; from 1998-2016, 22 cattle herds and five privately-owned bison herds were affected in Idaho, Montana, and Wyoming. During the same time period, all other states in the United States achieved and maintained brucellosis class-free status. A 2010 interim rule to regionalize brucellosis control enabled the three GYA states to create designated surveillance areas (DSAs) to monitor brucellosis in specific zones and to reduce the economic impact for producers in non-affected areas. However, brucellosis has expanded beyond the original DSAs, resulting in the outward adjustment of DSA boundaries. Although most cattle in the GYA are vaccinated with *B. abortus* strain RB51, it does not necessarily prevent infection while it does reduce abortions. The increase in cattle infections in the GYA, coupled with the spread in wildlife, has been alarming for producers in the area; moreover, the risk of additional spread from movement of GYA livestock to other areas across the United States is increasing due to the lack of guidance and surveillance, with the potential for spread and significant economic impact outside the GYA.

### **SCOPE AND APPROACH TO THE REVIEW**

The 1998 NRC report reviewed the scientific knowledge regarding *B. abortus* transmission among wildlife—particularly bison and elk—and cattle in the GYA. Given the scientific and technological advances in two decades since that first report, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) requested that the National Academies of Sciences, Engineering, and Medicine (the National Academies) revisit the issue of brucellosis in the GYA. The primary motivation for USDA-APHIS in requesting the study was to understand the factors associated with the increased transmission of brucellosis from wildlife to livestock, the recent apparent expansion of brucellosis in non-feedground elk, and the desire to have science inform the course of any future actions in addressing brucellosis in the GYA. Although USDA-APHIS commissioned the study to inform its brucellosis eradication strategy, there are additional federal and state agencies that each have authority across state, federal, private, and tribal lands that course through the GYA. Also, Yellowstone National Park (YNP) is a national icon, American bison were recently designated as the national mammal, and the subject of brucellosis is of interest to many groups with economic interests in wildlife and livestock in the GYA.

### **CONCLUSIONS AND RECOMMENDATIONS**

## A New Focus on Elk

In tracing the genetic lineage of *Brucella* across the ecosystem and among species, elk are now recognized as a primary host for brucellosis and have been the major transmitter of *B. abortus* to cattle. All recent cases of brucellosis in GYA cattle are traceable genetically and epidemiologically to transmission from elk, not bison. The seroprevalence of brucellosis in elk in some regions has been increasing from what were historically low levels, and data strongly suggest that elk are able to maintain brucellosis infection within their populations that have limited to no direct contact with the feedgrounds or with infected bison. Direct contact of elk with cattle is more prevalent than contact of cattle with bison. As a result, the risk of transmission from elk to cattle may be increasing.

In contrast, there have been no cases of transmission from GYA bison to cattle in the 27 herds infected with brucellosis since 1998 despite no change in the seroprevalence of brucellosis in bison. This is likely a result of bison management practices outlined in the Interagency Bison Management Plan (IBMP) combined with fewer cattle operations in the GYA region where bison leave YNP.

Ecological changes within the GYA since 1998 have shifted the dynamics of wildlife populations.

The reintroduction of wolves and increases in grizzly bear numbers have impacted the density and distribution of elk. Elk populations have expanded on the periphery of the GYA but have decreased inside YNP. The rising number of private landowners has changed how land is used around national parks, with private lands increasingly serving as refugia for elk from hunting.

**With elk now viewed as the primary source for new cases of brucellosis in cattle and domestic bison, the committee concludes that brucellosis control efforts in the GYA will need to sharply focus on approaches that reduce transmission from elk to cattle and domestic bison (Conclusion 1).**

**Recommendation 1: To address brucellosis in the GYA, federal and state agencies should prioritize efforts on preventing *B. abortus* transmission by elk. Modeling should be used to characterize and quantify the risk of disease transmission and spread from and among elk, which requires an understanding of the spatial and temporal processes involved in the epidemiology of the disease and economic impacts across the GYA. Models should include modern, statistically rigorous estimates of uncertainty.**

### **Adopting an Active Adaptive Management Approach**

Many brucellosis management efforts implemented since the 1998 report may appear to have taken an adaptive management approach; however, those efforts have not followed the basic tenet of employing an *active* approach. More specifically, individual management actions were not designed or established to allow for scientific assessment of effectiveness, which is a central tenet of active adaptive management. Management activities are typically conducted as hypothesis testing, the outcome of which

directs subsequent decisions and actions toward the ultimate goal. In the absence of carefully designed management actions that include experimental controls, it is difficult to determine the effectiveness of a particular practice, leading to a slower learning process.

**Recommendation 2: In making timely and data-based decisions for reducing the risk of *B. abortus* transmission from elk, federal and state agencies should use an active adaptive management approach that would include iterative hypothesis testing and mandated periodic scientific assessments. Management actions should include multiple, complementary strategies over a long period of time, and should set goals demonstrating incremental progress toward reducing the risk of transmission from and among elk.**

#### **Adaptive Management Options to Reduce Risk**

**No single management approach can independently result in reducing risk to a level that will prevent transmission of *B. abortus* among wildlife and domestic species (Conclusion 2).** To consider any approach in isolation is to miss the bigger picture of a highly interconnected ecosystem and a broader understanding of various factors affecting risk that has evolved since 1998. While there are knowledge gaps that limit understanding of actual risk, the options below are possible adaptive management approaches to reduce risk of *B. abortus* transmission and to inform future risk management plans. These approach would need to be based on an integrated assessment of risk and costs, but do not necessarily need to be applied uniformly over space and time.

#### **Population Reduction**

Reducing the population size of cattle, bison, or elk are all likely to reduce the risk of brucellosis transmission to cattle by reducing the area of potential contact or the number of infected individuals in those areas, even if the disease prevalence in the wildlife hosts remains constant. However, each species has a constituency that would likely oppose any population reduction.

**Elk:** Reducing the elk population is an option for reducing the risk of transmission among elk, cattle, and bison. Unlike bison, transmission among elk appears to be influenced by density. **Thus, reducing elk group sizes and/or density may decrease elk seroprevalence over time, and potentially decrease the risk of elk transmission (Conclusion 3).**

Potential management approaches for elk population reduction include the following:

- **Hunting.** Hunting is currently used to control elk populations, with management unit population targets set as a balance of public demand and population goals. Hunting could also be used as a means of incentivizing targeted population reductions based on brucellosis risk. Additional and ongoing assessments of the efficacy of these approaches would be needed as part of an active adaptive management approach.



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- Contraception. GonaCon™ is an immunocontraceptive that targets high-risk females; contraception would need to be viewed as experimental in elk but, as in bison, there is potential in significantly reducing the elk population and prevalence of brucellosis in elk.
- Test and removal. Test and removal has been an invaluable part of the brucellosis eradication program for domestic species. As with domestic species, test and removal in elk would need to be part of an integrated program combined with other tools such as quarantine, herd management to reduce intra-herd transmission, and vaccination.

**Bison:** While the primary focus would be on elk, bison remain an important reservoir for brucellosis. If further reducing the prevalence of brucellosis in bison is desirable, these bison population control measures could potentially be considered:

- Removal of infected bison. Population reduction alone is not likely to reduce brucellosis prevalence in bison since transmission is frequency dependent rather than density dependent. **For this reason, if reduction of brucellosis prevalence is a goal, removal of bison for population management purposes will need to target brucellosis infected individuals, whenever possible (Conclusion 4).**
- Quarantine and relocation. Sufficient evidence is now available to also include separation and quarantine of test negative bison as a management action, allowing for the eventual relocation of GYA bison to other bison herds (including onto tribal lands).
- Targeted removal within YNP. While this option may not be politically, logistically, socially, or economically feasible, targeted removal of seropositive bison (which would be facilitated by the use of a pen-side assay) or high-risk bison (such as young, pregnant females) within YNP in the winter could reduce the need for large culls of bison populations that move outside YNP. This could also reduce the episodic swings in the bison population and winter emigrations from YNP that lead to large culls in some years.
- Bison genetics. Test and removal of bison provides a valuable opportunity to preserve genetic material and live cells for future use in establishing brucellosis negative and potentially disease resistant bison through cloning techniques.
- Contraception. Experimental and modeling results in bison suggest that contraception using a gonadotropin releasing hormone immunocontraceptive (i.e., GonaCon™) may help in reducing the prevalence of brucellosis. This approach targets high-risk females, preventing pregnancy and thus abortion and birthing events that increase risk of transmission through shedding of high numbers of bacteria.

### Intervention Options Within Feedgrounds

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The role of the National Elk Refuge and Wyoming elk supplemental winter feedgrounds in maintaining and propagating brucellosis in the GYA is a controversial topic. Feedgrounds have been useful for conservation and hunting purposes, and for separating elk from cattle. However, it is widely accepted that feedgrounds promote transmission of *B. abortus* among elk and are likely responsible for causing and maintaining elevated seroprevalence in those areas.

The potential options below for management interventions in feedgrounds could be further evaluated using an active adaptive management approach, with the interventions applied singularly or in combination.

- Balance the timing and use of feedgrounds. Data suggest that ceasing feeding earlier in the season on feedgrounds to encourage dispersal would result in less risk of infection among elk (and bison where intermixing occurs), because calving of elk would occur in a more natural environment away from the dense population present in feedgrounds.
- Feeding patterns on feedgrounds. Data suggest that feeding in checkerboard patterns and spreading feed more broadly appear to reduce elk to elk contact, and therefore potentially reduce transmission risk.
- Test and removal on feedgrounds. The Muddy Creek feedground pilot project provided an example of temporarily reducing seroprevalence of brucellosis through test and removal of infected female elk. Its use would be limited to very specialized conditions (e.g., in reducing feedground density) as large populations appear to be able to maintain a brucellosis reservoir outside the feedgrounds.
- Contraception in elk. The feedgrounds provide an opportunity to more easily access female elk for contraceptive application.
- Removal of aborted fetuses. Abortion on feedgrounds offers an opportunity to remove aborted fetuses on a daily basis and to disinfect the abortion site using an appropriate disinfectant, thus reducing the likelihood of transmission to other elk.
- Other future interventions. Given the enormity of the challenge in accessing elk in the vastness of the open West, feedgrounds offer a unique opportunity to intervene in a relatively smaller land area where elk are concentrated and capture is easier, less dangerous for personnel, and less costly.

### **Incremental Closure of Feedgrounds**

Closure of feedgrounds appears to be an obvious approach to control brucellosis in the GYA, but there are impacts of feedground closure that will need to be considered and assessed. First, while there is still some uncertainty, scientific evidence suggests that brucellosis in elk is self-sustaining in some areas without continuous reintroduction of infected feedground elk. If future work continues to support this conclusion, it is possible that closure of feedgrounds would not have any impact on

brucellosis prevalence in more remote elk populations away from the feedgrounds. Closure of feedgrounds would, however, potentially reduce the “seeding” of new areas with infected elk where a reservoir does not currently exist. Second, anecdotal evidence suggests that feedgrounds reduce exposure of cattle to infected elk during the high-risk period of abortion or calving. Observational data to support this notion are weak at present. Thus, an unintended outcome of closing feedgrounds could be increased exposure of cattle to infected elk if cattle are turned onto grazing areas at the time that elk are calving. **The weight of evidence nonetheless suggests that reduced use or incremental closure of feedgrounds could benefit elk health in the long-term, and could reduce the overall prevalence of brucellosis in elk on a broad population basis (Conclusion 5).**

The closure of feedgrounds is likely to bring increased short-term risk due to the potential for increased elk-cattle contact while the seroprevalence in elk remains high. In the longer term, closing feedgrounds may result in reduced elk seroprevalence. **Reduced use or incremental closure of feedgrounds is not a stand-alone solution to control of brucellosis in the GYA, and will need to be coupled with other management actions to address the problem at a systems level (Conclusion 6).**

**Recommendation 3: Use of supplemental feedgrounds should be gradually reduced. A strategic, stepwise, and science-based approach should be undertaken by state and federal land managers to ensure that robust experimental and control data are generated to analyze and evaluate the impacts of feedground reductions and incremental closure on elk health and populations, risk of transmission to cattle, and brucellosis prevalence.**

#### **Spatial and Temporal Separation**

One of the fundamental principles of infectious disease control is spatial and temporal separation of individuals and groups to reduce the risk of transmission. Bison management to prevent brucellosis transmission has been successful in part due to spatial and temporal separation from cattle, both because bison are largely contained within YNP and Grand Teton National Park, and when outside the parks they are managed to reduce cattle contact.

**Recommendation 4: Agencies involved in implementing the IBMP should continue to maintain a separation of bison from cattle when bison are outside YNP boundaries.**

Spatial and temporal separation also plays an important role in reducing transmission risk from elk. Separation of susceptible and infected animals during high-risk periods has been and should continue to be utilized as a risk reduction tool, and is further discussed in the report in the context of specific management approaches. National policy for responding to the identification of infected cattle and domestic bison herds includes time-tested approaches toward maintaining separation of infected and susceptible animals, including hold orders and quarantine during follow-up testing. These actions are valuable tools for reducing risk. Other options include the timing and use of

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grazing allotments, biosecurity measures, and hazing of elk. Removal of bison for population management purposes could target *B. abortus* infected individuals if further reducing the prevalence of brucellosis is a goal; however, until tools become available that would simultaneously allow for an eradication program in elk, additional aggressive control measures in bison seem unwarranted.

### **Testing, Surveillance, and Designated Surveillance Areas**

Regionalization is now a well-accepted approach to allow subnational disease containment without jeopardizing the disease status of an entire nation. The success of regionalization relies on robust risk assessment, knowledge of the location and extent of infected animals within and immediately outside the boundary of a control zone, and effective boundary management and enforcement.

The designated surveillance area (DSA) zoning concept is a valuable approach toward brucellosis control in the GYA. The successful use of DSAs is dependent on responsible and timely adjustments of DSA boundaries based on adequate surveillance, particularly of elk. There is no federal guidance for conducting wildlife surveillance outside of the DSA at a level required to monitor the geographic expansion of brucellosis in elk. Each state independently conducts wildlife surveillance outside of the DSA, with no uniform data-based guidelines or requirements for states to reference in determining when to expand their DSA as a result of finding infected or exposed wildlife outside of established DSA boundaries. This lack of uniformity in rules and standards has resulted in an uneven approach to surveillance and to establishing boundaries that accurately reflect risk. If DSA boundaries are not expanded in a timely manner in response to finding seropositive wildlife, there is an increased probability that exposed or infected cattle and domestic bison herds in that area may not be detected in time to prevent further spread of infection as cattle and domestic bison are marketed and moved. There is no major slaughter capacity in Montana or Wyoming where surveillance samples can be collected to detect whether brucellosis has expanded in cattle beyond the DSA boundaries. This gap in slaughter surveillance for non-DSA cattle in the GYA states further raises the risk of brucellosis spreading beyond the DSAs.

**The lack of data-based guidance and uniformity in conducting wildlife surveillance outside the DSA, the absence of a GYA focused approach for national surveillance, and the infrequent oversight of state brucellosis management plans in the midst of expanding seroprevalence of elk has increased the risk for spread of brucellosis in cattle and domestic bison outside the DSA boundaries and beyond the GYA (Conclusion 7).**

**Recommendation 5: In response to an increased risk of brucellosis transmission and spread beyond the GYA, USDA-APHIS should take the following measures:**

- 5A: Work with appropriate wildlife agencies to establish an elk wildlife surveillance program that uses a modeling framework to

optimize sampling effort and incorporates multiple sources of uncertainty in observation and biological processes.

- 5B: Establish uniform, risk-based standards for expanding the DSA boundaries in response to finding seropositive wildlife. The use of multiple concentric DSA zones with, for example, different surveillance, herd management, biosecurity, testing, and/or movement requirements should be considered based on differing levels of risk, similar to current disease outbreak response approaches.
- 5C: Revise the national brucellosis surveillance plan to include and focus on slaughter and market surveillance streams for cattle in and around the GYA.

### **Vaccination**

Vaccination is a time-tested, proven method of infectious disease control. Brucellosis vaccination has been an important part of the program to eradicate brucellosis from domestic cattle, and is effective when used in conjunction with other disease management approaches such as quarantine, herd management to reduce intra-herd transmission, and test and removal.

**The significant reduction in risk of transmission among vaccinated cattle provides sufficient reason to continue calfhood and adult vaccination of high-risk cattle when coupled with other risk reduction approaches (Conclusion 8).**

An improved vaccine for each of the three species (elk, bison, and cattle) would help suppress and eventually eliminate brucellosis in the GYA. For free-ranging bison and elk, appropriate and cost effective vaccine delivery systems would be critical. However, until the issue of infected elk transmitting *B. abortus* to cattle is fully addressed, there will still be a perception of risk by other states that would likely drive continued testing of cattle leaving the DSAs even if cattle are vaccinated with a highly effective vaccine.

### **Bioeconomics: A Framework for Making Decisions**

Economic resources for managing disease risks in the GYA are scarce. Any management strategies that impose costs on agencies and other stakeholders while producing few benefits will not be adopted. Costs are not limited to direct monetary costs of undertaking management actions, and benefits are not limited to reduced economic risks to cattle producers; the costs and benefits also include the positive and negative impacts to the ecological processes of the region that are directly or indirectly valued by stakeholder groups. Moreover, many costs and benefits ultimately depend on how individual ranchers, landowners, and resource users respond to changes in risk. Many of these costs and benefits will not be realized in the short term, and thus a long-term perspective is needed in managing the entire system.

Bioeconomic modeling provides a valuable framework for systems-level decision making that is able to take into account the socioeconomic costs and benefits of reducing transmission from wildlife to domestic cattle and bison, and is able to promote coordination and targeting of actions spatially

and temporally based on expected costs and benefits, including potential impacts beyond the GYA. While the Statement of Task requests a cost-benefit analysis for various management options, a lack of critical information severely limits the committee's ability to develop a comprehensive empirical assessment at this time. There are significant knowledge gaps for key economic and disease ecology relations, including the effectiveness, cost, and unanticipated impacts of various candidate management options to control brucellosis in the broader GYA system.

**A coupled systems/bioeconomic framework is vital for evaluating the socioeconomic costs and benefits of reducing brucellosis in the GYA, and would be needed to weigh the potential costs and benefits of particular management actions within an adaptive management setting. A bioeconomic framework is also needed to identify appropriate management actions to target spatial-temporal risks, including risks beyond the GYA (Conclusion 9).**

#### **A Call to Strategic Action**

The current committee echoes the sentiments from the 1998 NRC report and concurs that eradication of brucellosis from the GYA remains idealistic, but is still not currently feasible for scientific, social, political, and economic reasons. However, while eradication of brucellosis in the GYA remains a distant goal, significant progress toward reducing or eliminating brucellosis transmission from wildlife to domestic species is possible. Undoubtedly, sufficient societal and political will along with sufficient financial resources will be required for success. **Managing an ecosystem as complex as the Greater Yellowstone Ecosystem will require coordination and cooperation from multiple stakeholders, and will require expertise across many disciplines to understand the intended and unintended costs and benefits of actions (Conclusion 10).** Addressing brucellosis under the new and changing conditions in the region necessitates a more systematic, rigorous, and coordinated approach at several levels—from priority setting to information gathering, data sharing, and wildlife and disease management—than has occurred thus far. **A strategic plan is needed to coordinate future efforts, fill in critical knowledge and information gaps, and determine the most appropriate management actions under a decision-making framework that is flexible and accounts for risks and costs (Conclusion 11).**

**Recommendation 6: All federal, state, and tribal agencies with jurisdiction in wildlife management and in cattle and domestic bison disease control should work in a coordinated, transparent manner to address brucellosis in multiple areas and across multiple jurisdictions. Effectiveness is dependent on political will, a respected leader who can guide the process with goals, timelines, measured outcomes, and a sufficient budget for quantifiable success. Therefore, participation of leadership at the highest federal (Secretary) and state (Governor) levels for initiating and coordinating agency and stakeholder discussions and actions, and in sharing information is critical.**

### **Coordinating a Complex System**

Management of brucellosis in the GYA is under the jurisdiction of various state, federal, private, and tribal authorities. Each entity has its own mission and goals, and at times these goals may conflict with one another. In addition, there are private landowners, hunters, and ranchers whose actions can impact and are impacted by the decisions of others. To date, the efforts undertaken by various state and federal entities have been conducted in a piecemeal fashion, resulting in a disjointed and uneven approach. Moreover, actions taken have not been effective in addressing the problem, because they have not addressed the issues on a systems level. While each state has the right to establish independent management approaches, management actions within each state can have external impacts for the other two states in the GYA and beyond; similarly, each federal agency has the right to establish independent management approaches for their area of jurisdiction, yet there may be unintended consequences that impact the mission and goals of other agencies. Thus, **coordinated efforts across federal, state, and tribal jurisdictions are needed, recognizing firstly that *B. abortus* in wildlife spreads without regard to political boundaries, and secondly that the current spread of brucellosis will have serious future implications if it moves outside of the GYA (Conclusion 12)**. Future progress will depend on actions of private and public stakeholders, and will require integrating multiple scientific approaches.

### **Integration of Management Approaches**

Historically, there was great interest in brucellosis at the highest levels of government through the Greater Yellowstone Interagency Brucellosis Committee. While the threat has expanded since 1998, the participation of essential stakeholders has diminished due to loss of interest caused by lack of a positive outcome or productive movement in the disease progression within the wildlife populations. There is a need to reinvigorate this interest with buy-in and participation of leadership and development of a mechanism for coordinating policy and management actions.

### **Integration of Scientific Approaches**

Lack of openly accessible data has limited the amount of scientific progress on controlling brucellosis, slowed the learning process, and limited critical information necessary for making decisions. A forum to coordinate scientific approaches toward brucellosis control among all states and agencies with jurisdiction in the GYA would be a valuable mechanism to ensure that science informs policy. Such a body would share information, prioritize research projects, limit duplication of efforts, advise on management actions, and serve as a potential venue for communicating scientifically sound and agreed-upon messages and policies to the public.

### **Addressing Knowledge Gaps Through Research**

Eliminating *B. abortus* transmission within wildlife populations (elk and bison) and from wildlife to cattle and domestic bison in the GYA—and by extension, eliminating it from the United States—is not feasible unless critical knowledge gaps are addressed. An integrated, multi-disciplinary approach is

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necessary for addressing multiple aspects of the problem, thus research teams will need to include members from various disciplines who provide relevant expertise and understanding. This will also require collaboration and coordinated communications among the university, agency, and nonprofit research communities.

**Recommendation 7: The research community should address the knowledge and data gaps that impede progress in managing or reducing risk of *B. abortus* transmission to cattle and domestic bison from wildlife.**

- **7A: Top priority should be placed on research to better understand brucellosis disease ecology and epidemiology in elk and bison, as such information would be vital in informing management decisions.**
- **7B: To inform elk management decisions, high priority should be given to studies that would provide a better understanding of economic risks and benefits.**
- **7C: Studies and assessments should be conducted to better understand the drivers of land use change and their effects on *B. abortus* transmission risk.**
- **7D: Priority should be given to developing assays for more accurate detection of *B. abortus* infected elk, optimally in a format capable of being performed “pen-side” to provide reliable rapid results in the field.**
- **7E: Research should be conducted to better understand the infection biology of *B. abortus*.**
- **7F: To aid in the development of an efficacious vaccine for elk, studies should be conducted to understand elk functional genomics regulating immunity to *B. abortus*.**
- **7G: The research community should (1) develop an improved brucellosis vaccine for cattle and bison to protect against infection as well as abortion, and (2) develop a vaccine and vaccine delivery system for elk.**

### **CONCLUDING REMARKS**

Even over the course of the committee’s 16-month review, there were rapid changes in management practices and new cases of brucellosis in cattle and domestic bison, which reemphasizes the difficulty in handling this complex and expanding problem. Brucellosis was eliminated from cattle in the United States after nearly a century of dedicated funding and resources from USDA, states, and livestock producers. With increasing incidence of brucellosis in cattle and domestic bison herds in the GYA in the past few decades due to transmission from elk, significant resources are needed to address a problem that is expanding in scale and scope; without the changes and investments necessary to aggressively address this problem in a coordinated and cost-effective manner, brucellosis may spread beyond the GYA into other parts of the United States resulting in serious economic and potential public health consequences. Efforts to reduce brucellosis in the



GYA will depend on significant cooperation among federal, state, and tribal entities and private stakeholders as they determine priorities and next steps in moving forward. The report's intent is to be useful for decision makers and stakeholders as they address the challenging matter of brucellosis in the GYA.

### **Update on New World Screwworm Infestation in Florida Key Deer**

Mark W. Cunningham, Samantha Gibbs, Lara Cusack, Michael P. Milleson, Florida Fish and Wildlife Conservation Commission

A New World screwworm (NWS, *Cochliomyia hominivorax*) epidemic in the Florida Keys (USA) occurred between July 2016 and January 2017 and primarily affected the endangered Key deer (*Odocoileus virginianus clavium*). At least 150 cases were diagnosed in Key deer, and infestation resulted in the deaths of at least 135. The total extent of affected cases and mortality are estimated to be higher; however, the true extent is unknown. The first documented case occurred July 5, and cases in Key deer peaked the second week of October. Of the documented cases, infestations were most frequently seen in male deer (139 of 149 [92%] total documented cases), and males were 73 times (CI 37.4 – 142.5) more likely to be infested than female deer. Lesions in males were most frequently seen on the head, neck, and forelimbs, likely associated with injuries sustained during fighting. Only ten (8%) females were infested, and the distal extremities and vulva were most often affected. Lesions were usually extensive, had multiple larval stages indicative of multiple ovipositions, and extended deep into the surrounding tissues. Management strategies to eradicate the outbreak included the release of sterile male flies, euthanasia of severely infested deer, and treatment of mild to moderate cases. Together these multi-agency management practices contributed to the eradication of NWS in the Keys with the last documented case in a Key deer occurring January 7, 2017. NWS were declared by USDA-APHIS to be eradicated from the U.S. on March 23, 2017.

### **Copper Deficiency in Captive Wildlife**

Nadine Lamberski, San Diego Zoo Global

Copper deficiency is a recognized disease in wild and captive ruminants in many regions of the world. Clinical signs include decreased weight gain, unthrifty appearance, lightening of coat color, diarrhea, anemia, spontaneous fractures, demyelination, and death. Copper deficiency occurs when there is inadequate copper in the diet or when there are interfering substances adversely affecting absorption or metabolism of copper such as molybdenum, sulfates, zinc, iron, or other compounds. Excess molybdenum, sulfur, and sulfates in the diet and/or water form insoluble thiomolybdates in the rumen. Treatment is aimed at increasing dietary copper to overcome the effect of other minerals while also decreasing the amount of molybdenum and sulfur in feed and water. Managing captive ruminants in large mixed-species exhibit poses additional challenges due to the large amount of

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manure in a confined space, enclosure topography, water features, grazing preferences among various species, and individual species susceptibility and sensitivity.

### **Chronic Wasting Disease Management: A Path Forward**

Mary Wood, Wyoming Game and Fish Department

Over the past thirty years, surveillance has shown an increase in the prevalence and distribution of chronic wasting disease (CWD) in Wyoming and recent research demonstrates deer declines in areas where CWD prevalence is high. While current data suggests that CWD is impacting free-ranging cervid populations, sustainable management for CWD remains uncertain. To date, there has been little published information on effective CWD management, despite significant increases in our understanding of this disease. Due to the complex sociopolitical aspects of CWD and limited information on effective management; no single jurisdiction is likely to be successful in identifying and implementing long-term successful CWD management alone. Here, we describe a potential path forward by outlining a regional, coordinated adaptive management approach to CWD in the West.

### **Committee Business:**

The Mission of this new committee was briefly discussed with committee consensus (due to time constraints) to circulate the statement amongst the committee members and review and finalize at next year's meeting.

The USDA-APHIS-VS responses to the resolutions from the 2016 Committee Captive Wildlife and Alternative Livestock were shared. There was discussion that these resolution responses from USDA-APHIS-VS are often received from USDA by the USAHA Committees so late that there is little time to review thoroughly for any meaningful discussion before or at the USAHA meeting. One resolution (Annual Reporting of CWD Epidemiological Data) was brought forward, discussed, amended, and passed. During the discussion of this resolution, it was brought forward that Resolution # 28 from 2014, an information request to USDA-APHIS-VS concerning captive cervid CWD trace-outs of certified herds, was inadequately responded to with partial and incomplete trace-out investigation information.

## **II. F. Other Reports**

## **II.F.1 USDA Animal Health Research Review 2017**

**Development of Foot-and-Mouth Disease (FMD) Vaccine Platforms for Safe Production in the USA** - Mahesh Kumar, Zoetis

**Research Toward Foot-and-Mouth (FMD) Disease Vaccine Platforms for Safe Production in the USA** - Luis L. Rodriguez, Elizabeth Rieder, and Teresa Delos Santos, USDA-ARS-Plum Island

**Vaccine Response to the 2015-2016 HPAIV Outbreaks in the United States** - David L. Suarez and Eileen Thacker

## DEVELOPMENT OF FOOT-AND-MOUTH DISEASE (FMD) VACCINE PLATFORMS FOR SAFE PRODUCTION IN THE USA

Mahesh Kumar

Zoetis

FMD is among the most infectious diseases known and affects economically important cloven-hoofed livestock production species around the globe (Fig. 1). Multiple serotypes and subtypes, each requiring a specific vaccine, circulate in endemic regions and pose a constant threat to the fully susceptible U.S. livestock population. The damage FMD inflicts economically can be enormous. The 2001 FMD outbreak in the U.K. caused about US\$14 billion in direct and indirect costs. In India, FMD causes damages of US\$4.1 billion every year. Outbreaks in FMD-free countries results in the loss of income and livestock due to the policy of vaccination to stem the outbreak followed by culling of all seropositive animals in the absence of true marked vaccines. The National Cattlemen's Beef Association (NCBA) indicates that a U.S. FMD outbreak could result in "beef export losses alone within the first year would be estimated at around \$6.34 billion, not to mention the cumulative impact of an outbreak on the beef and port sectors over a 10-year period would be more than \$128 billion. The impact would be felt well outside of animal agriculture. Corn and soybean farmers would lose \$44 billion and nearly \$25 billion, respectively, making the impact on these four industries alone **almost \$200 billion**".

In the United States, FMD is considered a Foreign Animal Disease threat since the World Organisation for Animal Health (OIE) recognizes the U.S. as "Free from FMD without vaccination", therefore, vaccine manufacturing using virulent FMD virus is not allowed. USDA-APHIS is charged with preventing and controlling FMD outbreaks. As part of their emergency response USDA maintains a strategic FMD vaccine bank that is sourced from vaccine manufacturers overseas. The National Cattlemen's Beef Association and the National Pork Board (NPB) sponsored a White Paper by The Center for Food Security and Public Health calling for improvements to the National FMD preparedness and medical countermeasures in the National Veterinary Stockpile.

Therefore, it is of utmost importance for the defense of the U.S. agricultural sector to develop and maintain effective FMD medical countermeasures that have the potential to be produced in the United States, are of high quality and potency, are fully Differentiating Infected from Vaccinated Animals (DIVA) compatible, and may be rapidly adapted to new FMD strains.

Traditional foot-and-mouth disease virus (FMDV) vaccines are used to control FMD around the world in spite of drawbacks - (1) large quantities of virulent FMDV are used, with the risk of virus escaping from manufacturing facilities or incomplete inactivation during the vaccine formulation process; (2) traditional vaccines produced from wild type FMDV are not fully compatible with a DIVA approach, since small amounts of nonstructural

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proteins (NSPs) may still be present; and (3) they do not fully protect animals from persistent infection. A novel marked FMD-LL3B3D vaccine platform under development by Zoetis, Inc. and The United States Department of Agriculture - Agricultural Research Service, consists of an attenuated virus platform containing negative markers in the NSPs 3B and 3D<sup>pol</sup>. This vaccine platform allows for the easy exchange of capsid coding sequences. In contrast to wild-type FMD vaccine viruses, the FMD-LL3B3D vaccine viruses induce no clinical signs of FMD and no shedding of virus in cattle or pigs when inoculated as a live virus. This vaccine platform may use existing FMD vaccine manufacturing technology and significantly lowers biosafety risks associated with FMD vaccine production. Upon exclusion from the Select Agent Program, the vaccine platform may be used to produce high potency, fully DIVA compatible FMD vaccines in the United States. Cattle immunized with a variety of chemically inactivated FMD-LL3B3D vaccine constructs were protected from challenge with parental virus. Two negative markers allow the FMD-LL3B3D vaccines to be fully DIVA compatible. This vaccine platform, currently undergoing development in the United States, provides opportunities for safer and higher potency FMD vaccines in support of global control and eradication programs.

**RESEARCH TOWARD FOOT-AND-MOUTH (FMD) DISEASE VACCINE  
PLATFORMS FOR SAFE PRODUCTION IN THE USA**

Luis L. Rodriguez, Elizabeth Rieder, and Teresa Delos Santos  
USDA-ARS-Plum Island

Foot-and-Mouth Disease is a devastating infectious viral disease causing great economic, social and environmental impacts. FMD is caused by a small, genetically and antigenically diverse RNA virus (FMDV). Seven immunologically distinct serotypes (O, A, C, SAT1, SAT2, SAT3 and Asia 1) occur in different endemic regions with specific virus serotypes and subtypes forming seven regional viral pools. Current vaccines typically provide coverage only to certain serotypes and subtypes within these pools. Further challenges include antigen drift within serotypes that requires specific vaccines to address newly emerging antigens. In addition, no currently available vaccine provides “sterilizing immunity,” resulting in subset of vaccinated animals becoming subclinical carriers. The presence of carrier animals blocks exports as trading partners will not recognize the country as free of disease. Current commercial FMD vaccines are produced using virulent virus which can pose a risk of virus escape from manufacturing facilities. In the United States, live virulent FMDV is not allowed on the main land, resulting in a lack of vaccine production and complete dependence on foreign manufacturing for stocking the emergency FMD vaccine bank. In response to these needs, ARS has developed two safe alternative vaccine platforms for FMD production in the USA: The Ad5-FMD and FMD-LL3B3D vaccine platforms. The Ad5-FMD platform is safe and has been shown to be safe and efficient in cattle but not in pigs and still requires industrial development. The FMD-LL3B3D platform consists of an innocuous FMDV lacking the leader sequence and containing specific antigenic markers (FMDVLL3B3D). This virus has been shown to be innocuous in cattle and pigs with no detectable viral replication, no transmission and no clinical signs in inoculated animals. Inactivated vaccines produced with this platform have been shown to be effective and efficacious in cattle and pigs. Furthermore, when formulated with a proprietary adjuvant, this vaccine prevented primary infection in cattle challenged by direct tongue inoculation. Vaccines targeting emerging FMD strains may be produced rapidly by exchanging the structural proteins in the platforms cassette using synthetic biology. The FMD-LL3B3D vaccine production platform promises a new paradigm for vaccine banking – with domestic industrial production and versatility for emerging strains.

## **VACCINE RESPONSE TO THE 2015-2016 HPAIV OUTBREAKS IN THE UNITED STATES**

David L. Suarez and Eileen Thacker  
USDA-ARS

In December 2014, a H5 highly pathogenic avian influenza (HPAI) was identified in the United States and over the next seven months this virus lineage infected more than 200 poultry premises and resulted in the death or euthanasia of over 49 million birds making it the largest animal disease outbreak in the United States(2, 6). Highly pathogenic avian influenza is considered a foreign animal disease in the United States and had only rarely been diagnosed in the U.S. prior to this outbreak (three times in the last 100 years). The control strategy for HPAI in the U.S. is to rapidly identify an infected flock, and to quickly euthanize the flock before the virus has an opportunity to spread to other poultry farms. This approach has generally been successful in controlling low pathogenic avian influenza (LPAI) outbreaks in the United States.

Vaccination for the control of both LPAI and HPAI has been increasing worldwide because of the increasing number of outbreaks worldwide. Vaccines can be used to just control clinical disease, but in some situations, it can also aid in the eradication of avian influenza from a country. In general, a good antigenically matched vaccine can prevent clinical disease and greatly reduce virus shedding in vaccinated flocks that do become exposed to the virus. The reduction of virus shedding allows the opportunity for vaccines to help break the transmission chain, and help eradicate the virus from a country. For eradication to be the goal, a country has to have a good veterinary infrastructure, increased biosecurity, increased surveillance, and properly manage animal movements. Unfortunately, most countries that vaccinate have been poorer countries that are vaccinating with the goal of only reducing clinical disease.

The Southeast Poultry Research Laboratory (SEPRL) has had an active vaccine research program on avian influenza with the goal of improving vaccination as a control tool and to provide APHIS with information about the role vaccination could play in the control of a U.S. outbreak. Vaccination has never been used for HPAI in the U.S., and it has only been sparingly used for H7 low pathogenic avian influenza. The research at SEPRL has included the development of new vaccines, testing of available vaccines to assure they work well with currently circulating strains, assist U.S. vaccine manufactures to have new vaccines licensed in the U.S. market, and finally provide recommendations on the best way to vaccination for optimal protection(3). When the H5 HPAI outbreak occurred in the U.S., one of the priorities for research were to evaluate currently available vaccines or vaccines that were likely to be available in the near horizon.

Using two representative viruses, a H5N8 and related reassortant H5N2 virus, vaccines studies were designed using both killed adjuvanted vaccines and commercially available viral vector vaccines. The killed vaccines



included several North American seed strain viruses, an autogenous vaccine, and several Chinese vaccines made by reverse genetics technology. In challenge studies the autogenous vaccine provided the best protection based on clinical disease and virus shedding. One of the Chinese vaccines also provided good protection, but that virus is not licensed for use in the U.S. The other vaccines either did not provide adequate protection from mortality (>90%) or had high levels of virus shedding after challenge. The autogenous vaccine, because it is made with a HPAI virus, couldn't be commercially produced in the U.S. which meant that none of the existing vaccines were recommended if vaccination was to be a control option.

Alternative vaccines that could be licensed quickly were tested. This included the development of new vaccine made by reverse genetics technology that attenuated the H5 HPAI virus making a safe autogenous vaccine. A second tested vaccine, made by a commercial company, was an RNA particle vaccine made from an alphavirus vector system that was already licensed for swine influenza in the U.S. This vector system was replication restricted so for regulatory purposes it is considered an inactivated vaccine. Both vaccines in vaccine trials in chickens and turkeys provided excellent protection. Based partly on these experimental trials both vaccines were licensed in the U.S. and eventually were purchased for use by the U.S. Veterinary stockpile for emergency use. Additional work was done that showed the use of recombinant vector vaccines, including the RNA particle vaccine and the Herpesvirus of turkeys-H5 vaccine, as a prime vaccination with a second vaccination of a killed vaccine also provided good protection. This prime-boost approach is commonly used in countries for avian influenza vaccination (1, 4, 5).

Although vaccination was never used in the U.S. to control the HPAI virus, the studies at SEPRL provided the data for two different new vaccines to be licensed that could be used if necessary. In addition, additional data on the use of combination vaccine administration to improve the immune response was shown to be a valuable option. Finally, the vaccine studies reinforced the idea that matching vaccines to field strains provides better protection.

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## **II.F.2 Applied Animal and Public Health Research and Extension Symposium – 2017**

2017 Applied Animal and Public Health Research and Extension Symposium – K.A. Rood, M.L. Pate

Animal Disease Response Training (ADRT) - K.R. Burton

Casein Hydrolysate as a Possible Adjunct or Replacement Treatment to Current Antibiotic Therapies Used at Dry-Off in Dairy Cows - J. Britten, D.J. Wilson, K.A. Rood

Economic Impacts of Trichomoniasis - J. Wenzel, C. Gifford, G. Hawkes

Excellence in Exhibition: Preventing Disease in Animals and People: *Bring Home the Blue, Not the Flu!* - M. Lee, A. Canon, K. Obbink and B. Nelson

Infection Control Practices and Zoonotic Disease Risk Among Utah Practicing Veterinarians - K.A. Rood, M.L. Pate

Ride Utah! A Therapeutic Equine Activity for Military Personnel - K. H. Hoopes

Swine Disease Surveillance in Hawai'i - J.S. Odani, H.M. Zaleski, N. Ogasawara, B. Castle, F. Vannucci, T.W. Heskett

The Cost of Bovine Respiratory Disease in U.S. Beef Calves Prior to Weaning - M. Wang and D.R. Smith

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### **2017 APPLIED ANIMAL AND PUBLIC HEALTH RESEARCH AND EXTENSION SYMPOSIUM**

Kerry A. Rood<sup>1</sup> and Michael L. Pate<sup>2</sup>

<sup>1</sup>School of Veterinary Medicine, Utah State University (USU)

<sup>2</sup>Agricultural Systems Technology (USU)

Practicing veterinarians are exposed to unique occupational hazards and zoonotic diseases. National studies have highlighted a lack of veterinary awareness for these hazards. In Utah (and likely other states), reports of acquired zoonoses are sporadic, and underlying risk factors poorly understood. To better clarify occupational risk factors, the knowledge, attitudes, and behaviors of Utah veterinarians were examined. An internet-based survey was sent to 809, currently licensed, Utah veterinarians identified from a list provided by the Utah Division of Professional Licensing. Two hundred and thirty-five (29%) veterinarians responded, with 91.5% self-identifying as clinical veterinarians. Animal bites, needle-sticks, and cuts were specifically queried with 40.5, 59.8, 21.6%, respectively, reporting these injuries within the past year. Nearly 8% of clinical veterinarians reported not being vaccinated against rabies virus, with 44% not checking their rabies titer in ten years or longer. Twenty-two percent reported having contracted a zoonotic disease. While 19% reported having access to particulate respirators, only 24% had undergone fit testing. Sixteen percent of Utah clinical veterinarians reported lost time from work due to an animal injury. Of those who reported time lost from work, 81% indicated one or more lost days, with 25% missing a month or more. These results highlight the need for veterinary education and outreach on occupational hazards and disease risk.

## **ANIMAL DISEASE RESPONSE TRAINING (ADRT)**

K.R. Burton

National Agricultural Biosecurity Center (NABC), Kansas State University

Recent outbreaks of Porcine Epidemic Diarrhea Virus (PEDV) and Highly Pathogenic Avian Influenza (HPAI) in the U.S. have re-focused attention to agricultural emergency preparedness and the necessity in coordinating responders. Animal Disease Response Training (ADRT) emphasizes whole community involvement and the importance multiple resources bring to a highly coordinated response. Non-traditional response personnel must understand their roles and be able to communicate effectively through all levels of the Incident Command Structure (ICS).

ADRT provides awareness level training for local, state, tribal, and territorial first responders. Familiarizing local and state responders with this type of training is key for a quick and effective response. Response personnel will be much more effective if they possess an awareness level of knowledge concerning why and how response procedures need to occur. Minimizing the impact of animal disease outbreaks requires complex coordination between many individuals, organizations, and government agencies. It is essential that each responder understands and can communicate the basic concepts necessary for an effective response effort.

ADRT focuses on best practices and safety issues associated with an animal disease outbreak in the areas of quarantine, biosecurity, euthanasia and disposal; use of personal protective equipment; and cleaning and disinfection. ADRT also assists in promoting and enhancing the coordination of responders across jurisdictions, lines of authority, and disciplines by examining the integration of response efforts.

The ADRT curriculum is approved by the Federal Emergency Management Agency's (FEMA) National Preparedness Directorate, National Training and Education Division (NTED) and is included in its State/Federal sponsored course catalog (Course # DHS-128-RESP). Upon successful completion of the course, each student receives a Department of Homeland Security Certificate of Completion. ADRT is an eight (8) hour course delivered over one (1) instructional day, by mobile training teams at an instructional site chosen and provided by the requesting entity.

ADRT is for non-traditional responder groups that include, but are not limited to:

- Emergency Management
- Emergency Medical Services
- Veterinarians
- Fire Fighters
- Law Enforcement
- Public Health
- Public Works
- Environmental Agencies
- Producers
- Industry

**CASEIN HYDROLYSATE AS A POSSIBLE ADJUNCT OR  
REPLACEMENT TREATMENT TO CURRENT ANTIBIOTIC THERAPIES  
USED AT DRY-OFF IN DAIRY COWS**

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Intramammary antibiotic infusions, often in a slow-release form, are commonly used at dry-off in dairy cows. Consumer concern over the use of antibiotics in food production animals has become a substantial issue in the U.S. Many consumers want minimal or zero use of antibiotics in production animal management. Additionally, the use of dry cow antibiotics has already been banned in some countries, a trend that seems to be spreading globally. Previous studies have shown intramammary (IMM) casein hydrolysate (CNH) to be effective in both inducing mammary involution in single mastitic quarters and accelerating this process at the time of dry off. The aim of this study was to explore the use of IMM CNH treatment at the time of dry off in dairy cows to accelerate mammary involution. A commonly used dry treatment protocol, intended to be representative of current industry practices, served as a control and was compared in a split udder design to four different treatment combinations. Study animals (n=32) were divided evenly into two groups, pregnant or open, with one udder half as the experimental unit and the contralateral half as an internal control. Pregnant cows had milk samples collected at 6 time points for bacterial culture and testing of somatic cell count, pH, lactose, lactoferrin and serum albumin, as biochemical markers of involution. These animals were also bucket milked before dry-off and then followed through to calving for evaluation of bacterial cures and proportion of total-cow milk production after calving by udder half in each treatment group. Open cows were euthanized either two or seven days after treatment for collection of mammary tissue samples. Samples were dissected from three separate zones per quarter, for a total of 12 samples per cow, and histopathological characterizations evaluated for cellular change. Results comparing IMM infusions of common dry-off antibiotic treatments to combinations using CNH will be reported.

## **ECONOMIC IMPACTS OF TRICHOMONIASIS**

J. Wenzel, C. Gifford, G. Hawkes  
New Mexico State University

Trichomoniasis is a disease that can be economically devastating in a short period of time. Trichomoniasis is known to reduce herd fertility, and the economic impacts from reproductive losses can be substantial for the livestock enterprise with extensive implications for both production and economic sustainability. However, the full extent of economic damages associated with a Trichomoniasis outbreak in New Mexico livestock operations has not been evaluated. Therefore, a series of factors that are impactful to the economic profile of the livestock production unit were considered in a recent survey of known positive premises across New Mexico. Survey results were used to identify physiological factors that were the most economically impacted and included: calf crop percentage, conception rate, cull rates, weaning weights and re-establishment of the herd. Impacts associated with Trichomoniasis are not a one-year recovery process, but rather a long-term situation that requires intensive management by the livestock producer to return to profitability. The average of survey results were then used in the following economic model.

### **Cost and Return Estimate**

A representative livestock enterprise was employed in the modeling process using the New Mexico State University cost and return estimate generator. The representative ranch had 400 mother cows, 1:20 bull/cow ratio, 15% replacement rate, and a 91% weaned calf crop. The comparative analysis cost and return estimate for a Trichomoniasis infected herd had the same number of mother cows, 1:20 bull/cow ratio, 35% replacement rate and a 64% weaned calf crop. These values were determined through survey responses.

### **Summary**

The introduction of this disease in a livestock enterprise will have economic impacts. These impacts will impact both liquidity and solvency. The overall impact of the study determined that all factors when combined will have a total economic impact to the livestock enterprise of greater than \$400 per cow. Annualized return on investment (of testing for trich) would exceed 129% in this scenario. A return with a level of significance as presented allows the livestock enterprise owner/management team to make an easy decision to initiate and sustain Trichomoniasis testing.

## II.F. OTHER REPORTS

### **EXCELLENCE IN EXHIBITION: PREVENTING DISEASE IN ANIMALS AND PEOPLE: *BRING HOME THE BLUE, NOT THE FLU!***

M. Lee, A. Canon, K. Obbink and B. Nelson

Center for Food Security and Public Health (CFSPH), Iowa State University

Youth agriculture programs, including raising and showing livestock, help youth develop responsibility, learn good sportsmanship, gain confidence, and teach the public about animal agriculture. However, many zoonotic diseases can affect exhibitors and spectators, especially when people have close contact with animals. Several animal related disease outbreaks, such as variant influenza A virus of swine (H3N2v) and enteric diseases caused by *E. coli* and *Campylobacter*, have been associated with fairs in recent years. Children infected with these pathogens are at increased risk for severe complications. Youth involved in animal agriculture, teachers, volunteer leaders, and parents, should understand disease risks and preventive measures to reduce the occurrence of zoonotic diseases. Providing accessible, free, web-based education can produce engaging results and can be easily incorporated into current agriculture or science curricula. Excellence in Exhibition: Preventing Disease in Animals and People ([www.BlueNotFlu.org](http://www.BlueNotFlu.org)) is an online, interactive, educational course that was developed by CFSPH in collaboration with the Iowa Department of Public Health and with support from the Centers for Disease Control and Prevention and the Council of State and Territorial Epidemiologists. The course, which includes six lessons designed to be completed in 20–30 minutes each, may be taken independently by anyone at any time, but is targeted at youth aged 13–18 years. The first three lessons cover specific zoonotic diseases, such as influenza, and ways to prevent transmission to humans and animals. The remaining lessons review case studies, agencies, and career opportunities in One Health. Learning objectives, PowerPoint slides, supplemental materials, and class activities are also available. The course is designed to be used widely and in a variety of ways, including incorporation into classroom, chapter, and club curricula, into 4-H projects on animal and human health, as preparation for FFA contests, and/or as prerequisites for showing at local or state exhibitions or fairs. Real-time information on user data associated with course web page views has shown over 2,900 unique page views in 47 states and 32 countries since release; additionally, an optional evaluation component has indicated an increase in knowledge and plans to adopt disease prevention habits upon post-course completion.



**INFECTION CONTROL PRACTICES AND ZONOTIC DISEASE RISK  
AMONG UTAH PRACTICING VETERINARIANS**

Kerry A. Rood<sup>1</sup> and Michael L. Pate<sup>2</sup>

<sup>1</sup>School of Veterinary Medicine, Utah State University (USU)

<sup>2</sup>Agricultural Systems Technology (USU)

Practicing veterinarians are exposed to unique occupational hazards and zoonotic diseases. National studies have highlighted a lack of veterinary awareness for these hazards. In Utah (and likely other states), reports of acquired zoonoses are sporadic, and underlying risk factors poorly understood. To better clarify occupational risk factors, the knowledge, attitudes, and behaviors of Utah veterinarians were examined. An internet-based survey was sent to 809, currently licensed, Utah veterinarians identified from a list provided by the Utah Division of Professional Licensing. Two hundred and thirty-five (29%) veterinarians responded, with 91.5% self-identifying as clinical veterinarians. Animal bites, needle-sticks, and cuts were specifically queried with 40.5, 59.8, 21.6%, respectively, reporting these injuries within the past year. Nearly 8% of clinical veterinarians reported not being vaccinated against rabies virus, with 44% not checking their rabies titer in ten years or longer. Twenty-two percent reported having contracted a zoonotic disease. While 19% reported having access to particulate respirators, only 24% had undergone fit testing. Sixteen percent of Utah clinical veterinarians reported lost time from work due to an animal injury. Of those who reported time lost from work, 81% indicated one or more lost days, with 25% missing a month or more. These results highlight the need for veterinary education and outreach on occupational hazards and disease risk.

## II.F. OTHER REPORTS

### **RIDE UTAH! A THERAPEUTIC EQUINE ACTIVITY FOR MILITARY PERSONNEL**

Karl H. Hoopes

Department of Animal, Dairy, and Veterinary Sciences  
Utah State University (USU)

Our fast-paced lives have led to an increased need to understand and focus on mental health awareness. Additionally, nearly 1 in 4 active and retired military personnel exhibit signs of stress ranging from PTSD to depression. Each branch of the military has developed internal resiliency programs to increase psychosocial support and the ability to bounce back from stressors. Current research has shown clinically significant benefits from therapeutic horse activities with military personnel, veterans, and family members. Utah State University Extension has developed a therapeutic equine program called Ride Utah! that provides military personnel and a guest a 1-2-hour trail ride, lunch, and a professionally moderated group discussion focused on military family issues. Ride Utah! is hosted in each county by USU Extension and collaborates with community members and military support groups. The results from the participant completed Conner-Davidson Resiliency Scale's demonstrate that Ride Utah! is harnessing Utah's natural beauty and resources into a successful program that is improving participant's emotional wellbeing and strengthens communities. Program evaluation indicates an increase in resiliency for individuals participating in Ride Utah!.

### **SWINE DISEASE SURVEILLANCE IN HAWAII**

J.S. Odani<sup>1</sup>, H.M. Zaleski<sup>1</sup>, N. Ogasawara<sup>1</sup>, B. Castle<sup>1</sup>, F. Vannucci<sup>2</sup>,  
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#### **Abstract**

##### *Historical Background*

Swine play an important cultural and economic role in Hawai'i, and despite Hawai'i's relative isolation from the mainland USA and other countries, many swine pathogens have been introduced into the domestic herd. Porcine Respiratory and Reproductive Syndrome (PRRS) virus has been present in Hawai'i since 1992, and both the European and the North American strains have been detected. Porcine Circovirus 2 was first detected in Hawai'i in 2008, and subsequent surveillance in 2009 showed that it had already spread widely throughout the state. A variant strain of Porcine Epidemic Diarrhea (PED) virus caused disease in a single O'ahu farm in 2014, and investigations revealed other infected farms that did not exhibit clinical signs. Senecavirus A was first detected in imported hogs in Hawai'i in 2013, and sporadically thereafter in recently imported animals.

##### *Current Study*

The State of Hawai'i comprises a chain of eight major islands separated by sea, enabling interisland variability in disease introduction and maintenance. Therefore, swine herds on the four main swine producing islands (Kaua'i, O'ahu, Maui, and the Big Island) were included in this study, and serum samples were tested for Porcine Epidemic Diarrhea virus (immunofluorescence [IFA]), Senecavirus A (IFA), Porcine Respiratory and Reproductive Syndrome virus (enzyme-linked immunosorbent assay [ELISA]), and Porcine Circovirus 2 (ELISA) by the University of Minnesota's Veterinary Diagnostic Laboratory. Fecal samples were evaluated for parasites via the sodium nitrate flotation method. Results from this ongoing project suggest that there are geographic differences in pathogen occurrence, which provides meaningful information that local swine producers, veterinarians, consultants, and regulatory agencies can use in their decision-making process. Current data and maps will be presented.

**THE COST OF BOVINE RESPIRATORY DISEASE IN U.S. BEEF CALVES  
PRIOR TO WEANING**

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Department of Pathobiology and Population Medicine, College of Veterinary  
Medicine, Mississippi State University

**ABSTRACT**

The objective of this study was to estimate the direct economic cost of bovine respiratory disease (BRD) in U.S. beef calves prior to weaning. A stochastic simulation model was conducted using computer spreadsheet add-in software. Input data were obtained from USDA, peer-reviewed papers, and a survey of BRD treatment and labor costs by beef cow-calf producers. Results were reported by a median point estimate with 90% credible interval. Between 2011 and 2015 the estimate of the median total economic cost of BRD in pre-weaned beef calves was \$165 million (129–246), of which the costs due to death, medical treatment, and weight loss were \$126 million (92–200), \$25 million (20–32), and \$15 million (9–25), respectively. The median costs associated with death due to BRD in calves < 3 weeks and  $\geq$  3 weeks of age were \$44 million (29–72) and \$84 million (57–138), respectively. Death loss in calves prior to weaning was the largest cost component (76%). Total cost of BRD was most sensitive to deaths in calves  $\geq$  3 weeks of age. This model estimates the total and component costs of BRD in U.S. beef calves prior to weaning due to deaths, reduced performance, medicine, and labor to treat sick calves. Death loss was the most influential part of the total cost of BRD in beef calves prior to weaning.

### **III. Organizational Matters**

- A. Bylaws of USAHA**
- B. USAHA Administrative Policies**
- C. Previous Meetings**
- D. USAHA Award Recipients**

# III. A. BYLAWS OF THE UNITED STATES ANIMAL HEALTH ASSOCIATION

*APPROVED 2007*

## ARTICLE I – NAME

The name of this Association shall be “The United States Animal Health Association.”

## ARTICLE II – PURPOSE

The United States Animal Health Association is a forum for communication and coordination among State and Federal governments, universities, industry, and other concerned groups for consideration of issues of animal health and disease control, animal welfare, food safety and public health. It is a clearinghouse for new information and methods, which may be incorporated into laws, regulations, policy, and programs. It develops solutions of animal health-related issues based on science, new information and methods, public policy, risk/benefit analysis and the ability to develop a consensus for changing laws, regulations, policies, and programs.

## ARTICLE III – MEMBERS

**3.1. Classes of Members.** The classes of members are: Official Agency Members; Allied Organization Members; Individual Members; Student Members; Elected Regional Delegate Members; International Members; Life Members; and, Honorary Members.

**a. Official Agency Member.** The animal health department or agency of each state, U. S. territory or commonwealth, and the District of Columbia; the animal health department of the United States of America; and such other governmental departments or agencies as the Board of Directors may, by a two-thirds majority vote, approve.

**b. Allied Organization Member.** Any non-profit organization that is national in scope and actively and directly concerned with and supportive of the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Board of Directors by a two-thirds majority vote.

**c. Individual Member.** Any person engaged in work related to animal production, animal health, food safety, public health, veterinary medicine and animal research and who supports the interests and objectives of

### III.A. USAHA BYLAWS

the Association as outlined in Article II-Purpose, may become a member upon approval of the Executive Committee by a majority vote.

**d. Elected Regional Delegate Member.** Such elected regional delegates as provided for in Article VI-Board of Directors shall by virtue of such election automatically become members of the Association and shall serve from the close of the annual meeting following their election to the close of the following annual meeting and shall pay dues as the Board of Directors may determine.

**e. Student Member.** Any person enrolled in the study of animal production, animal health, food safety, public health, veterinary medicine, and animal health research who supports the interests and objectives of the Association as outlined in Article II-Purpose is eligible to become a member of the Association. Student members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2.

**f. International Member.** The chief official agency member from any foreign federal animal health, food safety, public health and animal health research agency or department, and any foreign national animal industry organization or person who supports the interests and objectives of the Association as outlined in Article II-Purpose, or said person's designee, is eligible to become a member of the Association upon approval of the Board of Directors by a two-thirds majority. International Members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2. However, the Association recognizes that Australia, Canada, Mexico and New Zealand are voting members and shall continue to remain full voting members after the adoption of these bylaws. New International Members shall obtain voting rights only by amendment of the bylaws.

**g. Life Member.** Any individual member who has maintained membership in the Association for 35 years, or if such member is at the point of retirement, for 25 years, is eligible to be a life member. Past Presidents of the Association are deemed to be life members. Life members shall have all the privileges of regular membership and shall be exempted from payment of all dues. Election to Life Membership of individual members shall be by a majority vote of the Board of Directors. Life Members shall be exempt from the payment of one-half of annual meeting registration fees; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

### III. ORGANIZATIONAL MATTERS

**h. Honorary Member.** Any person not otherwise a member of the Association who has contributed materially to the advancement of animal science, food safety, public health, veterinary medicine, animal research, or the purposes of the Association, may be nominated by the Executive Committee for Honorary Membership. Honorary Membership shall be conferred by a majority vote of the Board of Directors. Honorary Members shall be exempt from the payment of all dues and shall not have voting privileges as provided in 3.2.

**3.2. Voting.** Each member shall have one vote, unless otherwise provided in these By-Laws.

**a. By State and Federal Official Agency Members and Allied Organization Members.** The director or chief executive officer of each Official Agency Member and Allied Organization Member shall appoint and certify in writing to the Executive Director of the Association a person to be its representative who shall represent, vote, and act for each of these classifications of member in all the affairs of the USAHA, until further notification.

**3.3. Dues.** The Board of Directors at any annual meeting shall have the power to determine the amount of dues.

**a. Non-payment of Dues.** Subject to any policy the Board of Directors may establish for reinstatement, failure to pay dues within 90 days of notice of delinquency shall result in automatic termination of membership.

**b. Voluntary Withdrawal of Membership.** A member may voluntarily terminate membership effective upon submission of notice of withdrawal to the Association but shall not be entitled to a refund of any dues paid.

**3.4. Effective Date of Membership.** Membership shall become effective upon submission of written application in the form required, satisfaction of eligibility requirements, election to membership by an appropriate vote of the Executive Committee, and payment of annual dues.

**3.5. Suspension or Expulsion.** For cause, and upon reasonable notice setting forth the specific reasons therefore any member may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.



## ARTICLE IV – MEETINGS

**4.1. Annual.** There shall be an annual meeting between September 15 and November 15 for receiving annual reports and the transaction of other business.

**a. Notice Requirements.** Written notice setting forth the Agenda and location of the annual meeting shall be mailed or transmitted electronically to all members at least 60 days prior to the first day of such meeting.

**b. Annual Meeting Location.** The location of the annual meeting shall be selected by the Regional Districts on the following rotational basis: North Central, Northeast, Western, and Southern; and with the concurrence of the state animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or unacceptable the Executive Committee is authorized to select an alternate location.

**c. Closure.** The annual meeting shall be considered officially closed upon the completion of the Board of Directors' meeting held on the last day of the annual meeting.

**4.2. Special.** Special meetings may be called by the President, in consultation with the Executive Committee, or by a majority of the Board of Directors. Notice of any special meeting shall be mailed, published in the Association newsletter and/or transmitted electronically to the membership with a statement of time and place and information as to the subject(s) to be considered at least 30 days prior to the date of the meeting. Emergency situations shall be dealt with by the Executive Director with the approval of the Executive Committee who shall provide as much notice to the Board of Directors as may be practical under the circumstances.

**4.3. Committee and General Membership Meetings.** Unless otherwise specifically set forth in these bylaws, all committee and general membership actions require a majority vote provided a quorum of the voting membership is present.

### III. ORGANIZATIONAL MATTERS

**4.4. Quorum.** A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that a majority of those in attendance is comprised of Official Agency Members. A quorum of all other committees shall be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less. A quorum of the general membership shall consist of thirty (30) or more members.

**4.5. Proxy Voting.** Proxy voting (the power of attorney given by one person to another to vote in his or her stead) is not permitted in any meeting.

### ARTICLE V – OFFICERS AND EMPLOYEES

**5.1. Elected Officers.** The elected officers of the Association shall be a President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, and Treasurer. They shall be voting members in good standing of the Association.

**a. President.** The President is the chief officer of the Association and shall preside at the annual meeting and all meetings of the Executive Committee and perform such other duties as customarily belong to that office or which the Board of Directors or Executive Committee from time to time may assign. The president is an ex-officio member of all Committees and may designate an appropriately qualified member as his designee to attend any committee meetings of the Association in his place and stead.

**b. President-Elect.** The President-Elect shall act in place of the President in the event of his/her absence, death, or inability to act. When so acting the President-Elect shall have all the powers of and be subject to all restrictions upon the President. Specifically, he/she shall be the chairman of all meetings of the Board of Directors. He/she shall perform such other duties as the President, Board of Directors or Executive Committee from time to time may assign. The President-Elect shall automatically become President upon election at the close of the annual meeting.

**c. First Vice-President.** The First Vice-President shall act in place of the President Elect in the event of his/her absence, death or inability to act; and shall perform such other duties as the President, Board of Directors or Executive Committee may assign.

### III.A. USAHA BYLAWS

**d. Second Vice-President.** The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

**e. Third Vice-President.** The Third Vice-President shall take the place of the Second Vice-President in the event of his/her absence, death, or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

**f. Treasurer.** The Treasurer shall be the chief financial officer of the Association, shall be chairman of the Audit Committee and perform those duties that are delegated to the office by the Board of Directors and the Executive Committee. The treasurer shall not be responsible for the day-to-day financial transactions of the Association, which will be assumed by the Executive Director.

**g. Election.**

- 1) The Committee on Nominations and Resolutions shall annually report its recommendations for the offices of President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, Treasurer and Regional Delegates to the Association membership at the first business session.
- 2) The District from which the President originated shall submit a nominee for the office of Third Vice President.
- 3) Should vacancy(ies) occur before the next annual meeting, the District(s) from which the officer(s) vacated shall submit a nominee for the office of Second Vice President (if two vacancies occur a First Vice President will also need to be nominated).
- 4) Nominees for Regional Delegates from the Districts shall be selected by the individual districts and supplied in a timely fashion to the Committee on Nominations and Resolutions for inclusion in its report.
- 5) The Committee on Nominations report will be presented during the first business session. The committee report shall be posted on the registration bulletin board immediately following its presentation at the first business session. The report shall be read again during the second business session at a time certain specified in the program for "Report of Action of the Committee on Nominations and Resolutions." If a paper is being presented at the specified time, the

### III. ORGANIZATIONAL MATTERS

presentation will be completed and, immediately after, the report shall be read. If the program is ahead of schedule, a recess will be taken until the time specified in the program for the amendments to the slate presented by the Committee.

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

**h. Term.** The officers shall serve for one year or until their successors are elected and qualify.

**5.2. Executive Director.** The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association's day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

### ARTICLE VI – BOARD OF DIRECTORS

**6.1. Board of Directors.** The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

**6.2. Composition.** The Board of Directors shall be composed of the following:

- a. The Official Agency Members or their designees
- b. One representative selected by each of the Allied Organization Members
- c. Two delegates-at-large from each of the four regional districts
- d. Past presidents of the Association
- e. The International Member who is the chief animal health executive officer representing the principal federal animal health department of Canada, Mexico, Australia and New Zealand, or said person's designee.
- f. Members of the Executive Committee

**6.3. Meetings.** The Board of Directors shall have a regular meeting at the time and place of the annual meeting, and shall meet at such other times and

### III.A. USAHA BYLAWS

places selected by the President or by request of a majority of the directors, in which latter event, the President shall promptly set the time and place of the meeting. Notice of all meetings of the Board of Directors shall be mailed, published in the Association newsletter or transmitted electronically at least thirty days in advance of such meetings. The President, on such reasonable notice as may be practicable under the circumstances, may call emergency meetings of the Board of Directors. At any meeting of the Board of Directors, the President Elect (Chairman of the Board of Directors), with a majority vote of the Board of Directors, may call for an Executive Session limiting attendance.

**6.4. Duties.** The Board of Directors shall: receive all committee reports and accept or reject all or part of them; review and approve or disapprove with comment the actions of the Executive Committee; and perform such other functions set forth in the By-Laws of the Association.

### ARTICLE VII – EXECUTIVE COMMITTEE

**7.1. Executive Committee.** The Association shall have an Executive Committee composed of the elected officers and the immediate Past President of the Association. In addition, the Executive Director shall serve as an ex officio, non-voting member of the Executive Committee and shall not be counted for the purpose of determining a quorum.

**7.2. Duties.** The Executive Committee shall manage the financial, administrative and internal affairs of the Association when the Board of Directors is not in session. To exercise the authority of the Board of Directors, the Executive Committee must act as a whole, and must forthwith submit its action for approval at the next meeting of the Board of Directors.

**7.3. Meetings.** The Executive Committee shall meet at least four times each fiscal year at such time and place and upon such notice as the President determines. The Executive Committee is authorized to take action upon the concurring votes of a majority of its total membership, provided that a quorum is present.

**7.4. Emergency Meetings.** Should the President determine that an emergency situation exists, the President may convene a telephone or other type of electronic conference meeting of the Executive Committee, which may then act provided a quorum participates.

### ARTICLE VIII – ORGANIZATIONAL DISTRICTS

### III. ORGANIZATIONAL MATTERS

**8.1. Districts.** The Association shall be organized into five districts composed of the Northeast Regional District, the North Central Regional District, the Southern Regional District, the Western Regional District and the District-At-Large.

- a. The Northeast Regional District consists of Association members of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the District of Columbia.
- b. The North Central Regional District consists of Association members of the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.
- c. The Southern Regional District consists of Association members of the states of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and the Virgin Islands and Puerto Rico.
- d. The Western Regional District consists of Association members of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.
- e. The District-At-Large shall be composed of the Allied Organization Members and the Elected Regional Delegate Members and Past Presidents.

### **ARTICLE IX – STANDING AND SPECIAL COMMITTEES**

**9.1. General.** The President shall annually appoint from the members of the Association such standing or special committees or subcommittees and their chairpersons as may be required by the bylaws or as he/she may find necessary. Each committee shall meet at least once per year at the time of the annual meetings of the Association, and at such other times as the President of the Association and committee Chairman deem necessary to accomplish the work of the Committee. Only members of the Association permitted by these by-laws are permitted to vote on the work of the committee.

### III.A. USAHA BYLAWS

**9.2. Program Committee.** A program committee shall be appointed by the President and shall consist of the chairpersons of all committees and the elected officers of the Association to develop the programs for the annual and any special meetings of the Association with the goal of furthering the purposes of the Association. The Program Committee shall be chaired by the President-Elect and co-chaired by the First Vice-President.

**9.3. Committee on Nominations and Resolutions.** The Committee on Nominations and Resolutions shall be comprised of the living past presidents of the Association, the Presidents of the Northeast, North Central, Southern and Western Regional Districts, and the President of the District-At-Large.

**a. Chairman.** The immediate past President of the Association shall chair this committee.

**b. Nomination of Elected Officers.** This Committee shall receive, consider and recommend to the Association's membership at the annual meeting nominations for the elected officers specified in 5.1 and delegates from each district as specified in 6.2.c. The recommendation of elected officers and delegates from each district shall be submitted no later than the third day of September next preceding the annual meeting at which the election will be held.

**c. Resolutions.** This committee shall review all resolutions of the standing and special committees (the Executive Committee and Board of Directors are standing Committees) for ambiguities and redundancy, but shall not alter their intent. After this review, this committee shall present the resolutions to the general membership for approval, which shall require a majority vote.

**9.4. Audit Committee.** The Audit Committee shall receive the annual audit report, and confirm that all financial affairs of the Association are in order and make such recommendations to the Board of Directors as may be necessary to ensure the proper management of the finances of the Association.

**9.5. Special Committees.** The President with the advice of the Executive Committee shall appoint the chairman and members of such other committees as are necessary to accomplish the purposes of the Association.

## ARTICLE X – MISCELLANEOUS

**10.1. Amendments.**

### III. ORGANIZATIONAL MATTERS

- a. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Executive Committee for review. The Executive Committee shall then provide their recommendations on the proposed amendments to the Board of Directors for deliberation and action; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by publication in the next annual meeting proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting.
- b. Amendments to bylaws shall be presented section-by-section at a meeting of the members and shall be approved only upon an affirmative vote of two-thirds of the voting members, provided a quorum is present.
- c. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least thirty members which shall result in their proceeding through steps (2) and (3) above as if the Board of Directors had initially approved the proposed amendment(s).

**10.2. Fiscal Year.** The Executive Committee shall from time to time establish the Association's fiscal year.

**10.3. Parliamentary Procedure.** Robert's Rules of Order Newly Revised shall govern the proceedings of the Association, the Board of Directors and all committees in all cases not otherwise provided for in applicable federal or state statute or rule, the articles of incorporation or bylaws of the Association or its policies or procedures.

**10.4. Confidential Information.** Confidential information of the Association shall be maintained in confidence and not used for any other than Association purposes nor disclosed to others, except as permitted by law, these bylaws or written consent of the Association, by Association members, directors, officers, employees and agents.

**10.5. Liability of Officers and Directors.** The officers and directors of the Association shall not be personally liable for the debts or actions of the Association.

**10.6. Annual Audit.** The Association shall cause an independent certified public accountant, selected by the Executive Committee, to make an annual



### III.A. USAHA BYLAWS

examination of its financial accounts and shall submit the report of examination to Audit Committee.

**10.7. Compensation/Reimbursement.** No member of the Board of Directors, committee member or elected officer of the Association shall receive any compensation for his or her services as such. The Association shall develop policies providing for reimbursement of expenses reasonably incurred in attending meetings and performing special assignments of the Association by the elected officers.

**10.8. Dissolution.** In the event of dissolution, the Association shall distribute its assets as required by the laws and statutes of the State of Delaware; and distribute its remaining net assets in a manner permitted an entity to maintain its status as exempt from taxation under Section 501 (c) (5) of the Internal Revenue Code of 1986, as amended, or any successor provision.

### **III. B. USAHA ADMINISTRATIVE POLICIES**

#### **ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES**

*2012*

1. All members of standing committees must be official members of USAHA in good standing in accordance with Section 3.4 of the bylaws.
2. The Chair, Vice Chair, and all members of USAHA Committees shall be appointed by the President. It is expected that member appointments will be made in consultation with Committee Chair.
3. Efforts should be made to keep committee size to a manageable number of members, and to maintain a geographical balance, as well as an appropriate balance of State, federal, industry and technical members.
4. Committee Chairs shall be appointed for term of not more than five years, and should not be reappointed Chair for at least one year.
5. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.
6. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee reports are not considered official actions until approved by the Board of Directors. Committee resolutions are not considered official actions of USAHA until approved by the general membership.
7. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall deliberate only the subject matter(s) delegated to them by the parent committee and shall report only to the parent committee.
8. Committee rosters for the current year should be finalized no later than 30 days prior to the start of the Annual Meeting.

#### **PARTICIPATION IN USAHA OF FEDERAL AGENCIES AND FEDERAL EMPLOYEES**

*2009*

Federal agencies and personnel have long been an integral and valuable part of USAHA. Agencies have taken part in the organization through official membership and representation on the Board of Directors. This provides the opportunity for presenting agency positions and concerns to the Association. Individual membership and participation of numerous animal health, food safety, and research professionals from a variety of federal agencies is critical to the committees' success.

A major function of USAHA is development of policies and procedures of national disease control and eradication programs. This means that many committee findings and resolutions constitute recommendations to the

### III. B. USAHA ADMINISTRATIVE POLICIES

appropriate federal agency which is responsible for the area of concern. Some of these recommendations are contrary to agency policy or position. For this reason, federal employees should actively share their expertise and opinions as committee members, but should not serve as chairs where they would be making recommendations to their employer.

A number of committees have used federal employees as assistant chairs to good advantage. Also, committees which do not deal with federal agency policy may be chaired by federally-employed USAHA members where appropriate.

The Executive Committee is responsible for the daily activities of the Association, and represents the Association on a year-round basis. To avoid conflict of interest, federal employees should not serve in elected officer positions of the Association. Individuals that serve as an officer that become employed by the federal government should resign their officer position, and a replacement should be sought in accordance with the bylaws.

#### **FINANCIAL AND INVESTMENT POLICY**

*2008*

The following policy outlines the administrative principles of the United States Animal Health Association reserve funds.

##### **Goals**

1. Build and maintain two year's operation expenses in reserves.
2. Maintain adequate liquidity in the instance funds must be called for use.
3. Earn reasonable interest on reserves to maintain principle and exceed economic inflation rates.

##### **Delegation of Authority**

Both Treasurer and Executive Director should be designated as signors on any USAHA accounts. At this time, USAHA will not employ a third-party account manager to manage investments. However, USAHA may utilize the services of a brokerage manager for locating investment opportunities and advice.

##### **Responsibilities**

- Treasurer: Primary authority for investment decisions, acting within parameters of investment policy. Responsible for monthly review of financials and chairing audit committee.
- Executive Director: Manager of investments, to act under direction of Treasurer. Provide research, recommendations to Treasurer for decisions. Responsibility for day-to-day bookkeeping and reporting (to Treasurer/Executive Committee) of financial information. Compile and distribute quarterly investment reports to EC.

### III. ORGANIZATIONAL MATTERS

- Executive Committee: Provide regular review of investments from quarterly reports. Provide oversight of Treasurer and Executive Director decisions.
- Board of Directors: Provide approval and/or amendments to investment policy for execution.

#### **Asset Management**

USAHA shall put at risk no principle of its reserve funds or operating funds. Investments will be held in secured, FDIC insured institutions. Investments should be less than \$100,000 in any single financial institution whenever possible.

All cash received will be deposited into the checking account. To the extent possible, the checking account balance should not exceed \$100,000 at the end of each monthly reporting period.

Reserve funds shall be invested in Certificates of Deposit, Money Market, Treasury Bills or Treasury Notes as determined by the Treasurer. The following guidelines will assist in determining terms to allow reasonable liquidity should the reserves be needed.

- Maximum of 25% of Reserve Funds in products of greater than 4 years.
- Maximum of 25% of Reserve Funds in products of 24 months to 4 years.
- Minimum of 40% of Reserve Fund in products less than 24 months.
- Minimum of 10 % of Reserve funds in money market savings account for immediate liquidity.

USAHA shall make efforts to ladder CD maturity dates so that at least \$50,000 comes due in each fiscal quarter.

This policy will be reviewed annually by the Executive Committee, with any amendments to be brought before the Board of Directors.

#### **Reserve Fund Balance (2010)**

USAHA targets a financial reserves balance equal to two years of operating expenses. The Treasurer and Executive Director are responsible for monitoring this status, and reporting accordingly to the Executive Committee.

Should the reserve balance drop below the target amount, the following criteria should take place:

*85-99% of Target Balance*

The Executive Committee shall make appropriate budget adjustments to increase funds to target amount within one year, or an appropriate timeframe according to current economic conditions.

*50% - 84% of Target Balance*

The Executive Committee shall make appropriate financial cuts and budget adjustments to increase funds to target amount within three years, or a more appropriate timeframe according to current economic conditions.

*Less than 50%*

### III. B. USAHA ADMINISTRATIVE POLICIES

The Executive Committee shall undertake a major financial overhaul of the organization and develop a plan to: 1) operate in a sustainable manner and 2) rebuild the reserve funds to the target area. Adjustments should be made immediately upon Executive Committee approval of the new plan, with modifications subject to Board of Directors at the next annual meeting.

Should the above mitigations prove unsuccessful, the Executive Committee should evaluate all options for the organization to reduce expenses to a sustainable manner. This can include merging management with other organizations, merging the organization collectively with another, or ceasing operations altogether, in which case the organization will be dissolved according to the bylaws and applicable laws.

#### **YEAR-ROUND ACTIVITIES**

*2008*

USAHA is a year-round organization, and is often asked to comment on specific issues related to its mission. USAHA should first refer to its resolutions to address a given issue.

USAHA staff will act upon all resolutions as directed by the membership and Board of Directors, involving necessary correspondence. For issues that arise, that pertain to resolutions, can have direct action taken as deemed necessary. No additional voting is necessary, though the input of the executive committee is encouraged.

Should an issue be presented that no resolution has been approved, the Executive Director/Secretary will coordinate with President and First Vice President (Chair of Government Relations) to determine if USAHA should address the specific issue, with consensus from the Executive Committee.

#### **SPECIAL FUNDS POLICY**

*2009*

USAHA will manage special funds for Committees and closely related organizations to house finances and bookkeeping services. Special funds will be held separate of the general USAHA fund, and USAHA will record transactions accordingly. USAHA will enter into a written agreement for each account with the primary representative of the group or Committee and a designated treasurer for that account. The designated account treasurer holds authority for all transactions. Special fund oversight is held by the USAHA Treasurer with support of the Secretary/Executive Director.

#### **JOB POSTINGS FOR NEWS ALERTS AND WEB SITE**

*2010*

USAHA has available opportunities for distributing position announcements through its daily News Alert Summaries, currently on a weekly basis. The following policy sets forth guidelines for use of this service.

### III. ORGANIZATIONAL MATTERS

USAHA Job Postings are available to any member of the association at no fee. The association will post positions to its web site in addition to the distribution among members.

Non-member groups may also submit positions, however, are subject to review and approval for distribution. The following criteria will be considered:

- 1) Animal health or animal agriculture related
- 2) Fields of veterinary medicine, research, diagnostics, regulatory, technical services, non-profit, and/or other related supporting disciplines
- 3) Align with the mission of USAHA

USAHA reserves the right to refuse posting of any position.

#### **OFFICIAL AGENCY, ALLIED ORGANIZATION MEMBER SUBSTITUTIONS**

*2011*

Official Agency and Allied Organization Members have a designated representative to serve on the board of directors and receive the member benefits for that organization. Occasionally, the designated representative is unable to attend all or some of the annual meeting. In these instances, the representative can designate a substitution to fulfill their obligations on behalf of their agency/organization. This includes:

- Board of Directors Meetings
- Membership Meetings
- Committee Meetings (of which the original representative is an appointed member)

While the USAHA Bylaws state that proxy voting is not allowed, the substitution is treated differently as a transfer of the representative duties.

#### **STUDENT MEMBERSHIP POLICY**

*2012*

Students must be a full-time student in an accredited college or university, in a field of study outlined in the bylaws, part 3.1, E in order to be eligible as a student member and to receive student meeting registration rates.

#### **POLICIES REGARDING USAHA ANNUAL MEETING**

#### **ANNUAL MEETING SPEAKER REGISTRATION/COMPLIMENTARY REGISTRATION**

*Revised 2011*

USAHA will not provide complimentary registration to any member or regular attendee of USAHA annual meetings that is speaking on a committee agenda.

### III. B. USAHA ADMINISTRATIVE POLICIES

USAHA will provide a complimentary registration to non-member, invited speakers by request for committees for the purpose of presenting to a committee or general session. Requests must be submitted to the USAHA office.

USAHA will consider providing for travel expenses for general session and committee speakers on a limited basis. Requests must be submitted to the Executive Committee in advance, with consideration being given to a proposed speaker's expertise, timeliness of subject matter, likelihood of attending the meeting otherwise, and budgetary capabilities.

#### **VIDEO & AUDIO RECORDING OF COMMITTEE PROCEEDINGS**

*2008*

USAHA prohibits third-party video and audio recording of committee meetings at the Annual Meeting.

#### **THIRD PARTY MEETINGS**

*2008*

USAHA will permit related organizations, with missions consistent with those of USAHA, to partner in its Annual Meeting to provide a venue for their gatherings. Agreements are arranged on a case-by-case basis, with input from the Program Chair and approval by the Executive Committee. In general, these organizations are expected to cover related expenses to USAHA for their event. Attendees are also expected to pay registration fees for the Annual Meeting.

#### **AAVLD PARTNERSHIP**

*2008*

USAHA will maintain a Memorandum of Understanding with AAVLD regarding all issues surrounding the Annual Meeting execution. The MOU will serve as a basis for coordination between the two organizations, and be reviewed annually.

#### **ANNUAL MEETING HOST STATE BENEFITS POLICY**

*2010*

As the State hosting the Annual Meeting is often requested to provide support to the organization in terms of staff, supplies and time commitments, USAHA will provide reciprocal in-kind benefits to the hosting State to help offset those costs. USAHA will provide one complimentary registration for every three (3) paid registrations for host state employees. The state animal health official is responsible for communicating the complimentary registration designees to USAHA by the pre-registration deadline. Exceptions to this guideline are subject to review and approval by the Executive Committee.

### III. ORGANIZATIONAL MATTERS

#### **DIRECTOR, OFFICER AND STAFF RELATED POLICIES**

##### **REIMBURSEMENT AND EXPENSES**

*2008*

In accordance with the Bylaws, Section 10.7, USAHA may provide reimbursement or stipend to its officers, board of directors or committee leadership for reasonable expenses incurred while performing specific assignments of the Association. Requests must be submitted to the Executive Committee for approval in advance of the assignment. The Executive Committee will remain judicious in granting requests and mindful of budgetary limitations when considering requests.

USAHA will reimburse staff for all reasonable expenses incurred while performing duties of the Association. Each individual will furnish full documentation of expenses for audit purposes, subject to review of the Treasurer.

Mileage will be reimbursed at the federal Internal Revenue Service rate.

##### **CONFLICT OF INTEREST POLICY**

*2008*

Due to increased scrutiny of non-profit organizations, by the IRS and requirements for increased transparency, USAHA should have in place a conflict of interest policy for its Board of Directors, Officers and Employees. Policy:

Any member or employee involved in a business transaction of the United States Animal Health Association in which a conflict of interest may be present, shall notify the Executive Committee promptly. Said individual shall refrain from voting on such transactions, and exclude themselves from deliberations. The individual will refrain from any personal influence on the transaction. A transaction that involves a conflict of interest should be reviewed against relative competitive bids or proposals. Decisions to pursue a transaction with a potential conflict of interest should first uphold the best interests of USAHA, and include terms that are reasonable to USAHA within the given marketplace.

Approvals will be made by the Executive Committee. A written disclosure summarizing any possible conflict of interest shall be kept on file at the USAHA office. Discussion and resolution shall be indicated in the minutes of the USAHA Executive Committee session.

Conflict of interest should be disclosed if: a transaction of USAHA involves any close relative of a Director or Employee as the direct vendor/provider, or the Director/Employee stands material gain through a transaction. A Director or Employee holds financial interest if holdings are of 5% or greater of the potential vendor, or holds position of influence with an organization that seeks to do business with USAHA.

A close relative is defined as any parent, spouse, sibling, child, grandchild, or spouse of the aforementioned. Also to be included would be



### III. B. USAHA ADMINISTRATIVE POLICIES

any individual residing in the same household that would resemble a parental or marital relationship.

#### **WHISTLEBLOWER POLICY**

*2008*

Employees and members of USAHA should report illegal or unethical activities, directly relating to the business of USAHA, to the President. The President, in consultation with the Executive Committee, will then determine appropriate actions for investigation, reporting to proper authorities, and reconciliation as necessary.

Employees and members will be provided full confidentiality for reporting such activities, and the President and Executive Committee will ensure due diligence in protecting against retaliation by the organization, its members or other employees and supervisors.

#### **DOCUMENT RETENTION AND DESTRUCTION POLICY**

*2008*

USAHA will maintain all financial records for seven years. They will then be disposed of by either cross-shredding or incineration.

Meeting registrations and membership renewals will be kept for three years.

#### **USAHA PROFESSIONAL DEVELOPMENT SUPPORT**

*2011*

USAHA sees the importance of continuing education for its employees. USAHA may support the opportunities sought by its employees to enhance his/her skill sets. The following is an outline of benefit for employees.

USAHA may provide support as follows:

##### **General**

Support for professional development must be pre-approved by the employee's supervisor prior to commitment in order to receive benefits. Any opportunity should be directly beneficial to current job functions or can be justified as direct future benefit to the Association.

##### **Flexible Scheduling**

USAHA may work with employee to accommodate scheduling of work hours to allow for professional development. This can include:

- University/College courses during normal work hours
- Conferences/seminars for professional development
- Other events with pre-approval of supervisor

Employees should strive to maintain a full work week (40 hours) by making up any lost time at hours mutually agreed upon by employee and supervisor.

##### **Academic Courses**

USAHA may support tuition for courses directly beneficial to the employee's job duties, up to \$1000 per fiscal year. Tuition will be reimbursed

### III. ORGANIZATIONAL MATTERS

upon completion of the course by the employee, with a minimum of a C grade or relative “passing” status when grading is not applicable. Courses will be considered regardless of degree/non-degree track.

(\*Reimbursements are a taxable benefit.)

#### **Conference/Seminar Registration**

USAHA may support registration costs for conferences, seminars or other related courses (self-directed, web-based, etc.) Such programs should enhance the employee’s ability to do current job functions, or expand skill sets to take on additional duties. USAHA may support up to three conferences per year to a maximum of \$1000, unless employee is taking academic courses.

#### **Travel**

Travel, lodging and meals are reimbursable at federal per diem rates for development opportunities outside of local meetings, such as the St. Joseph or Kansas City areas.

### **III. C. Previous Meetings of the United States Animal Health Association**

### III. ORGANIZATIONAL MATTERS

<b>No.</b>	<b>Date</b>	<b>Place of Meeting</b>	<b>President</b>	<b>Secretary/Executive</b>
1	Sept. 27-28, 1897 †	Fort Worth, TX	*Mr. C.P. Johnston, Springfield, IL	*Mr. D. O. Lively, Fort Worth, TX
2	Oct. 11-12, 1898	Omaha, NE	*Mr. C.P. Johnston, Springfield, IL	*Mr. Taylor Riddie, KS
3	Oct. 11-12, 1899 ††	Chicago, IL	*Mr. C.P. Johnston, Springfield, IL	*Mr. Mortimer Levering, Lafayette, IN
4	Oct. 2-3, 1900	Louisville, KY	*Mr. C.P. Johnston, Springfield, IL	*Dr. E.T. Eisenman, Louisville, KY
5	Oct. 8-9, 1901	Buffalo, NY	* Dr. E.P. Niles, VA	*Dr. E.T. Eisenman, Louisville, KY
6	Sept. 23-24, 1902	Wichita, KS	*Mr. W.H. Dunn, TN	*Mr. Wm. P. Smith, Monticello, IL
7	Sept. 22-23, 1903	Denver, CO	*Mr. E. Bolton, Woodward, OK	*Mr. Wm. P. Smith, Monticello, IL
8	Aug. 23-24, 1904	St. Louis, MO	*Dr. J.C. Norton, AZ	*Mr. Wm. P. Smith, Monticello, IL
9	Aug. 15-16, 1905	Guthrie, OK	*Mr. Wm. P. Smith, Monticello, IL	*Dr. S. H. Ward, St. Paul, MN
10	Aug. 15-16, 1906	Springfield, IL	*Mr. M. M. Hankins, Quanah, TX	*Dr. S. H. Ward, St. Paul, MN
11	Sept. 16-17, 1907	Richmond, VA	*Dr. D. F. Luckey, Columbia, MD	*Dr. S. H. Ward, St. Paul, MN
12	Sept. 14-16, 1908	Washington, DC	*Dr. Charles G. Lamb, CO	*Dr. C. E. Cotton, St. Paul, MN
13	Sept. 13-15, 1909 ‡	Chicago, IL	*Dr. W. H. Dalrymple, Baton Rouge, LA	*Dr. C. E. Cotton, St. Paul, MN
14	Dec. 5-7, 1910	Chicago, IL	*Dr. C. E. Cotton, St. Paul, MN	*Mr. J. J. Ferguson, Chicago, IL
15	Dec. 5-6, 1911	Chicago, IL	*Dr. John F. Devine, Goshen, NY	*Mr. J. J. Ferguson, Chicago, IL
16	Dec. 3-5, 1912	Chicago, IL	*Dr. Macyck P. Ravener, Madison, WI	*Mr. J. J. Ferguson, Chicago, IL
17	Dec. 2-4, 1913	Chicago, IL	*Dr. Peter F. Bahnsen, Atlanta, GA	*Mr. J. J. Ferguson, Chicago, IL
18	Feb. 16-18, 1914	Chicago, IL	*Dr. S.H. Ward, St. Paul, MN	*Mr. J. J. Ferguson, Chicago, IL
19	Dec. 2-3, 1915	Chicago, IL	*Dr. J. L. Gibson, Des Moines, IA	*Mr. J. J. Ferguson, Chicago, IL
20	Dec. 5-7, 1916	Chicago, IL	*Dr. O. E. Dyson, Springfield, IL	*Mr. J. J. Ferguson, Chicago, IL
21	Dec. 3-5, 1917	Chicago, IL	*Dr. J. G. Wills, Albany NY	*Dr. S. H. Ward, St. Paul, MN
22	Dec. 2-4, 1918	Chicago, IL	*Dr. M. Jacob, Knoxville, TX	*Dr. S. H. Ward, St. Paul, MN
23	Dec. 1-3, 1919	Chicago, IL	*Dr. G. W. Dumphy, Lansing, MI	*Dr. D. M. Campbell, Chicago, IL

### III. C. PREVIOUS MEETINGS

<b>No.</b>	<b>Date</b>	<b>Place of Meeting</b>	<b>President</b>	<b>Secretary/Executive</b>
24	Nov. 29-Dec. 1, 1920	Chicago, IL	*Dr. S. F. Musselman, Frankfort, KY	*Dr. D. M. Campbell, Chicago, IL
25	Nov. 28-30, 1921	Chicago, IL	*Dr. W. F. Crewe, Bismarck, MD	*Dr. Theo. Burnett, Columbus, OH
26	Dec. 6-8, 1922	Chicago, IL	*Dr. T. E. M. Munce, Harrisburg, PA	*Dr. Theo. Burnett, Columbus, OH
27	Dec. 5-7, 1923	Chicago, IL	*Dr. W.J. Butler, Henena, MT	*Dr. O.E. Dyson, Kansas City, MO
28	Dec. 3-5, 1924	Chicago, IL	*Dr. J. G. Ferneyhough, Richmond, VA	*Dr. O.E. Dyson, Kansas City, MO
29	Dec. 2-4, 1925	Chicago, IL	*Dr. J. H. McNeil, Trenton, NJ	*Dr. O.E. Dyson, Kansas City, MO
30	Dec. 1-3, 1926	Chicago, IL	*Dr. John R. Mohler, Washington, DC	*Dr. O.E. Dyson, Kansas City, MO
31	Nov. 30-Dec. 2, 1927	Chicago, IL	*Dr. L. Van Es, Lincoln, NE	*Dr. O.E. Dyson, Kansas City, MO
32	Dec. 5-7, 1928	Chicago, IL	*Dr. C. A. Cary, Auburn, AL	*Dr. O.E. Dyson, Kansas City, MO
33	Dec. 4-6, 1929	Chicago, IL	*Dr. Chas. O. Lamb, Denver, CO	*Dr. O.E. Dyson, Kansas City, MO
34	Dec. 3-5, 1930	Chicago, IL	*Dr. A. E. Wright, Washington, DC	*Dr. O.E. Dyson, Kansas City, MO
35	Dec. 2-4, 1931	Chicago, IL	*Dr. J. W. Connaway, Columbia, MD	*Dr. O.E. Dyson, Kansas City, MO
36	Nov. 30-Dec. 2, 1932	Chicago, IL	*Dr. Peter Malcolm, Des Moines, IA	*Dr. O.E. Dyson, Kansas City, MO
37	Dec. 6-8, 1933	Chicago, IL	*E. T. Faulder, Albany, NY	*Dr. O.E. Dyson, Kansas City, MO
38	Dec. 5-7, 1934	Chicago, IL	*Dr. T. E. Robinson, Providence, RI	*Dr. O.E. Dyson, Kansas City, MO
39	Dec. 4-6, 1935	Chicago, IL	*Dr. Edward Records, Reno, NV	*Dr. O.E. Dyson, Kansas City, MO
40	Dec. 2-4, 1936	Chicago, IL	*Dr. Walter Wisnicky, Madison, WI	*Dr. O.E. Dyson, Kansas City, MO
41	Dec. 1-3, 1937	Chicago, IL	*Dr. R. W. Smith, Concord, NH	*Dr. O.E. Dyson, Kansas City, MO
42	Nov. 30-Dec. 2, 1938	Chicago, IL	*Dr. D. E. Westmoreland, Frankfort, KY	*Dr. O.E. Dyson, Kansas City, MO
43	Dec. 6-8, 1939	Chicago, IL	*Dr. J. L. Axby, Indianapolis, IN	*Dr. O.E. Dyson, Kansas City, MO
44	Dec. 4-6, 1940	Chicago, IL	*Dr. H. D. Port, Cheyenne, WY	*Dr. Mark Welsh, College Park, MD
45	Dec. 3-5, 1941	Chicago, IL	*Dr. E. A. Crossman, Boston, MA	*Dr. Mark Welsh, College Park, MD
46	Dec. 2-4, 1942	Chicago, IL	*Dr. I. S. McAdory, Auburn, AL	*Dr. Mark Welsh, College Park, MD

### III. ORGANIZATIONAL MATTERS

<b>No.</b>	<b>Date</b>	<b>Place of Meeting</b>	<b>President</b>	<b>Secretary/Executive</b>
47	Dec. 1-3, 1943	Chicago, IL	*Dr. W. H. Hendricks, Salt Lake City, UT	*Dr. R. A. Hendershott, Trenton, NJ
48	Dec. 6-8, 1944	Chicago, IL	*Dr. J. M. Sutton, Atlanta, GA	*Dr. R. A. Hendershott, Trenton, NJ
49	Dec. 5-7, 1945	Chicago, IL	*Dr. C. U. Duckwork, Sacramento, CA	*Dr. R. A. Hendershott, Trenton, NJ
50	Dec. 4-6, 1946	Chicago, IL	*Dr. William Moore, Raleigh, NC	*Dr. R. A. Hendershott, Trenton, NJ
51	Dec. 3-5, 1947	Chicago, IL	*Dr. Will J. Miller, Topeka, KS	*Dr. R. A. Hendershott, Trenton, NJ
52	Oct. 13-15, 1948	Denver, CO	*Dr. Jean V. Knapp, Tallahassee, FL	*Dr. R. A. Hendershott, Trenton, NJ
53	Oct. 12-14, 1949	Columbus, OH	*Dr. T. O. Brandenburg, Bismarck, ND	*Dr. R. A. Hendershott, Trenton, NJ
54	Nov. 1-3, 1950	Phoenix, AZ	*Dr. C. P. Bishop, Harrisburg, PA	*Dr. R. A. Hendershott, Trenton, NJ
55	Nov. 14-16, 1951	Kansas City, KS	*Mr. F. E. Mollin, Denver, CO	*Dr. R. A. Hendershott, Trenton, NJ
56	Oct. 29-31, 1952	Louisville, KY	*Dr. Ralph L. West, St. Paul, MN	*Dr. R. A. Hendershott, Trenton, NJ
57	Sept. 23-25, 1953	Atlantic City, NJ	*Dr. T. Childs, Ottawa, Canada	*Dr. R. A. Hendershott, Trenton, NJ
58	Nov. 10-12, 1954	Omaha, NE	*Dr. T. C. Green, Charleston, WV	*Dr. R. A. Hendershott, Trenton, NJ
59	Nov. 16-18, 1955	New Orleans, LA	*Dr. H. E. Wilkins, Helena, MT	*Dr. R. A. Hendershott, Trenton, NJ
60	Nov. 28-30, 1956	Chicago, IL	*Dr. A. L. Brueckner, Baltimore, MD	*Dr. R. A. Hendershott, Trenton, NJ
61	Nov. 13-15, 1957	St. Louis, MO	*Dr. G. H. Good, Cheyenne, WY	*Dr. R. A. Hendershott, Trenton, NJ
62	Nov. 4-6, 1958	Miami Beach, FL	*Dr. John G. Milligan, Montgomery, AL	*Dr. R. A. Hendershott, Trenton, NJ
63	Nov. 15-18, 1959	San Francisco, CA	*Mr. F. G. Buzzell, Augusta, ME	*Dr. R. A. Hendershott, Trenton, NJ
64	Oct. 17-21, 1960	Charleston, WV	*Dr. J. R. Hay, Chicago, IL	*Dr. R. A. Hendershott, Trenton, NJ
65	Oct. 30-Nov. 3, 1961	Minneapolis, MN	*Dr. A. P. Schneider, Boise, ID	*Dr. R. A. Hendershott, Trenton, NJ
66	Oct. 30-Nov. 2, 1962	Washington, DC	*Dr. W. L. Bendix, Richmond, VA	*Dr. R. A. Hendershott, Trenton, NJ
67	Oct. 15-18, 1963	Albuquerque, NM	*Dr. T. J. Grennan, Jr. Providence, RI	*Dr. R. A. Hendershott, Trenton, NJ
68	Oct. 19-23, 1964	Memphis, TN	*Dr. L. A. Rosner, Jefferson City, MO	*Dr. R. A. Hendershott, Trenton, NJ

### III. C. PREVIOUS MEETINGS

<b>No.</b>	<b>Date</b>	<b>Place of Meeting</b>	<b>President</b>	<b>Secretary/Executive</b>
69	Oct. 25-29, 1965	Lansing, MI	*Dr. J. W. Safford, Helena, MT	*Dr. R. A. Hendershott, Trenton, NJ
70	Oct. 10-14, 1966	Buffalo, NY	*Dr. C. L. Campbell, Tallahassee, FL	*Dr. R. A. Hendershott, Trenton, NJ
71	Oct. 16-20, 1967	Phoenix, AZ	*Dr. Grant S. Kaley, Albany, NY	*Dr. R. A. Hendershott, Trenton, NJ
72	Oct. 6-11, 1968	New Orleans, IA	*Dr. John F. Quinn, Lansing, MI	*Dr. W.L. Bendix, Richmond, VA
73	Oct. 12-19, 1969	Milwaukee, WI	*Dr. John L. Oharra, Reno, NV	*Dr. W.L. Bendix, Richmond, VA
74	Oct. 18-23, 1970	Philadelphia, PA	*Dr. Frank B. Wheeler, Baton Rouge, LA	*Dr. W.L. Bendix, Richmond, VA
75	Oct. 24-29, 1971	Oklahoma City, OK	*Dr. M.D. Mitchell, Pierre, SD	*Dr. W.L. Bendix, Richmond, VA
76	Nov. 5-10, 1972	Miami Beach, FL	*Dr. J. C. Shook, Mechanicsburg, PA	*Dr. W.L. Bendix, Richmond, VA
77	Oct. 14-19, 1973	St. Louis, MO	*Dr. W. C. Tobin, Denver, CO	*Dr. W.L. Bendix, Richmond, VA
78	Oct. 13-18, 1974	Roanoke, VA	*Mr. O. H. Timm, Dixon, CA	*Dr. W.L. Bendix, Richmond, VA
79	Nov. 2-7, 1975	Portland, OR	*Dr. J. E. Andrews, Atlanta, GA	*Dr. W.L. Bendix, Richmond, VA
80	Nov. 7-12, 1976	Miami Beach, FL	*Dr. H. E. Goldstein, Columbus, OH	*Dr. W.L. Bendix, Richmond, VA
81	Oct. 16-21, 1977	Minneapolis, MN	*Dr. A. E. Janawicz, Montpelier, VT	*Dr. W.L. Bendix, Richmond, VA
82	Oct. 21-Nov. 3, 1978	Buffalo, NY	**Dr. L. E. Bartell, Sacramento, CA	*Dr. W.L. Bendix, Richmond, VA
83	Oct. 28-Nov. 2, 1979	San Diego, CA	*Dr. T. F. Zweigart, Raleigh, NC	*Dr. J. C. Shook, Hyattsville, MD
84	Nov. 2-7, 1980	Louisville, KY	*Mr. B. W. Hawkins, Ontario, OR	*Dr. J. C. Shook, Hyattsville, MD
85	Oct. 11-16, 1981	St. Louis, MO	*Dr. L. W. Hinchman, Indianapolis, IN	*Dr. J. C. Shook, Hyattsville, MD
86	Nov. 7-12, 1982	Nashville, TN	*Dr. G. B. Rea, Salem, OR	*Dr. J. C. Shook, Hyattsville, MD
87	Oct. 15-21, 1983	Las Vegas, NV	Dr. J. R. Ragan, Nashville, TN	*Dr. J. C. Shook, Annapolis, MD
88	Oct. 21-26, 1984	Fort Worth, TX	*Mr. J. O. Pearce, Jr. Okeechobee, FL	*Dr. J. C. Shook, Annapolis, MD
89	Oct. 27-Nov. 1, 1985	Milwaukee, WI	*Dr. David U. Walker, Montpelier, VT	*Dr. J. C. Shook, Annapolis, MD
90	Oct. 14-19, 1986	Louisville, KY	*Dr. N. W. Kruse, Lincoln, NE	*Dr. J. C. Shook, Mechanicsburg, PA
91	Oct. 25-30, 1987	Salt Lake City, UT	*Dr. J. F. Hudelson, Denver, Co	*Dr. J. C. Shook, Mechanicsburg, PA

### III. ORGANIZATIONAL MATTERS

<b>No.</b>	<b>Date</b>	<b>Place of Meeting</b>	<b>President</b>	<b>Secretary/Executive</b>
92	Oct. 16-21, 1988	Little Rock, AR	*Dr. J. A. Cobb, Atlanta, GA	*Dr. J. C. Shook, Mechanicsburg, PA
93	Oct. 28-Nov. 3, 1989	Las Vegas, NV	Mr. P. E. Bradshaw, Griggsville, IL	*Dr. J. C. Shook, Mechanicsburg, PA
94	Oct. 6-12, 1990	Denver, CO	Dr. M. A. Van Buskirk, Harrisburg, PA	*Dr. J. C. Shook, Mechanicsburg, PA
95	Oct. 26-Nov. 1, 1991	San Diego, CA	*Dr. P. L. Smith, Sacramento, CA	*Dr. J. C. Shook, Mechanicsburg, PA
96	Oct. 31-Nov. 6, 1992	Louisville, KY	Dr. J. Lee Alley, Montgomery, AL	*Dr. J. C. Shook, Mechanicsburg, PA
97	Oct. 23-29, 1993	Las Vegas, NV	Dr. T. J. Hagerly, St. Paul, MN	*Dr. J. C. Shook, Mechanicsburg, PA
98	Oct. 29-Nov. 4, 1994	Grand Rapids, MI	*Mr. J. B. Finley, Jr., Encinal, TX	*Dr. J. C. Shook, Mechanicsburg, PA
99	Oct. 28-Nov. 3, 1995	Reno, NV	Dr. H. Wesley Towers, Dover, DE	*Dr. J. C. Shook, Mechanicsburg, PA
100	Oct. 12-18, 1996	Little Rock, AR	Dr. M. R. Marshall, Salt Lake City, UT	*Dr. J. C. Shook, Mechanicsburg, PA
101	Oct. 17-24, 1997	Louisville, KY	Dr. Larry L. Williams, Lincoln NE	*Dr. J. C. Shook, Mechanicsburg, PA
102	Oct. 3-9, 1998	Minneapolis, MN	Dr. Jones W. Bryan, Columbia, SC	*Dr. J. C. Shook, Mechanicsburg, PA
103	Oct. 7-14, 1999	San Diego, CA	Dr. Richard H. McCapes, Davis, CA	*Dr. J. C. Shook, Mechanicsburg, PA
104	Oct. 19-26, 2000	Birmingham, AL	Dr. Ernest W. Zirkle, Trenton, NJ	Dr. J Lee Alley, Montgomery, AL
105	Nov. 1-8, 2001	Hershey, PA	Dr. Bob R. Hillman, Boise, ID	Dr. J Lee Alley, Montgomery, AL
106	Oct. 1-24, 2002	St. Louis, MO	Dr. Maxwell Lea, Jr., Baton Rouge, LA	Dr. J Lee Alley, Montgomery, AL
107	Oct. 9-16, 2003	San Diego, CA	*Mr. Bob Frost, Lincoln, CA	Dr. J Lee Alley, Montgomery, AL
108	Oct. 21-27, 2004	Greensboro, NC	Dr. Donald Lein, Ithaca, NY	Dr. J Lee Alley, Montgomery, AL
109	Nov. 3-9, 2005	Hershey, PA	Dr. Richard D. Willer, Phoenix, AZ	Dr. J Lee Alley, Montgomery, AL
110	Oct. 12-18, 2006	Minneapolis, MN	Dr. Bret D. Marsh, Indianapolis, IN	Dr. J Lee Alley, Montgomery, AL
111	Oct. 18-24, 2007	Reno, NV	Dr. Lee M. Myers, Atlanta, GA	§Dr. J Lee Alley, Montgomery, AL/Mr. Benjamin Richey, St. Joseph, MO
112	Oct. 23-29, 2008	Greensboro, NC	Mr. James W. Leafstedt, Alcester, SD	Mr. Benjamin Richey, St. Joseph, MO
113	Oct. 8-14, 2009	San Diego, CA	Dr. Donald E. Hoenig, Belfast, ME	Mr. Benjamin Richey, St. Joseph, MO
114	Nov. 11-17, 2010	Minneapolis, MN	Dr. Richard E. Breitmeyer, Sacramento, CA	Mr. Benjamin Richey, St. Joseph, MO



### III. C. PREVIOUS MEETINGS

No.	Date	Place of Meeting	President	Secretary/Executive
115	Sept. 29- Oct.5, 2011	Buffalo, NY	Dr. Steven L. Halstead, East Lansing, MI	Mr. Benjamin Richey, St. Joseph, MO
116	Oct. 18-24, 2012	Greensboro, NC	Dr. David T. Marshall, Raleigh, NC	Mr. Benjamin Richey, St. Joseph, MO
117	Oct. 17-23, 2013	San Diego, CA	Dr. David L. Meeker, Alexandria, VA	Mr. Benjamin Richey, St. Joseph, MO
118	Oct. 16-22, 2014	Kansas City, MO	Dr. Stephen K. Crawford, Concord, NH	Mr. Benjamin Richey, St. Joseph, MO
119	Oct. 22-28, 2015	Providence, RI	Dr. Bruce L. King, Axtell, UT	Mr. Benjamin Richey, St. Joseph, MO
120	Oct. 13-19, 2016	Greensboro, NC	Dr. David D. Schmitt, Ankeny, IA	Mr. Benjamin Richey, St. Joseph, MO
121	Oct. 12-18, 2017	San Diego, CA	Dr. Boyd H. Parr, Columbia, SC	Mr. Benjamin Richey, St. Joseph, MO

**Key**

\* Deceased

‡ Last meeting of the Interstate Association of Livestock Sanitary Boards

\*\* Resigned Dec. 12, 1977

§ USAHA hired an Executive Director, in lieu of the Secretary, effective 2006-2007

† Reprinted in 54th Annual Proceedings

†† Reprinted in 66th Annual Proceedings

### **III. D. USAHA Award Winners**

III.D. USAHA AWARD WINNERS

**USAHA MEDAL OF DISTINCTION RECIPIENTS**

110<sup>th</sup> Annual Meeting, Minneapolis, Minnesota – 2006  
Dr. Clarence L. Campbell, Tallahassee, Florida  
Dr. Richard H. McCapes, Davis, California

111<sup>th</sup> Annual Meeting, Reno, Nevada – 2007  
Dr. J. Lee Alley, Montgomery, Alabama  
Mrs. Linda B. Ragland, Richmond, Virginia

112<sup>th</sup> Annual Meeting, Greensboro, North Carolina – 2008  
Dr. John C. Shook, Mechanicsburg, Pennsylvania

113<sup>th</sup> Annual Meeting, San Diego, California – 2009  
Dr. Bret E. Marsh, Indianapolis, Indiana

114<sup>th</sup> Annual Meeting, Minneapolis, Minnesota – 2010  
Mr. Neal F. Black, Eagan, Minnesota  
Dr. Thomas J. Hagerty, St. Michael, Minnesota

115<sup>th</sup> Annual Meeting, Buffalo, New York– 2011  
Dr. Bob E. Hillman, Boise, Idaho

116<sup>th</sup> Annual Meeting, Greensboro, North Carolina – 2012  
Dr. John E. Ragan, Bowie, Maryland

117<sup>th</sup> Annual Meeting, San Diego, California – 2013  
Dr. Don H. Lein, Ithaca, New York

118<sup>th</sup> Annual Meeting, Kansas City, Missouri – 2014  
Mr. William Hawks, Washington, District of Columbia

119<sup>th</sup> Annual Meeting, Providence, Rhode Island – 2015  
Dr. Richard Breitmeyer, Davis, California

120<sup>th</sup> Annual Meeting, Greensboro, North Carolina – 2016  
Mr. Jim Leafstedt, Alcester, South Dakota

121<sup>st</sup> Annual Meeting, San Diego, California – 2017  
Mr. Bobby Acord, Rocky Point, North Carolina

### III. ORGANIZATIONAL MATTERS

#### **USAHA FEDERAL PARTNERSHIP AWARD RECIPIENTS**

115<sup>th</sup> Annual Meeting, Buffalo, New York– 2011  
Dr. Jack Shere, Raleigh, North Carolina  
Dr. William Smith, Sutton, Massachusetts

116<sup>th</sup> Annual Meeting, Greensboro, North Carolina – 2012  
Dr. Donald Otto, Knoxville, Iowa

117<sup>th</sup> Annual Meeting, San Diego, California – 2013  
Dr. Donald Evans, Topeka, Kansas

118<sup>th</sup> Annual Meeting, Kansas City, Missouri – 2014  
Dr. Sarah Tomlinson, Fort Collins, Colorado

119<sup>th</sup> Annual Meeting, Providence, Rhode Island – 2015  
Dr. Kevin Petersburg, Des Moines, Iowa

120<sup>th</sup> Annual Meeting, Greensboro, North Carolina – 2016  
Dr. Angela Pelzel-McCluskey, Fort Collins, Colorado

121<sup>st</sup> Annual Meeting, San Diego, California – 2017  
Dr. Jonathan Zack, Riverdale, Maryland

III.D. USAHA AWARD WINNERS

**OTHER AWARDS**

<b>Year</b>	<b>APHIS Administrator's Award</b>	<b>National Assembly Award</b>
2017	Dr. Bruce Akey, TX	Dr. Kent Fowler, CA
2016	Dr. Annette Jones, CA	Mr. Paul Rodgers, WV
2015	Dr. Dustin Oedekoven	Dr. Bob Meyer
2014	Dr. Donald Ritter	Dr. Tom Holt
2013	Dr. James Roth	Dr. Bill Hartmann
2012	Dr. Donald Hoenig	Dr. Jim Logan
2011	Dr. Don Lein	Dr. Taylor Woods
2010	Dr. Alex Ardans; Dr. Alfonso Torres	Mr. George Teagarden
2009	Mr. James Leafstedt	Mr. John Adams
2008	Dr. Claude Barton	Dr. Bret D. Marsh
2007	Dr. Francois Elvinger	Dr. Bob Hillman
2006	Dr. Terry McElwain; Dr. Willie Reed	Dr. Sam Holland
2005	Dr. Bob Hillman	Dr. Richard D. Willer
2004	Dr. Joan Arnoldi	Dr. Steven England
2003	Ms. Martha Roberts	Dr. John Huntley
2002	Mr. Gus Douglas	Dr. Ernest W. Zirkle
2001	Dr. Richard E. Breitmeyer	Dr. Richard E. Breitmeyer
2000	Dr. Mo Salman	Dr. H. Wesley Towers, Jr
1999	Dr. Terry Beals	Dr. Ralph Knowles
1998	Dr. Marvin Beeman	Dr. Larry L. Williams
1997	Dr. Elizabeth A. Lautner	Dr. Terry L. Beals
1996	Dr. Paul B. Doby	Dr. J. Lee Alley
1995	Mr. Philip E. Bradshaw	Dr. Lewis P. Thomas
1994	Mr. Neal Black	Dr. J. C. Shook
1993	Mrs. Ella Blanton	Dr. Calvin W. S. Lum
1992	Dr. Pat Smith	Dr. Patton L. Smith

### III. ORGANIZATIONAL MATTERS

1991	Dr. C. L. Campbell	Dr. Paul B. Doby
1990	Dr. David T. Berman	Dr. Clarence L. Campbell
1989	Mr. John B. Armstrong	Ms. Mabel Owen
1988	Dr. Frank A. Hayes	
1987	Dr. Robert P. Hanson	
1986	Dr. Benjamin s. Pomeroy	
1985	Dr. J. G. Flint	
1984	Dr. William C. Tobin	
1983	Dr. Harold E. Nadler	
1982	Dr. John L. O'Harra	
1981	Dr. J. D. Lamont	
1980	Dr. John F. Quinn	
1979	Dr. A. G. Boyd	
1978	Mr. Francis Buzzell	
1977	Dr. Jay Arthur Myers	

**IV. APPENDIX**  
**A. GLOSSARY OF COMMONLY USED ACRONYMS**

#### IV.A.GLOSSARY OF ACRONYMS

AAAP	American Association of Avian Pathologist
AAC	Animal Agriculture Coalition
AAEP	American Association of Equine Practitioners
AAHA	American Animal Hospital Association
AASV	American Association of Swine Veterinarians
AAVLD	American Association of Veterinary Laboratory Diagnosticians
AAWV	American Association of Wildlife Veterinarians
AB	Antibiotic
ABADRU	Arthropod Borne Animal Diseases Research Unit
ABTICS	Abstract and Book Title Index Card Service
ACAN	American Council of Animal Naturopathy
ADD	Advanced Animal Diagnostics
ADT	Animal Disease Traceability
AF	Accredited free
AFIA	American Feed Industry Association
AFS	American Fisheries Society
AGID	Agar gel immunodiffusion
AHC	American Horse Council
AHS	African horse sickness
AHTs	Animal health technicians
AIDS	Acquired immune deficiency syndrome
AmPV	Avian Metapneumovirus
AMR	Antimicrobial resistance
AMS	Agriculture Marketing Services
APAD	Animal Pest and Disease Prevention Program
APEC	Avian pathogenic E. coli
APMV	Avian paramyxovirus
ARMAR	Agriculture Response Management and Resources
ARS	Agricultural Research Services
ASAP	Agricultural Stewardship Assurance Program
AST	Aspartate aminotransferase
ATL	Advance Technology Laboratory
AVBP	American Veterinarians in Broiler Production
AVEP	Association of Veterinarians in Egg Production
AVMA	American Veterinary Medical Association
BCS	Body condition score
BFB	Biosecurity for the Birds
BHV-1	Bovine herpesvirus-1
BLV	Bovine Leukosis Virus



#### IV.A. GLOSSARY OF ACRONYMS

BRI	Biosecurity Research Institute
BRT	Brucellosis Ring Test
BSA	Bovine Serum Albumen
BSE	Bovine spongiform encephalopathy
BTV	Bluetongue virus
BVDV	Bovine viral diarrhea virus
C/D	Cleaning and disinfection
CA	Control Area
CADMS	Center of Animal Disease Modeling and Surveillance
CAHPS	Commercial aquaculture health program standards
CAST	Council on Agricultural Science and Technology
CCT	Comparative cervical tuberculin
CD	Clostridial Dermatitis
CDC	Centers for Disease Control and Prevention
CDV	Canine distemper virus
CE	Continuing education
CEAH	Center for Epidemiology and Animal Health
CEM	Contagious Equine Metritis
CFIA	Canadian Food Inspection Agency
CFMC	Community Foundation for Monterey County
CFR	Code of Federal Regulations
CFSPH	Center for Food Security and Public Health
CFT	Complement fixation test
CFT	Cattle fever ticks
CFT	Caudal fold test
CFTEP	Cattle Fever Tick Eradication Program
CGAHR	Center for Grain and Animal Health Research
CIS	Comprehensive and integrated surveillance
CIS	Client information sheet
CLSM	Comprehensive Laboratory Submission Module
CNS	Central nervous system
COB	Continuity of business
COPEG	Commission for the Eradication and Prevention of Screwworm
CPG	Comprehensive Preparedness Guide
CPQAs	Control purpose quarantine areas
CSFV	Classical swine fever virus
CT	Cycle threshold
CTC	Chlortetracycline
CVB	Center for Veterinary Biologics

#### IV.A.GLOSSARY OF ACRONYMS

CVI	Certificates of Veterinary Inspection
CVM	Center for Veterinary Medicine
DER	Drug Establishment Registration
DFWED	Division of Foodborne, Waterborne, and Environmental Diseases
DHS	Department of Homeland Security
DNA	Deoxyribonucleic acid
DoD	Department of Defense
DPP	Dual-Path Platform
DSAs	Designated surveillance areas
DTRA	Defense Threat Reduction Agency
DVM	Doctor of Veterinary Medicine & Surgery
EAI's	Emerging Animal Issues
eCVI	Electronic Certificates of Veterinary Inspection
EDCC	Equine Disease Communication Center
EDLU	Extralabel Drug Use
EECVI	Extended Equine Certificate of Veterinary Inspection
EEE	Eastern Equine Encephalitis
EEZ	Exclusive Economic Zone
EHDV	Epizootic hemorrhagic disease virus
EHM	Equine herpesvirus myeloencephalopathy
EIA	Equine Infectious Anemia
EID	Electronic identification
ELDU	Extra-label drug use
ELISA	Enzyme-linked immunosorbent assay
EMRS	Emergency Management Response System
EP	Equine Piroplasmiosis
EPA	Environmental Protection Agency
ERMS	Emergency Management Response System
ESPD	Emerging swine production diseases
EV	Export Verification
EVA	Equine Viral Arteritis
FAD	Foreign animal disease
FADDL	Foreign Animal Disease Diagnostic Laboratory
FADDs	Foreign Animal Disease Diagnosticians
FAO	Food and Agriculture Organization
FAST	Federal and State Transport
FBS	Fetal Bovine Serum
FCV	Feline calicivirus
FDA	Food and Drug Administration

#### IV.A. GLOSSARY OF ACRONYMS

FDACS	Florida Department of Agriculture & Consumer Services
FESAP	Federal Experts Security Advisory Panel
FMD	Foot-and-mouth disease
FMDV	Foot and mouth disease virus
FPA	Fluorescence polarization immunoassay
FSIS	Food Safety and Inspection Service (USDA)
GAP	Global Action Plan
GCC	General Conference Committee
GEMP	Good Emergency Management Practices
GFI	Guidance for Industry
GF-TAD	Global Framework for the Eradication of Transboundary Animal Diseases
GHSA	Global Health Security Agenda
GIM	Gastrointestinal microbiota
GIPSA	Grain Inspection, Packers and Stockyards Administration
GMPs	Good Manufacturing Practices
GRAP	Global Rinderpest Action plan
GREP	Global Rinderpest Eradication Program
GYA	Greater Yellowstone Area
HHS	Health and Human Services
HIV	Human immunodeficiency virus
HPAI	Highly pathogenic avian influenza
HTLV	Human T-lymphotropic virus
IACG	Interagency Coordination Group
IAV	Influenza A virus
IAV-S	Influenza A virus in swine
IB	Infectious bronchitis
IBMP	Interagency Bison Management Plan
IBV	Infectious bronchitis virus
ICAR	International Committee for Animal Recording
ICG	Incident Coordination Group
ICPI	Intracerebral pathogenicity index
ICS	Incident Command Structure
ICVI	Interstate Certificate of Veterinary Inspection
IDC	Infectious Disease Committee
IDF&G	Idaho Department of Fish and Game
IDNR	Indiana Department of Natural Resources
IGRA	Interferon-gamma release assays
IHC	Immunohistochemistry
IHR	International Health Regulations

#### IV.A.GLOSSARY OF ACRONYMS

IIAD	Institute for Infectious Animal Diseases
ILTV	Infectious laryngotracheitis virus
IMT	Incident Management Team
IS	International Services
IS	International Services
ISA	Infectious Salmon Anemia
ISDA	Idaho State Department of Agriculture
ISIA	International Serum Industry Association
ISO	International Organization for Standardization
ISRPC	Initial State Response and Containment Plans
IT	Information technology
IV	Intravenous
JEE	Joint External Evaluation
KEDS	Koechner Euthanizing Device
LBMS	Live Bird Marketing System
LC	Lymphocyte count
LESC	Lesser Scaup
LIMS	Laboratory Information Management System
LOINC	Logical Observation Identifiers Names and Codes
LPAI	Low pathogenic avian influenza
LSD	Lumpy skin disease
MA	Modified accredited
MAA	Modified accredited advanced
MCI	Market Cattle Identification
MG	<i>Mycoplasma gallisepticum</i>
MM	<i>Mycoplasma meleagridis</i>
MOU	Memorandum of understanding
MP	Monitored premises
MPH	Master of Public Health
MS	<i>Mycoplasma synoviae</i>
Mtb	<i>Mycobacterium tuberculosis</i>
NA	National Assembly
NAA	National Aquaculture Association
NAAHP	National Aquatic Health Plan
NADA	New Animal Drug Application
NAE	No-antibiotics-ever
NAE	No antibiotics ever
NAHLN	National Animal Health Laboratory Network
NAHMS	National Animal Health Monitoring System

IV.A. GLOSSARY OF ACRONYMS

NAHRS	National Animal Health Reporting System
NAHSS	National Animal Health Surveillance System
NASAHO	National Association of State Animal Health Officials
NASPHV	National Association of Public Health Veterinarians
NASS	National Agricultural Statistics Service
NBAF	National Bio and Agro-Defense Facility
NBCS	New Born Calf Serum
NCAT	National Center for Appropriate Technology
NCDA	North Carolina Department of Agriculture
NCEZID	National Center for Emerging and Zoonotic Infectious Diseases
NCP	National Contingency Plan
NEHP	National Equine Health Plan
NEPA	National Environmental Policy Act
NGS	Next generation sequencing
NHTC	Non Hormone Treated Cattle
NIAA	National Institute for Animal Agriculture
NIES	National Import and Export Services
NiV	Nipah Virus
NiV	Nipah virus
NLRAD	National List of Reportable Animal Diseases
NMPF	National Milk Producers Federation
NPB	National Pork Board
NPIC	National Preparedness and Incident Coordination Center
NPIP	National Poultry Improvement Plan
NRC	National Research Council
NSEP	National Scrapie Eradication Program
NTF	National Turkey Federation
NUES	National Uniform Eartagging System
NVAC	National Vaccine Advisory Committee
NVAP	National Veterinary Accreditation Program
NVS	National Veterinary Stockpile
NVSL	National Veterinary Services Laboratories
NWRC	National Wildlife Research Center
NWS	New World Screwworm
OCVI	Official Certificate of Veterinary Inspection
OD	Optical density
OFVM	Office of Foods and Veterinary Medicine
OHCC	One Health Coordination Center
OID	Office of Infectious Diseases

#### IV.A.GLOSSARY OF ACRONYMS

OIE	World Organisation for Animal Health
OM	Osteomyelitis
OP	Oropharyngeal
OR	Office of Research
ORF	Open Reading Frame
ORPB	Outbreak Response and Prevention Branch
ORT	<i>Ornithobacterium rhinotracheale</i>
OSA	Official State Agent
OTC	Over-the-counter
PACCARB	Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria
PCR	Polymerase Chain Reaction
PCV2	Porcine circovirus type 2
PDF	Portable Document Format
PDRC	Poultry Diagnostic and Research Center
PED	Porcine epidemic diarrhea
PEDV	Porcine epidemic diarrhea vaccine
PEMS	Poult Enteritis and Mortality Syndrome
PFGE	Pulsed field gel electrophoresis
PI	Persistently infected
PIN	Premises identification numbers
PL	Pregnancy loss
PMIP	Pre-movement isolation period
PPD	Purified protein derivative
PPE	Personal Protective Equipment
PPMV-1	Pigeon paramyxovirus type 1
PPP	Public-Private Partnerships
PPR	Peste des petits ruminants
PQZ	Permanent Quarantine Zone
PreP	Preparedness and Response Plan
PrP	Prion protein
PRRSV	Porcine reproductive and respiratory syndrome virus
PRV	Pseudorabies
PSV	Porcine sapelovirus
PT	Proficiency test
PVL	Proviral Load
PVS	Performance of Veterinary Services
QA	Quality assurance
QFT	QuantiFERON® TB
qPCR	Quantitative polymerase chain reaction

#### IV.A. GLOSSARY OF ACRONYMS

QR	Quick response
QSA	Quality Systems Assessment
RFID	Radio frequency identification
RHF <sub>s</sub>	Rinderpest Holding Facilities
RIU	Risk Assessment Unit
RNA	Ribonucleic acid
RP	Rinderpest
RSSS	Regulatory Scrapie Slaughter Surveillance
RT	Real-time
RVF	Rift Valley fever
RWA	Raised without antibiotics
Rx	Prescription
SAGARPA	Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (Mexico)
SAHOs	State Animal Health Officials
SBS	Secure Broiler Supply
SCAD	Scientific Commission for Animal Diseases
SCS	Surveillance Collaboration Services
SCT	Single cervical tuberculin tests
SCWDS	Southeastern Cooperative Wildlife Disease Study
SE	<i>Salmonella enteritidis</i>
SECD	Swine Enteric Coronavirus Disease
SEPRL	Southeast Poultry Research Laboratory
SES	Secure Egg Supply
SFCP	Scrapie Flock Certification Program
SFP	Swine Futures Project
SFS	Secure Food Supply
SHIC	Swine Health Information Center
SICCT	Single intradermal comparative cervical tuberculin test
SISPA	Sequence-independent single-primer amplification
SIV	Swine influenza virus
SLD	Spotty Liver Disease
SMEs	Subject matter experts
SNP	Single nucleotide polymorphism
SPHV	Supervisory Public Health Veterinary
SPRS	Surveillance, Preparedness and Response Services
SPS	Secure Poultry Supply
STAS	Science, Technology and Analysis Services
STEC	Shiga toxin-producing <i>E. coli</i>
STS	Secure Turkey Supply

#### IV.A.GLOSSARY OF ACRONYMS

SVA	Senecavirus A
SVDV	Swine vesicular disease virus
SVV	Seneca Valley virus
TAHC	Texas Animal Health Commission
TARV	Turkey Arthritis Reovirus
TCV	Turkey Coronavirus
TDC	Tibial dyschondroplasia
TEP	Training and Exercise Plan
TIEC	Tryon International Equestrian Center
TPMs	Trace Performance Measures
TPQA	Temporary preventive quarantine area
TR-DFTR	Turkey Reovirus Digital Flexor Tendon Rupture
T-RFID	Temperature Sensing Radio Frequency Identification
TTX	Tabletop Exercise
UHC	Unwanted Horse Coalition
UHF	Ultra-high frequency
USAPEEC	Poultry and Egg Export Council
USEF	United States Equestrian Federation
USFWS	United States Fish and Wildlife Service
VCPR	Veterinarian-Client-Patient Relationship
VDLs	Veterinary Diagnostic Laboratories
VESV	Vesicular exanthema of swine virus
Vet-LIRN	Veterinary Laboratory Investigation and Response Network
VFD	Veterinary Feed Directive
VI	Virus isolation
VL	Visible-lesions
VMOs	Veterinary medical officers
VS	Veterinary Services
VSLs	Veterinary Services Laboratory Submissions
VSPS	Veterinary Services Process Streamlining
VSV	Vesicular Stomatitis Virus
WAHIS	World Animal Health Information System
WEG	World Equestrian Games
WG	Working group
WGFD	Wyoming Game and Fish Department
WGS	Whole Genome Sequencing
WLSB	Wyoming Livestock Board
WNV	West Nile Virus
WSVL	Wyoming State Veterinary Laboratory



#### IV.A. GLOSSARY OF ACRONYMS

WTO	World Trade Organization
XML	Extensible markup language
YNP	Yellowstone National Park