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Questions and Answers

Q. What is avian influenza?

A. Avian influenza (AI)--the bird flu--is a virus that infects wild birds (such as ducks, gulls and shorebirds) and domestic poultry (such as chickens, turkeys, ducks and geese). There is a flu for birds just as there is for humans and, as with people, some forms of the flu are worse than others.

AI viruses are classified by a combination of two groups of proteins: the hemagglutinin or H proteins, of which there are 16 (H1-H16), and neuraminidase or N proteins, of which there are 9 (N1-N9).

AI strains also are divided into two groups based upon the ability of the virus to produce disease in poultry: low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI).

Q. What is "low pathogenic avian influenza" vs. "highly pathogenic avian influenza?"

A. Native North American strains of avian influenza naturally occur in wild birds and can spread to domestic birds. In most cases it causes no signs of infection or only minor clinical signs in birds; these are LPAI or "low path" viruses. Typically, these strains of the virus pose little threat to human health. LPAI H5 and H7 strains have the potential to mutate into HPAI and are therefore closely monitored. HPAI, or "high path" avian influenza, has a high death rate in chicken and turkeys, and spreads rapidly.

Q. What are the newly-detected mixed origin HPAI viruses that have been detected recently?

A. USDA has identified Eurasian H5N8 HPAI and mixed-origin viruses, H5N2 and a novel H5N1, in the Pacific Flyway. The HPAI H5N2 virus strain has been confirmed in several states along three of the four North American Flyways: Pacific, Central and Mississippi.

On January 16, 2015, USDA's National Veterinary Services Laboratories (NVSL) confirmed a finding of a *novel* avian influenza virus in a wild green winged teal (a wild duck) in Washington State (new H5N1). *This particular strain had not been identified in an animal or human host before.* USDA is part of the National Flyway Council and posts [confirmations of wild bird highly pathogenic avian influenza case in the U.S.](#)

Q. Is this "new H5N1" the same virus that has been circulating in Southeast Asia, Africa and Europe?

A. No. The novel HPAI H5N1 virus is **not** the same virus as the H5N1 virus found in Asia, Europe and Africa that has caused some human illness. This HPAI H5N1 strain is a new mixed-origin virus that combines the H5 genes from the Asian HPAI H5N1 virus with N genes from native North American avian influenza viruses found in wild birds.

Q. Are these new mixed origin viruses unusual?

A. With several different viruses circulating in wild birds, it is not unexpected that a new mixed-origin virus was identified. Viruses continually mutate and form new combinations with genetic material

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from similar viruses. It's not unexpected, nor is it cause for alarm. It is, however, a main reason why it is necessary to continue USDA surveillance efforts for avian influenza in migratory birds.

Q. Did the HPAI H5N8 strain come from Asia?

A. The HPAI H5N8 virus originated in Asia and spread rapidly along wild bird migratory pathways during 2014, including the Pacific flyway. In the Pacific flyway, the H5N8 virus has mixed with North American avian influenza viruses, creating new mixed-origin viruses. These mixed-origin viruses contain the Asian-origin H5 part of the virus, which is highly pathogenic to poultry. The N parts of these viruses came from native North American avian influenza viruses found in wild birds. This is not unexpected, nor is it cause for undue alarm.

Q. How does the avian influenza virus spread in birds?

A. Avian influenza is primarily spread by direct contact between healthy birds and infected birds, and through indirect contact with contaminated equipment and materials. The virus is excreted through the feces of infected birds and through secretions from the nose, mouth and eyes.

Contact with infected fecal material is the most common of bird-to-bird transmission. Wild ducks often introduce low pathogenic avian influenza into domestic flocks raised on range or in open flight pens through fecal contamination. Within a poultry house, transfer of the highly pathogenic avian influenza virus between birds also can occur via airborne secretions. The spread of avian influenza between poultry premises almost always follows the movement of contaminated people and equipment. Avian influenza also can be found on the outer surfaces of egg shells. Transfer of eggs is a potential means of transmission. Airborne transmission of virus from farm to farm is highly unlikely under usual circumstances.

Q. What are the signs of illness of birds infected with avian influenza?

A. Low pathogenic avian influenza signs are typically mild. Infected birds typically show signs of decreased food consumption, respiratory signs (coughing and sneezing) and decreased egg production. Birds that are infected with highly pathogenic avian influenza are more severely ill and could exhibit one or more of the following clinical signs: sudden death; lack of energy and appetite; decreased egg production; soft-shelled or misshapen eggs; swelling; purple discoloration; nasal discharge; coughing, sneezing; lack of coordination and diarrhea.

Q. Is it possible for a low pathogenic avian influenza strain to become highly pathogenic?

A. Some low pathogenic subtypes have the capacity to mutate into more virulent strains. While low pathogenic avian influenza is considered lower risk, low pathogenic strains of the virus – the H5 and H7 strains – can mutate into highly pathogenic forms.

Avian Influenza Testing and Diagnostics

Q. What kind of test is used to diagnose avian influenza in birds?

A. Samples are usually taken by swabbing the mucus that coats the throat of live birds, which does not harm the birds. With wild birds, a fecal sample can be taken instead. These samples go into sealed tubes and are taken to USDA-approved laboratories. The initial test is a polymerase chain reaction (PCR) test. A PCR test is a rapid method of identifying the virus, typically producing results within 3 hours. If a sample from an area where avian influenza has not been previously detected tests positive on a rapid test, a virus isolation confirmatory test is performed. This test involves growing the sample in embryonated chicken eggs, which then provides the material to allow detailed identification of the

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strain of virus and whether it is highly pathogenic or low pathogenic. The virus isolation test can take 7-10 days to produce results. All H5 and H7 isolations are confirmed at the USDA Animal and Plant Health Inspection Service (APHIS) National Veterinary Services Laboratories at Ames, Iowa.

Q. Is this PCR test effective in initially detecting these HPAI H5 strains specifically?

A. Yes, the USDA Agricultural Research Service Southeast Poultry Research Lab (SEPRL) scientists developed a specific diagnostic test (RRT-PCR) test that directly detects the new Hemagglutinin gene of the viruses (in less than 3 hours) that came from Asia and a rapid N8 test. This test was transferred to the APHIS National Veterinary Services Laboratories and is being used by them.

Current HPAI H5 Outbreaks

Q. How is USDA covering the costs associated with the current HPAI H5N2 outbreaks?

A. USDA is using its authority to transfer funds from the Commodity Credit Corporation, or CCC, on an as-needed basis to ensure that its response to this outbreak continues to be adequately resourced. The most important thing now is continuing to ensure that producers and handlers practice good biosecurity protocols and take appropriate measures to protect their birds and themselves. USDA is working with federal, state and local officials to support producers in their time of need. USDA knows that these producers are suffering losses and will continue to do everything it can to support them.

Q. Is USDA doing any research on these new HPAI H5 strains?

A. The USDA Agricultural Research Service Southeast Poultry Research Lab (SEPRL) scientists obtained samples from the USDA Animal and Plant Health Inspection Service (APHIS) of the HPAI H5N8 and H5N2 from cases that occurred in the State of Washington. SEPRL quickly initiated infectivity, transmissibility, and pathogenicity studies in wild ducks, Japanese quail, turkey and chicken.

These studies will help USDA better understand how the virus spreads to poultry from wild birds. Thus far, based upon these studies:

- 1) SEPRL now understands how turkeys are slightly more susceptible than chickens to infection, but Japanese quail are the most susceptible to infection by these viruses. This explains that the HPAI H5 virus can infect and spread in the most important domestic poultry species.
- 2) And based upon current studies on Mallard ducks – SEPRL now understands how easily the HPAI H5 virus can infect and spread in the major wild duck species.
- 3) The studies also show that the two viruses can infect mallards without causing illness or death and the virus can grow and be shed in respiratory and fecal secretions for over 14 days.....making this species a possible means to spread the virus in the wild undetected.

Q. Is USDA developing a vaccine that can be used for these HPAI outbreaks?

A. Yes. SEPRL does vaccine seed strain development and testing as a routine research activity. SEPRL is developing a vaccine seed strain for potential emergency use, which would be designed to give optimal protection in poultry, but it is too early in the development process. SEPRL scientists have developed a candidate vaccine seed strain for an inactivated vaccine that currently is being tested. There are several steps in the development process. USDA cannot have a vaccine considered for use in the field until it is shown to work in the experimental studies in the laboratory. USDA SEPRL does not manufacture avian influenza vaccines nor decide when or if they should be used in field. APHIS decides use based on need.

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Q. Has USDA used avian influenza vaccines in the past?

A. USDA has not used vaccines against highly pathogenic avian influenza. However, it has been used against low pathogenic avian influenza. The last use of H7 vaccine was in 2003 and H5 vaccine in the 1990s against.

Q. When will USDA have a vaccine for the current outbreaks ready?

A. Vaccine development occurs in many stages and because the next steps are dependent on the outcomes of these stages, USDA cannot predict when the vaccine has reached the stage for use in poultry. USDA will provide an update as soon as the SEPRL researchers have finished the project.

Q. Will the poultry vaccine be effective against HPAI H5N2, HPAI H5N8 or the “novel” HPAI H5N1?

A. Because most of the protection from influenza vaccines comes from antibodies to the hemagglutinin protein, SEPRL is working to make a single vaccine that will provide protection to all the variants that the scientists are seeing, including HPAI H5N8, H5N2, and “novel” H5N1. All of these variants share the same hemagglutinin gene while differing in some the other genes.