

Moredun



ISSUE 6 | AUTUMN/WINTER 2013

magazine

Moredun Scientific celebrates 25 years

Aquavalens: European consortium partnership
to tackle water safety

XL Vets: new partnership agreement

www.moredun.org.uk

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Chairman's comment



Welcome to the autumn edition of the Moredun magazine. I trust some of the articles carry particular interest to your business.

We've had a busy year, both within the research labs, and in the area of knowledge exchange with the farmer members and wider stakeholders within agriculture. Clearly disease issues and the corresponding solutions are uppermost in terms of effort and interest, and in this sphere liver fluke has become increasingly important following a series of wet years. However, at the time of writing we have enjoyed a spell of decent hay weather that hopefully will have put the mud snails on the back foot, and if it continues, should help lower infection levels. That has not diminished our efforts towards solutions as damper conditions will probably follow! Weather and climate change are linked in some mystical way, and much of the politics around agriculture – the obvious referendum issues excepted – are about carbon footprints,

sustainability, renewable energy and efforts to mitigate against climate change. However, it remains true that the biggest financial and physical benefit in livestock production comes from improved animal health and welfare, which reduces waste within the production cycle and enhances profit.

Moredun is at the forefront of that drive towards healthier farmed stock, and I am pleased to report that our Scientific Director, Professor Julie Fitzpatrick, has been recognised for her particular contribution. In addition to having the first UK Chair of Global Food Security, at Glasgow University, she was awarded an Honorary Doctor of Science at the Heriot Watt University June Graduation Ceremony in recognition of her contribution to animal science research.

I am also pleased to report that my predecessor as chair of the Moredun Foundation, John Ross, was awarded an Honorary Doctor of Veterinary Medicine and Surgery at Glasgow University in recognition of his work in fostering the scientific collaboration between the Moredun Research Institute and Glasgow University.

Congratulations to both of them for their individual effort: they are part of the wider Moredun family that will continue to search out disease solutions for better farm animal health and welfare. I trust you enjoy the interesting articles.

Ian Duncan Millar
Chairman

Moredun Magazine

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Cover image: Thomas Tzelos

BBC Landward features Moredun's work on Liver Fluke

Moredun were pleased to welcome back the BBC Landward film crew to Pentlands Science Park in March this year. Landward's Sarah Mack joined Dr Philip Skuce in our laboratories to discuss the increasing problems with liver fluke.

The piece featuring Moredun was broadcast on BBC Two Scotland on 12th April and can be viewed on our website at www.moredun.org.uk/liver-fluke



Adult liver fluke escaping from the bile duct of a chronically infected lamb at post mortem

Phone call reveals links to Moredun's past

Moredun receives phone calls every day with requests for information on a range of livestock health issues. However, in April this year Moredun was contacted by Fiona Greig who had a very special offer. Fiona had been clearing out her late uncle's house and came across a box full of some very interesting research papers, books, drawings and slides belonging to her grandfather, John Russell Greig.



John Russell Greig



Notebooks and original articles from J.R.Greig

John Russell Greig was Director of the Moredun Research Institute from 1929 until 1955. Under his directorship vaccines against louping ill, braxy and enzootic abortion in ewes were developed, understanding of clostridial diseases of sheep and the cause of tick-borne fever and the pathology of pyraemia in lambs was advanced, and the infectious nature of scrapie was established.

One of the highlights of his earlier career was the discovery (with Dr Henry Dryerre) of the cause and nature of milk fever in cattle. Greig went on to devise a treatment for the disease which has been of immense value to dairy farmers around the world.

We were delighted to receive the donation and a selection of the items were showcased in a special display at the Royal Highland Show.

Moredun student wins science photography prize

Many congratulations to Thomas Tzelos, a PhD student at Moredun who won first prize in the British Society of Parasitology's annual photo competition.

Thomas' stunning image of *Teladorsagia circumcincta* larvae was selected from the numerous entries at the society's spring meeting in Bristol on 8-11 April.



Thomas Tzelos

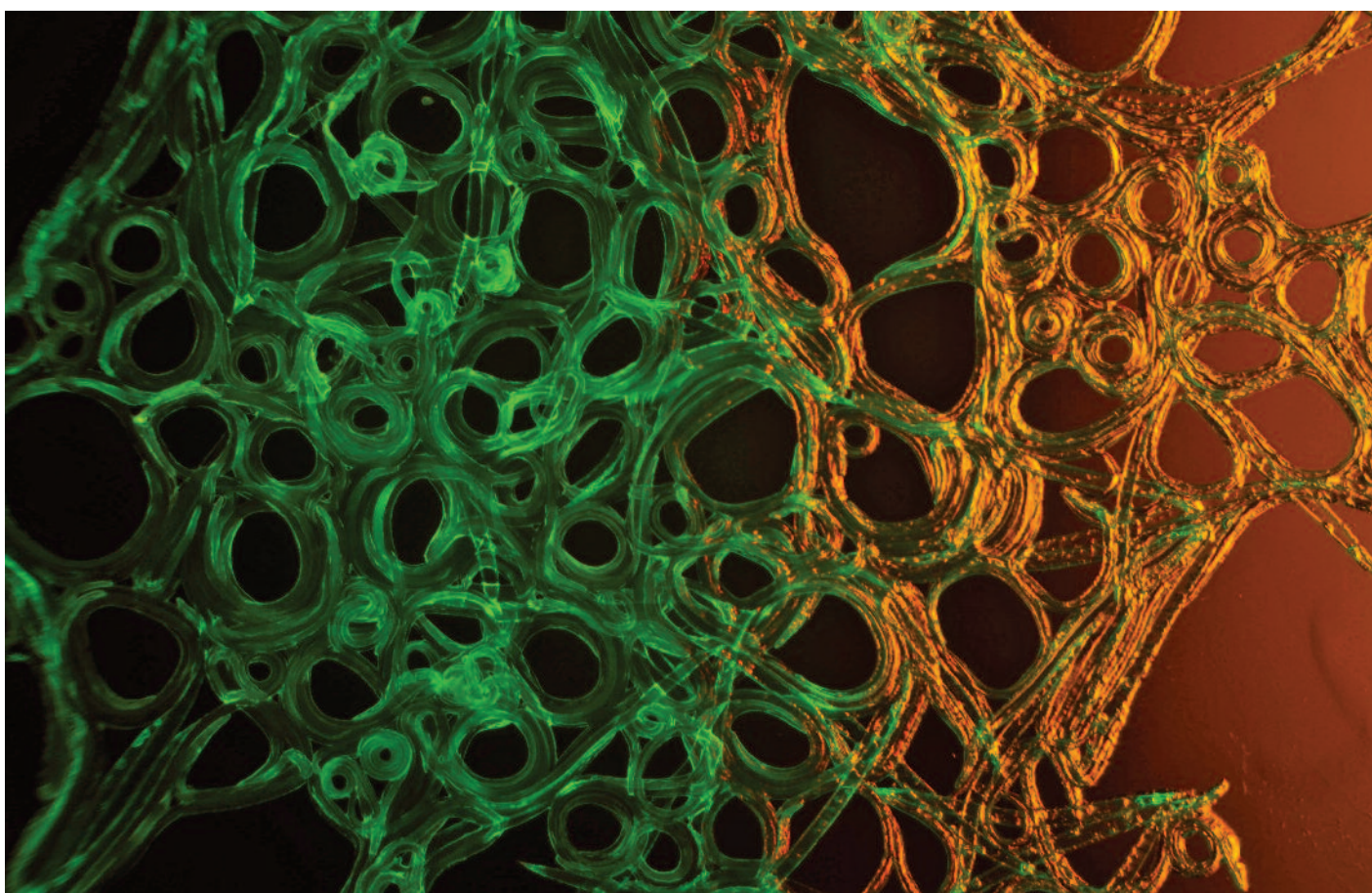


Photo | Thomas Tzelos

Exsheathed L3 *Teladorsagia circumcincta* larvae after they have ingested fluorescently labelled small interfering RNAs (siRNAs)

XL Vets

Moredun is delighted to announce the launch of a new partnership with XL Vets.

XL Vets is a group of independently owned and progressive veterinary practices that work

together to achieve the highest standards of veterinary care.

The partnership will involve all XLVet farm practices having associate group membership of the Moredun Foundation with the aim of improving connectivity and knowledge



exchange between Moredun and XLVets to bring further benefit to the veterinary and livestock farming communities.

Livestock Keepers

Livestock Keepers is a public engagement project aiming to tell the stories of people that keep livestock and their role in supporting diverse rural businesses.

Moredun has won funding for the project from the Office of the Chief Scientific Advisor and is working in collaboration with the Crown Estate; Cairngorm National Park; Crofting Connections; Orkney Island Council; Ballandalloch Castle; Harris Tweed Authority; James Hutton Institute. Through still images, audio interviews, video, vox-pops and web materials the project will highlight the



Livestock Keepers exhibition at the Highland Show



contribution of livestock keeping to the economic and social well being of remote rural communities and take a look at the unique relationships between people and their livestock. A wide range of different enterprises are supported by the livestock industry, these include: food and drink, textiles and fashion, tourism and the arts. The project was launched at the Royal Highland Show in June and will be going on tour to different venues across the country over the next 18 months. For news as the project develops, please visit the project webpage:

www.moredun.org.uk/livestock-keepers



Congratulations

Moredun is delighted to announce that Professor Julie Fitzpatrick, Scientific Director of Moredun Research Institute and CEO of the Moredun Group, was recently awarded an Honorary DSc by Heriot Watt University, in recognition of her part in the valuable collaborative work between the two institutions. In addition, John Ross (former Chairman of the Moredun Foundation) was awarded an honorary Doctor of Veterinary Medicine and Surgery from the University of Glasgow in recognition of his efforts to foster the scientific collaboration between Moredun and the University of Glasgow.



Photo | Kevin McCollum

Aquavalens: safe drinking water in Europe



Scientists from Moredun Research Institute and Moredun Scientific are part of a consortium partnership across Europe to help develop new technologies to prevent and control the spread of water-borne diseases. The €8.9 million, AQUA VALENS research project is funded by the European Union Framework Programme 7 and brings together 39 partners from small businesses, universities and research institutes. The project is being led by the University of East Anglia.

The main aim of the project is to protect public health from microbial contamination of

drinking water and water used for food processing. The research involves developing and applying new molecular pathogen detection techniques and platforms to improve the sensitivity and specificity of detection of a wide range of viruses, bacteria and parasites in water and improve the provision of safe, hygienic water for drinking and food production throughout Europe.

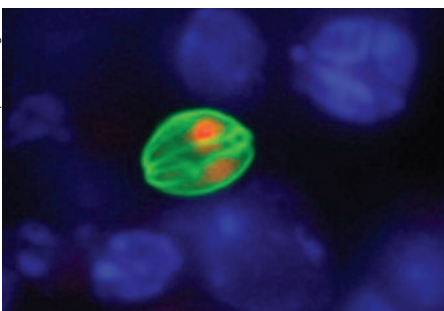
The research project connects a multi-disciplinary team of scientists, engineers, public health practitioners and policy makers from 13 countries across Europe. Throughout the project, close cooperation will be maintained with biotechnology companies, water providers and food producers so that new technologies can be more rapidly applied to bring benefits to consumers.

Around 330,000 cases of water-related diseases are reported yearly in Europe according to the World Health Organisation (WHO). Between 2000 and 2007 there were 354 outbreaks of waterborne diseases across 14 countries. Symptoms include diarrhoea, vomiting, headache, and fever. The Aquavalens project seeks to develop suitable platforms that harness the advances in new molecular techniques to enable the rapid detection of waterborne pathogens that is appropriate for

large and small systems throughout Europe.

Moredun's role in the project will be to focus on rapid molecular detection methods for the zoonotic protozoan parasites, *Cryptosporidium* spp and *Toxoplasma gondii*, which are important livestock pathogens and also environmental contaminants causing major public health concerns. *Cryptosporidium* parasites are particularly problematic to control as the oocyst stage of the parasite can persist in the environment and water for 12-18 months and is resistant to normal water disinfection treatments such as chlorine. Moredun scientists will also be working closely with other partner organisations in Scotland, including Heriot Watt University and the James Hutton Institute. www.aquavalens.org

Photo: David Ferguson



Toxoplasma gondii parasites



Beth Wells, Frank Katzer and Lee Innes

Moredun Scientific Celebrates 25 Year Anniversary

Moredun Scientific is celebrating 25 years of providing contract research and testing services to the animal health and biopharmaceutical industries.

The company was created in 1988 as the commercial arm of the Moredun Research Institute in recognition that Moredun's expert knowledge of animal diseases and its state

of the art animal facilities could provide world class services to the animal health industry.

The animal health business continues to deliver efficacy and safety testing studies for vaccines and therapeutics to the leading animal health companies around the world. The company has a large portfolio of infectious disease models in response to industry requirements.



2008 marked the launch of Moredun Scientific's biosafety testing business providing GLP and GMP compliant testing of cell lines, cell banks and final biopharmaceutical products to meet the needs of the global biopharmaceutical industry. The business is growing strongly and imminent expansion of the laboratory facilities is planned to meet client demand.

Professor Willie Donachie, Managing Director of Moredun Scientific said "We are proud to celebrate this significant milestone in our company development and would like to thank our clients, collaborators and staff for their continued support."

Can you help with a research project?

The Moredun Research Institute is looking for help from grazing livestock farmers or grazing experts (researchers and grazing advisors/consultants) to participate in an online survey about grazing management (grazing season, lambing/calving patterns, etc). It takes less than 10 minutes, doesn't require any personal information and you can skip any questions you are unsure of.

After doing it, you can automatically view a live summary of results so far. It would be a massive help to us if you could participate by logging onto:

www.surveymonkey.com/s/Grazing_UK

This survey is for a Europe-wide project called GLOWORM (www.gloworm.eu). Within this project, the Moredun Research

Institute is teaming up with researchers across Europe to develop strategies to reduce the negative economic and welfare effects that gastrointestinal parasites have on farms. Your participation is needed so that we can develop strategies relevant to farming in your region.

Thank you very much for your time and assistance with this research.





Moredun's patron, HRH The Princess Royal

Education and training in Livestock Science

A consistent strength of Moredun has been its long standing and effective track record in providing practical solutions to help improve the health and welfare of livestock animals. The research outputs, knowledge, skills and expertise generated at Moredun are disseminated as widely as possible to maximise the benefits our scientific research may bring to the industry and to the wider economy and society.

The experience and expertise of our staff at Foundation Membership provide a fantastic knowledge base which we strive to foster, improve and share. Education and training are an inherent part of Moredun's culture. Over the years Moredun staff have been actively involved in teaching, mentoring and supervising hundreds of postgraduate students and visiting workers who come from across the globe to undertake training and research at our world renowned international research centre.

Moredun also understands the responsibility research institutes have to ensure that their work brings benefits to society at large and to help the general public understand how science is relevant to their lives. With this

in mind, Moredun's public engagement programme continues to grow with new projects involving broadcast media, public debates, interactive exhibitions and education projects working together with teachers and both secondary and primary school pupils.

HRH The Princess Royal praises dedication to training and education

We were delighted to share our experiences in training, education and knowledge exchange with Her Royal Highness The Princess Royal, during a special showcase event held at Pentland Science Park in February.

Over 100 representatives from the agricultural, veterinary, government and



Education and learning is an inherent part of Moredun's culture

research sectors, including the equine grass sickness fund as well as those involved in education, broadcast media and the arts, attended this networking event. The participants discussed creative and innovative ways to effectively communicate research outputs and to encourage the next generation to take up careers in livestock science.

During her visit, HRH The Princess Royal listened to a series of short presentations highlighting many of the different knowledge exchange initiatives Moredun has developed to improve the effectiveness of science communication and training. These included undergraduate and post-graduate research training, farmer discussion groups and farm demonstrations, public debates, audio and film projects, educational work with schools and collaboration with the arts.

Moredun will continue to connect with as wide an audience as possible to ensure that our research remains relevant to peoples lives going forward.

Major breakthrough in the war against worms

Scientists at Moredun have made a major breakthrough in the battle to prevent and control parasitic worm infections by successfully protecting sheep using vaccination. The team at Moredun have recently had their results published in the leading scientific journal *Vaccine* and the paper reports the most successful attempt yet to protect animals against worms, using a recombinant vaccine, giving hope for a sustainable control strategy that does not rely on drugs.

Parasitic worms have profound effects on human and animal health and welfare worldwide: over 1 billion humans, primarily in the developing world, are affected by soil-



transmitted nematodes. When measured in terms of disability-adjusted life years, their global impact is comparable to that of malaria or tuberculosis. Infection of livestock with closely related parasitic nematodes can have devastating effects on health and production, affecting food security in developed and developing regions. Despite decades of intensive research, the development of

vaccines against these pathogens has been unsuccessful.

Dr Alasdair Nisbet, who is heading up the research team at Moredun said, "Currently, these pathogens are controlled using drugs, however multi-drug resistant isolates are being reported with such frequency that development of a vaccine against this species is now a research priority".

The approach taken by the team at Moredun involved identifying a number of key proteins which the worm produces, some of which enable it to escape the immune response and to survive and multiply within the animal. By immunizing sheep with these key proteins the research team showed that the vaccinated animals had significantly reduced numbers of adult worms and eggs shed into the environment.

Fish Vet Group

Moredun and Fish Vet Group working together to develop novel vaccines for aquaculture

Moredun is delighted to announce a new relationship with the FVG to develop novel vaccines to protect farmed fish against disease.

A new research group has been established within the Moredun Research Institute, to work on strategies to combat a number of defined pathogens that cause significant economic loss to aquaculture fish stocks. Moredun has considerable experience in developing vaccines for the livestock sector against a wide range of different pathogens including viruses, bacteria and parasites. The Fish Vet Group, based in Inverness, provides technical and veterinary services to diagnose, treat and prevent infectious disease in the global aquaculture industry.

Salmon production in Scotland generate c.£434 million per year and Scotland is now the world's second largest salmon producer. The industry also supports employment in remote and rural communities in the Highlands and Islands of Scotland. The expansion of the



Salmon swimming upstream

aquaculture industry in recent years has been accompanied by the emergence of many infectious diseases causing significant economic losses and welfare issues. According to Malcolm Pye, a director of FVG "This expansion is an important step for us to take. By adding more world class people, knowledge and facilities to our existing capabilities we can

increase our dedicated sector support for global animal health".

The new relationship offers exciting opportunities to bring together the complementary expertise of the two internationally renowned organisations to develop novel disease control strategies for the aquaculture sector worldwide.

Research

Could immunological markers predict the health and welfare of dairy cows?

Current figures show that financial losses from lameness equate to nearly £15,000 a year for an average herd while the average cost of a case of mastitis is £180. Nationally this means an economic loss of around £500,000 a day in the UK, an annual loss of £170 million.

Researchers from the Moredun Research Institute and Scotland's Rural College have received a major funding award to develop a project that could ultimately lead to an early warning system for poor health and welfare states in dairy cattle. Initial work by the team has found that easily recordable immune traits could be used to predict an individual farm animal's susceptibility, and recovery from, a range of health conditions.

Being able to use immune traits to identify health and welfare problems - such as lameness - could be of huge benefit to the industry, as they can be used to measure and monitor the challenges that dairy cows face and to develop prediction and prevention



tools that could help reduce the incidence of ill health. Current recording of health and welfare events is costly and highly labour intensive. Furthermore, such events are often missed as the signs in the cow can be subtle and difficult to detect. In contrast, immune traits can be measured in a high throughput manner in easily obtainable biological samples such as blood and milk, and may identify more subtle changes in health or welfare status.

Initial results from a Scottish Government funded study were published in June in the leading scientific journal PLoS One. The study is the first to evaluate multiple immune traits (e.g. levels of white blood cells, antibodies or inflammatory markers in the blood) in dairy cows on a repeated basis and relate them to common health and welfare challenges such as lameness, udder health and poor fertility. The results demonstrated that immune measures are useful as predictors

of health and welfare states.

The team have recently commenced a three year project funded by the Biotechnology and Biological Sciences Research Council (BBSRC) to expand this work. The aim of the new project is to further develop these immune markers to understand how they relate to the initiation and recovery from health and welfare events. The team will also examine the feasibility of developing rapid milk based immune indicators to help predict health and welfare more routinely in dairy farms.

Dr Tom McNeilly, a principal investigator at the Moredun Research Institute commented, "This study represents the largest simultaneous analysis of multiple immune traits in dairy cattle to date and demonstrates that a number of immune traits are associated with health events and can be associated with susceptibility to diseases such as mastitis and lameness".

Healthy seals, healthy seas?

High levels of the food poisoning species of bacteria *Campylobacter* and *Salmonella* have been found in grey seal pups by scientists at the Moredun Research Institute. Understanding what bacteria, viruses or parasites grey seals carry may help us determine how healthy our seas really are.

45% of the World's population of grey seals live in Scottish coastal waters, coming ashore to breed in the autumn months. They are at the top of their food chain, live at the interface between the marine and terrestrial environments and, as such, may hold valuable information about the health of our coastal waters.

Scientists at Moredun Research Institute, in collaboration with the Sea Mammal Research Institute in St Andrews and the Wildlife Unit at the Scottish Rural College, Inverness, are looking at causes of disease and death in grey seal pups on the Isle of May breeding colony in the Firth of Forth. By screening for large numbers of different bacteria as well as specific viruses and parasites they hope to work out which pathogens grey seals are carrying that



Grey seal

may be shared with other species such as birds and land mammals.

Campylobacter and *Salmonella* bacteria were found in the intestines of grey seal pups from the Isle of May during the pupping season in autumn 2011 (in 50% and 20% of pups respectively). These findings do raise concerns that these bacteria may indicate pollution of

the Scottish marine environment through contamination from sources such as human sewerage or run-off from agricultural land. The next step is to fully identify these bacteria at the genetic level to try to determine their source and if they have been present in seal populations for many years or represent a new threat to this species.



Photo | Johanna Baily



Photo | Johanna Baily



Photo | Johanna Baily

Out and About

Show report

The summer months each year sees a team of Moredun scientists travel around the UK attending specialist sheep and beef events to discuss with farmers the latest advances in livestock health research.

Moredun had an extremely successful summer show season this year. We started off with Welsh Sheep in Llandeilo and in the same week we moved to Malvern to attend Beef Expo. In June we attended both North Sheep in Harrogate and the Royal Highland Show.

We crossed over the water for the NSA Northern Ireland show in Ballymena: where we had a very warm welcome and useful

discussions about setting up a Northern Ireland regional board.

All the shows were very well attended and our scientists were kept busy answering questions on a variety of disease topics. At the Royal Highland show we met farmers, politicians, representatives from the major supermarkets, funding bodies and members of the public. We were delighted to also receive a surprise visit from our patron, HRH The Princess Royal, who joined us in the Moredun marquee on the Friday of the show.

As part of our Livestock Keepers project, we also travelled to the North of Scotland for the Black Isle Show.

We crossed over the water for the NSA Northern Ireland show in Ballymena: where we had a very warm welcome and useful discussions about setting up a Northern Ireland regional board

For further information about the shows and events Moredun will be attending please visit www.moredun.org.uk/events



Royal Highland Show, Edinburgh

Edinburgh International Science Festival

The 2013 Edinburgh International Science Festival featured two events organised by Moredun.

The 'Dark Arts of Innovation' saw the BBC's Mark Stephens join Gerry Mulligan (WL Gore & Associates), Alan Miller (Heriot Watt University) and Moredun's Lee Innes to discuss

how best to nurture Scottish innovators of the future.

'Disease Explorers' at the Botanic Gardens was an interactive exhibition for children, highlighting the different bugs and beasts that can make animals and humans sick. The children helped our very own Farmer

Fred to diagnosis what was wrong with his flock by collecting snot, poo and blood samples and testing them in the Lab.

It proved to be a highly popular event attracting over 600 visitors during the two days and a great success with both children and grown ups!

Photo | Kevin McCollum



Alan Miller, Mark Stephen, Gerry Mulligan and Lee Innes

Photo | RBGE



Disease Explorers



Royal Highland Show, Edinburgh

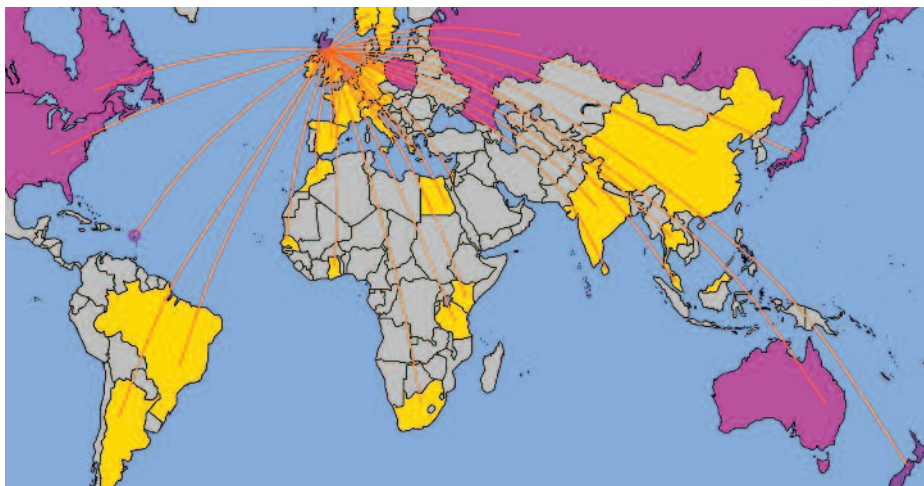
Moredun's Animal Health Roadshow 2013

We are delighted to announce that we will be running our very successful and popular Animal Health Roadshow meetings again this November. Ten meetings are planned across the country and will cover a variety of topics chosen by our regional advisors. Please watch our website and mailings for further information confirming dates, topics and locations.

For further information please visit:
www.moredun.org.uk/roadshow

Focus On...

Moredun's Global Reach



Sharing knowledge is vital to maintaining excellence in animal health research. Moredun's international collaborations facilitate the sharing of new information and perspectives, innovative concepts and methods and emerging research technologies.

Scientific Partnerships

We continue to seek new partnerships to help drive animal health research forward. For example, Moredun's collaboration with researchers from the Western Australian Department of Food and Agriculture has led to trials of a promising vaccine against the parasitic worm *Haemonchus contortus*.

Moredun has forged alliances not only with several UK universities, and institutes but also with animal health research organisations overseas. Our links with AgResearch in New Zealand and Ross University School of Veterinary Medicine (RUSVM), St Kitts, West Indies, give access to unique populations and environments important for addressing global animal health problems.

International Grant Partners

Moredun scientists and our partners continue to compete successfully for funding on the international stage. For example, the 'GLOWORM' project (total grant, €3.3million) is funded under the EU-Framework 7 Initiative and involves 14 European research partners,

who have joined forces to investigate the effects of global (including climate) change on parasitic worms in livestock. Beyond the UK, collaborating countries include Belgium, Germany, Ireland, Italy, Sweden and Switzerland.

The 'PARAVAC CONSORTIUM', led by Moredun and involving over 20 academic partners across the globe, received the largest grant ever awarded by the EU in the field of animal health (€9 million), for research into a more sustainable approach to the control of nematode parasitic worms through vaccination.

An international consortium of researchers, again led by Moredun, recently secured £1 million from the Wellcome Trust to develop a new vaccine to help control haemorrhagic septicaemia of cattle and buffalo in India.

Over the last year Moredun has hosted over 80 visitors, including visiting scientists from around the globe

The AQUAVALENS project (p4) is a large scale collaborative consortium inviting academic partners and small and medium enterprises to develop new technologies to improve the safety and quality of drinking water.

Visiting Scientists

Over the last year, Moredun has hosted over 80 visitors, including scientists from around the globe. To pick a few examples, we welcomed colleagues from: Italy, for laboratory training under EU 'Leonardo da Vinci – Vets in Europe' mobility scheme; Sri Lanka, to use our surgical facility; Netherlands, for work on a genotyping method for the grey squirrel; Senegal for the development of a diagnostic for enzootic nasal tumour of sheep.

Scientific papers

Our 2012 output of papers in scientific journals, involved co-authors from France, Italy, China, Belgium, Germany, USA, Canada, Australia, New Zealand, Kenya, Denmark, Brazil and India.

For further information and future news, visit our web site. www.moredun.ac.uk



Pentland Science Park: supporting innovative companies



High occupation is very important to the sustainability of the science park and it is very satisfying that occupation levels have remained in excess of 95% in recent years and, indeed, we have enjoyed periods of full occupation at times. PSP staff work hard to deliver high quality, cost-effective services to our tenants to provide that added value that is of great benefit to the businesses located on site.

The staff within Pentlands Science Park possess a variety of skills and experience to help tenants in a number of areas such as altering and improving laboratory fit-out and environments, purchasing requirements, engineering maintenance, specialist waste disposal and IT. PSP also helps facilitate access to skills and facilities within the Moredun Group which may provide short or longer term benefits to our tenants, be that access to animal facilities, containment laboratories, incinerator services, health & safety, sample or archive storage. Benefits from bulk buying of

utilities by PSP for the whole site also provide cost advantage. PSP is part of a wider science community and is happy to help our tenants connect with other companies and individuals. We also have links with Scottish Enterprise and the wider business growth community which can often prove extremely valuable.

The majority of PSP tenants work in the biotech sector and we have had many success stories over the years with companies growing significantly at PSP. The Moredun Foundation and PSP pride themselves in supporting these companies through successful times but also through more difficult periods. Very occasionally, biotech companies are unable to survive these difficult periods. Only recently, PSP and TMF were able to help negotiate for a new company to acquire the assets and leases of one of our tenant companies that was unable to continue, resulting in a successful outcome which safeguarded the jobs of most of the staff.

This episode does highlight the risks of biotech. Enormous investment is often required for what can be a very long term process in developing products or services. As

PSP approaches its 20th anniversary in 2014, we will continue to use our skills, experience and excellent facilities to help our tenants to continue to be successful.

2013
Christmas Card
and Gift range

Christmas will soon be upon us, and we are delighted that The Moredun Foundation have a selection of Christmas gifts and merchandise for sale to members and supporters this year.

Further information about our Christmas gifts and merchandise we have available for sale this year, can be found on our website
www.moredun.org.uk/shop



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www.moredun.org.uk

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