The Institute for Animal Health; its role as a research provider and challenges being faced

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Introduction

The Institute for Animal Health (IAH) plays a central role in the UK's capability for addressing current and future infectious diseases affecting farm livestock, and so supports the UK's farming industry. Scientists at IAH recently provided Government with highly accurate advance warning of the at-risk times of bluetongue (BT) virus being carried across the English Channel by infected midges and first-class investigation, diagnostic service and advice following the outbreak of BT in the UK in September 2007. IAH is working with Defra to develop the best control and eradication strategies for the expected resurgence of BT in 2008 when the midge population again becomes active.

The mission of IAH, which comprises the Compton (Berkshire) and Pirbright (Surrey) Laboratories, is *'to deliver high quality fundamental, strategic and applied science into infectious animal diseases, some of which affect people, and, from that knowledge, to advance veterinary and medical science, enhance the sustainability of livestock farming, improve animal welfare, safeguard the supply and safety of food, and protect public health and the environment.'* IAH occupies a unique niche within the UK with its work being distinct from, but complementary to, that undertaken in other sectors such as the Universities and Government Agencies.

IAH, which is a Charitable Company, is sponsored by, and its science programme closely aligned to the strategic planning of, the Biotechnology and Biological Sciences Research Council (BBSRC), with funding also from Defra.

The Institute has a strong postgraduate training programme and provides science and veterinary graduates with advanced training in all aspects of infectious disease research. IAH has formal research links with approximately 25 UK universities, including all of the Veterinary Schools. In the past year IAH has worked with almost 200 overseas institutions in more than 30 partnering countries.

IAH research delivers benefits to animal health and welfare

Events during August and September 2007 were difficult for the IAH Pirbright Laboratory because the outbreak of FMD in cattle nearby was blamed upon the escape of virus as a result of the inadequacy of the drains at Pirbright site, which are used by both IAH and its tenant, Merial, who manufacture vaccines, including vaccines against FMD. However, as part of the process for UK Government to gain control of the situation, scientists and many others at IAH worked almost 24/7 for very many weeks to deliver a state of the art diagnostic service so that the outbreak of disease could be contained, controlled and eradicated in an informed manner. Whilst the scientific reputation *per se* of IAH Pirbright has not been damaged, public perception of its competence has no doubt suffered.

As amply demonstrated by BSE, FMD in 2001, the recent incursion of highly pathogenic H5N1 avian influenza, and BT in 2007, animal health is a long-term strategic issue for the UK, with international dimensions and implications for human health. The risk to the UK of infection by exotic animal diseases has never been greater and has increased significantly as a result of globalization, climate change and potential malicious acts.

IAH research is a key part of the long-term UK capability to ensure that future control of infectious diseases is effective, timely and sustainable. IAH scientists have 'a brief' to understand the specific interactions between livestock hosts and their pathogens. Only through knowledge of how infectious agents persist, are transmitted and cause disease in their natural hosts is it ever possible to develop better methods of diagnosis, improve husbandry to reduce disease transmission, improve existing vaccines, develop new vaccines, therapies and other control measures, and to optimise the breeding of naturally resistant stock.

- The underpinning strategic nature of much of the science at IAH ensures that it delivers practical outcomes. Just a few of our achievements are described briefly below.
- IAH predicted several years ago the potential for northward spread of BT virus due to global warming and confirmed that midges in the UK were competent vectors for transmission of BT virus – documented by the detection of BT virus in northern Europe in 2006 and the spread of BT virus in the UK in 2007.
- IAH's long and prominent contribution to the global eradication of rinderpest (cattle plague) that is expected in 2010, with a benefit to the developing world of >$1 billion annually and is work that addresses the UN Millennium Development Goal of eradicating extreme poverty and hunger (http://www.un.org/millenniumgoals).
- Faster diagnostic tests for FMD and BT, of proven worth in the outbreaks of 2007. Our new diagnostic tests can differentiate between FMD-vaccinated and FMD-infected animals, a crucial first step for a vaccinate-to-live policy.

- *Paracox*, the first completely safe vaccine against coccidiosis in chickens, now used globally to protect more than 1 billion chickens annually.
- *Torvac*, a vaccine against respiratory syncytial virus, to control respiratory infections in cattle which in the UK alone affect 1.9 million cattle and kill 160,000 calves annually.
- Diagnostics kits and reagents for distribution worldwide.

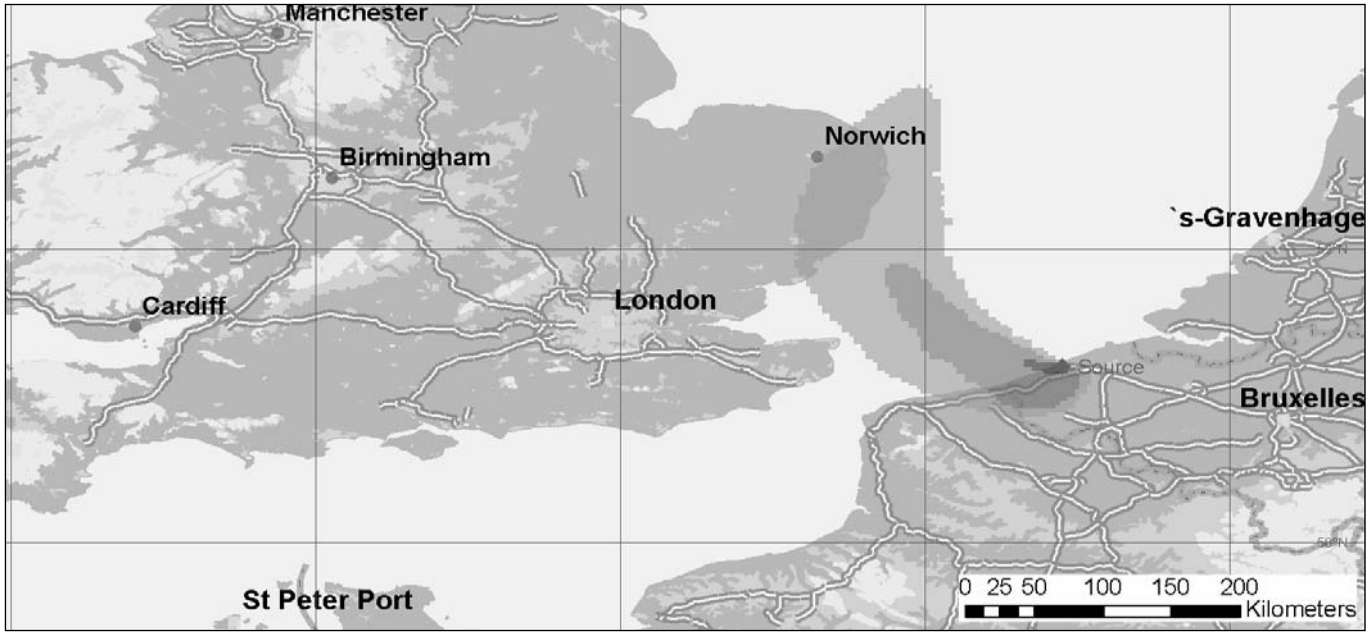
The work of IAH informs and supports policy-makers

A critical aspect of IAH research is that it generates information and advice that is crucial for supporting UK Government and others, including the European Commission; the EC Directorate General for Health and Consumer Affairs; the Food and Agriculture Organisation; the Office International des Épizooties; the Pan African Control of Epizootics programme, and the US Department of Agriculture. IAH can do this because it houses national and international Reference and Surveillance Laboratories. These analyse thousands of samples from more than 50 countries each year. IAH also provides support and training *in situ* to smaller diagnostic laboratories within developing countries, and holds several training courses within IAH for veterinarians and scientists from the UK and all over the world.

Challenges for IAH

The key challenges for IAH in 2008 are more than those envisaged even just one year ago. The Pirbright Site Redevelopment Programme started in 2003 and work on new animal accommodation, an insectary and effluent treatment plant is complete. Construction of the new Laboratory facility (to replace the current 1950s/1960s building) is now our number one priority and greatest imperative and will begin in 2008 as the final phase of the Redevelopment Programme. However, costs for the complete Programme are now expected to increase above the budgeted £121m for reasons that include delays through the summer and a review of the provisions for Biosecurity to implement lessons learned from the 2007 FMD outbreak. Renewed commitment from all stakeholders is now therefore essential if the UK is to have the facility that it needs to help deliver crucial surveillance, diagnosis and control of livestock pathogens that threaten the UK. In his independent review of the safety of UK facilities for handling FMD virus, presented to Government in August 2007, Professor Brian Spratt wrote in Recommendation 11 that "The construction of the new containment laboratories at IAH should go ahead as a matter of urgency. Such facilities are expensive to construct and maintain and Government must ensure that adequate funds continue to be available to enable the highest standards of biological safety for dealing with FMDV and other high risk viruses."

A related challenge for IAH is how to deal with the rising costs of infectious disease research on a day-to-day basis, especially as IAH has an intrinsic requirement for livestock housed in high containment buildings. Increasingly stringent health and safety, environmental, security and biosecurity requirements for our type of research add an enormous overhead onto the work we do. If the budgets of our main funders (currently BBSRC and Defra) were to decrease markedly, IAH would be forced to work on fewer diseases and, for the most part, only those that are an immediate problem. Significant rationalisation of an important programme of work is not desirable because the UK is continually faced with either new diseases appearing or old diseases re-emerging as a result of changes in climate, legislation, trade or animal and human movements. While recent history demonstrates that it is certain that these changes will happen, predicting specifically which diseases will appear next is extremely difficult and it is essential that IAH provides UK with expertise and facilities to deal with whatever nature throws at us. Ideally, IAH should already be working on these disease threats before they happen (as was the case with BT) but not all funders of research are currently prepared to commit to financial support for more than 1-3 years. Short-term funding from any major funder is not compatible with long-term research needs for the national interest, and could threaten the survival of Laboratories such as Pirbright and Compton. Once specialised expertise, livestock and facilities are lost they are unlikely to be recovered – retaining competency in scientific research is not like a tap that can be turned on and off as required. Given the unequivocally strong demand for research into diseases of livestock that can threaten the economic wellbeing of the UK, IAH remains very optimistic for its future.



The modelled plume of air that is believed to have carried bluetongue virus-infected midges to the UK on the night of 4-5th August 2007, precipitating the disease in the UK. Produced as part of a joint IAH/Met Office and Defra-funded collaborative project.