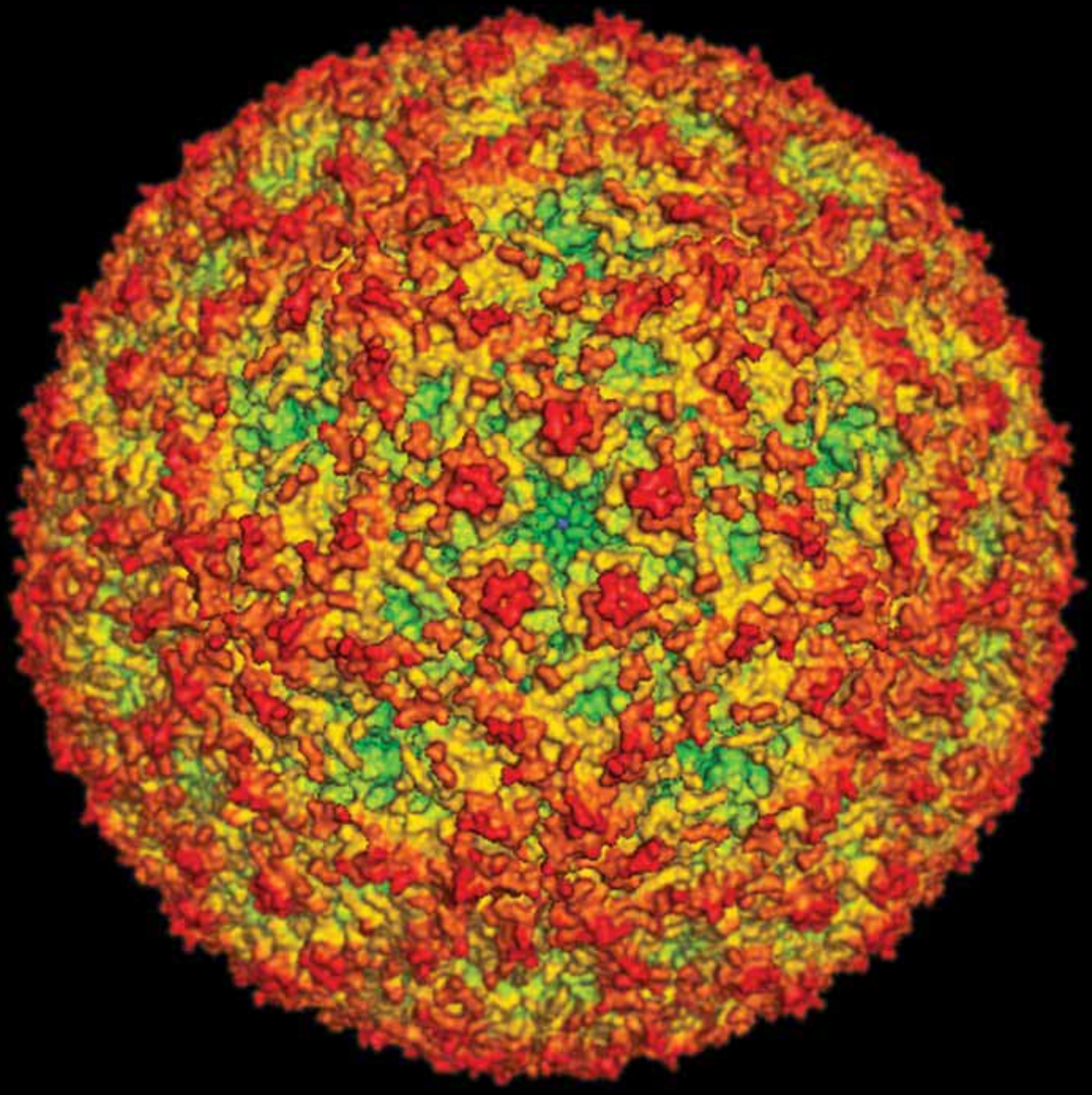
FOOT AND MOUTH DISEASE 2007: REVIEW



Return to an Address of the
Honourable the House of Commons dated
11 March 2008 for the

Foot and Mouth Disease 2007:
A Review and Lessons Learned

Chairman, Dr Iain Anderson CBE

Presented to the Prime Minister and the Secretary of State for Environment,
Food and Rural Affairs

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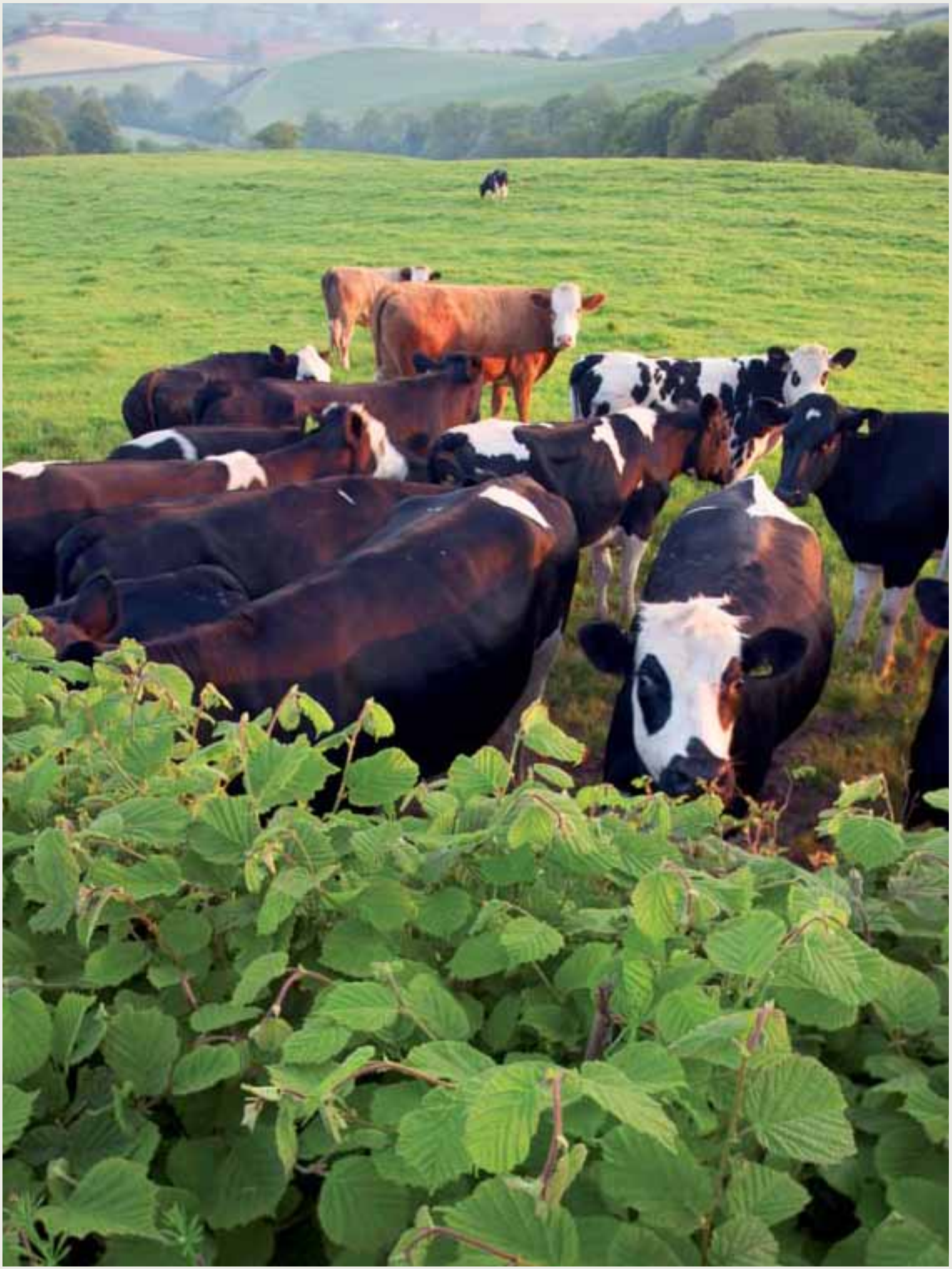


Section one

Foreword

by Iain Anderson

In 2002 I published the report of my inquiry into the Foot and Mouth Disease outbreak of 2001, setting out my analysis of the main lessons to be learned and a comprehensive range of recommendations to government and other relevant organisations. Last summer, in the middle of the recent FMD outbreak, I was asked by the Prime Minister and the Secretary of State for the Environment, Food and Rural Affairs to conduct a review to find out if the lessons of 2001 had indeed been learned and whether there might be new lessons and further recommendations. This report is the result of that work. It is a closely-documented description of what happened, from the first steps taken on 3 August in response to the FMD outbreak, through to 22 February when the last international restrictions were removed.

The report is built around the findings from 2001, with a chapter devoted to each of the major lessons identified six years ago. We also look at the Pirbright facility – the source of the virus incriminated in this recent outbreak – to see what further lessons may be drawn. Each chapter ends with key conclusions and recommendations. The report is preceded by a summary of events and a complete list of recommendations.

A Review such as this is an intensive – and extensive – collective effort. I want to express my gratitude to my support team who worked so tirelessly: to Alun Evans, who once again was prepared to join me, as Secretary to the Review, and to each one of my small secretariat who patiently researched the details and brought them together into the final report. I would also like to thank the many people who have taken time to send submissions or have been willing to share their knowledge in discussion. I include in my thanks those officials in the Department of the Environment, Food and Rural Affairs and elsewhere who agreed to be questioned about their roles and actions. We have endeavoured to be accurate and fair in our analysis, comments and reflections.

We consulted experts to help inform our opinions and avoid errors of fact or interpretation. For any that have slipped through I apologise.

In analysing how the 2007 outbreak was handled, with its innumerable, interwoven decisions and actions, we found much to applaud, along with some deficiencies. On balance, the positive easily outweighs the negative.

There were many examples of strong leadership, from the Prime Minister down which contributed to setting the right tone at the outset. Improved contingency planning and far better integration of scientific advice and capabilities at the centre of disease control strategies were big lessons learned from 2001. And external communication too was greatly improved, especially with the news-hungry media.

Less encouraging were the inadequate infrastructure and governance of the Pirbright facility where the Institute for Animal Health (IAH) is located, and the poor regulatory regime in place to license work with dangerous animal pathogens. Defra's information systems too were found wanting. We make specific recommendations in this report on these and all other matters needing attention.

A personal recommendation concerns the future of IAH itself. Looking across all the evidence we sifted and the analyses we made, I have become convinced of the need to reposition IAH as a new 'National Institute of Infectious Diseases' supported by multiple sources of funding from government and elsewhere. This new Institute should be devoted to vital short, medium and long term research into animal and zoonotic viral diseases. It should also have the capability to respond to disease emergencies by providing support for surveillance and control. To be effective the Institute would need to have the capacity to deploy and direct a critical mass of resources to selected, strategic areas of work, ideally via forging formal links with one or more universities.

The events of last summer brought home that the old arrangements at Pirbright must now be discarded. My hope is that a new consensus can be formed to move forward swiftly on a firm, sustainable basis, and I believe that Defra is best placed to take the lead in making this happen. The ambiguities of departmental leadership – and the lack of long-term sustainable funding – that have bedevilled progress in this area must be tackled and not left in doubt any longer. The increasing movement of people and goods as a result of globalisation, together with the advance of climate change, contribute to the growing risks to this country from the introduction of exotic diseases. Accordingly, I hope action will be taken to address this recommendation urgently and progress reported regularly to Parliament.

With the creation of a National Institute of Infectious Diseases, I believe parallel steps should also be taken to create an Independent Advisory Committee on Animal and Emerging Infectious Diseases along the lines, perhaps, of the successful Spongiform Encephalopathy Advisory Committee (SEAC). This would be a high level group of distinguished

experts, along with stakeholders, with a mission to provide independent advice to government. It would be required to take a strategic overview on all aspects of animal health, transcending artificial boundaries defined by government departments. It would link closely with the Government's and departmental Chief Scientific Advisors and count among its members the Chief Veterinary Officer and the Chief Medical Officer.

I do not share the view, held in some quarters, that Defra lacks the deep-seated commitment to research that would be needed to champion and lead the kind of co-ordinated, sustained investment now called for. On the contrary, I believe Defra will properly support well argued, peer reviewed research programmes if it is confident that value will be delivered and budget pressures allow.

If, however, these issues cannot be resolved at departmental level, or Defra is constrained by lack of funding, then I urge the Prime Minister to ensure that appropriate new arrangements are brought into being as soon as practicable.

Iain Anderson
March 2008

Section two

Summary and recommendations

The story of the outbreak

Late in the evening of Thursday 2 August a vet was called to visit some ailing cattle at Woolford Farm in Surrey. She was worried. The animals had symptoms suggesting that this could be a case of Foot and Mouth Disease (FMD). Because it was getting dark she could not examine the cattle then, so she returned early the next day. Samples from the cattle were sent to the nearby laboratories of the Institute for Animal Health (IAH) in Pirbright for analysis.

Later that afternoon, Friday 3 August, at around 17.50, IAH informed Defra that the tests confirmed the presence of FMD. The public announcement later that day sent shock waves across the country and above all into all rural communities, many of which were still scarred by the experience of the disease in 2001.

The contingency plans of government, Defra, the Animal Health agency and the devolved administrations of Scotland and Wales – developed over the past six years in response to the outbreak in 2001 – came into action. An immediate national livestock movement ban was brought into force and a three kilometre Protection Zone (PZ) and ten kilometre Surveillance Zone (SZ) were set up around the infected premises. Within hours, the normal patterns of susceptible livestock movement and trade had been shut down in an impressive display of co-ordination and co-operation, especially as there had been no warning nor any sense of increasing risk.

At national strategic level, the response was overseen and steered by the Cabinet Office Briefing Room (COBR), the government's central crisis management committee. COBR met first at 21.00 on Friday 3 August and regularly thereafter (and in the early days was often chaired by the Prime Minister). It brought together all the main departments and agencies involved in responding to the disease, including representatives from the Scottish Executive and the Welsh Assembly. The Prime Minister

and the Secretary of State for Environment Food and Rural Affairs both gave a strong lead in placing themselves at the forefront of the response.

Operationally the management of the disease was headed by the Chief Veterinary Officer (CVO) in Defra who led the response from the National Disease Control Centre (NDCC) at Defra's London headquarters – in accordance with the arrangements set out in the contingency plan. She too gave a strong lead both in the way in which she managed the outbreak from the start and from her clear communications with the press and media.

Locally, the field response was led by the Local Disease Control Centre (LDCC) headed by a series of Regional Operations Directors (RODs), who had been trained in advance of the outbreak as part of wider contingency planning. The LDCC began operating at the Reigate Animal Health Divisional Office (AHDO) from 18.00 on Friday 3 August. Staff arrived over that weekend and communications and IT equipment were installed. Within a few days it became clear that the Reigate office was too small for the operation and by the following weekend the LDCC had moved to another Defra site in nearby Guildford.

On Saturday 4 August culling of infected animals took place at Woolford Farm (infected premises number one, or IP1).

Meanwhile work was already in hand to identify the strain of the virus. The commitment of people everywhere to make things happen was striking. A few kilometres from the first site of infection the scientists at the Pirbright laboratory of IAH found themselves in the front line, working around the clock to characterize the virus and find its source. Once their test results that Saturday identified it as FMD virus strain O_1BFS 1860 it became clear that Pirbright itself – the only known UK location where this strain is held – was the likely source. The Government immediately commissioned two independent reviews: the Health and Safety Executive (HSE) was asked to lead an investigation into potential breaches of biosecurity at the Pirbright site; while Professor Brian Spratt was asked to review arrangements for biosecurity in UK facilities handling FMD virus and to evaluate if a breakdown in these controls could have led to the outbreak. Merial Animal Health Limited – a vaccine production company based on the site – voluntarily suspended production on 4 August.

On Monday 6 August, a second nearby farm was diagnosed as having the disease. Cattle were subsequently culled there. This was IP2.

In accordance with EU requirements, a total ban on the export of UK animal and meat products from susceptible species was imposed. The disease did not appear to have spread due, in part, to the immediate livestock movements ban, though the low density of livestock in the region no doubt contributed. Tracing and surveillance activities took place throughout the outbreak. However, the inaccurate and out-of-date data available to Animal Health and the many small diffuse holdings of land, coupled with a high ratio of livestock keepers who only kept one or two animals, complicated this vital process.

On Tuesday 7 August, HSE published an initial report to set out the lines of its inquiry and concluded that there was no reason for IAH to cease operations, provided it followed rigorous biosecurity protocols.

By 8 August, Genus – the vaccination contractor – was ready to vaccinate, according to the arrangements laid out in the contingency plan. The pre-planned vaccination decision tree was followed and on 9 August the Secretary of State for Defra announced the decision not to vaccinate. This process was repeated in what was to become the second phase of the outbreak.

By 23 August, all animal movements to and from the SZ had been traced. On that date the EU Standing Committee for the Food Chain and Animal Health (SCoFCAH) met to study the evidence from Defra vets on tracing and hear their argument that the disease had been contained. The Committee agreed to relax the ban on the trade of animals from outside the SZ, subject to additional safeguards. The SZ would be lifted 30 days after cleansing and disinfection at the last infected farm, subject to clinical inspection and serological testing with negative results. This happened on 8 September – the first date allowable under the EU FMD Directive.

HSE and Professor Spratt reported on 7 September. They concluded that the virus had most likely leaked out from drainage pipework at the Pirbright facility, contaminating the surrounding soil and then was carried from the Pirbright site by vehicles to the proximity of Woolford Farm.

On 8 September the CVO declared that the disease was over and that the remaining restrictions on animal movements would be lifted. This news was received with great relief by the livestock industry.

On the evening of 11 September a farmer six kilometres outside the previous SZ reported a suspected case of FMD. This was confirmed by IAH the next day, as IP3, and the animals were culled. A new three kilometre PZ and a ten kilometre SZ were put in place and a national movement ban was re-introduced. Nucleotide sequencing analysis of the virus samples showed that it was highly likely there was a ‘missing’ infected premises between this latest case and the previous known centres of infection. On 15 September, a fourth case was discovered and, on 17 September, a fifth was identified at Klondyke farm during routine surveillance work. Later research showed that the infection had spread from IP2 to IP5 and progressed from there through the rest of the properties in the second cluster. It has not yet however been established how the virus managed to travel 16 kilometres from IP2 to IP5.

Livestock located on infected premises or those considered to be dangerous contacts were culled throughout the second phase of the outbreak. Three further infected premises were identified (IPs 6-8); the final case being identified on 30 September 2007 – coincidently six years to the day after the final case in the 2001 outbreak.

During the early phase of the disease, the devolved administrations in Scotland and Wales were supportive of the policies and processes of disease control.

During the later phase of the disease that support waned. Scottish and Welsh sheep farmers in particular began to suffer significant economic hardship as a result of the ban on movements – especially at the time when sheep are taken down from the hills to market. There were major animal welfare concerns. Policy was perceived to be driven by English interests. Some specific relaxations, sought by the devolved administrations to ease their problems (such as changes to drivers' hours to help manage collections of animals), took an apparently disproportionate time to agree with London-based government departments.

Restrictions on animal movements were lifted progressively throughout October and the Secretary of State announced a package of welfare and farmers' support arrangements for England on 8 October. The Welsh Assembly Government and the Scottish Executive subsequently announced similar aid packages.

The country was split into different FMD risk zones (high, medium and low) in order to speed up relaxation of restrictions, starting in low risk areas. The complexity of managing the disease and the pressure on farmers only increased with the emergence of Bluetongue (as well as a small outbreak of Avian Influenza). These diseases had to be managed simultaneously alongside FMD.

Finally, again working closely with the EU veterinary authorities, an exit strategy was designed to ensure that the disease had been fully eradicated. The EU insisted on large scale serology testing to provide greater certainty that the disease was over. Widespread animal blood testing took place in and around the SZ during October and the beginning of November. On 31 December the last EU export restrictions were lifted. The OIE reinstated the country's FMD-free status on 22 February. The outbreak was formally over.

At the Pirbright site on 19 November there was a further unwelcome turn of events. FMD virus was again released into the site drainage system as a result of a faulty valve at the Merial vaccine manufacturing plant. This leak was contained as a result of the improvements to the drains which the Secretary of State had insisted on as a condition of re-licensing the Merial plant. This was reassuring but the accident exposed continuing communication lapses between Merial and IAH.

FMD in 2007 will be remembered for its two distinct phases. The first was restricted to just two cases. Formal control measures were confidently introduced on 3 August and just as confidently removed on 8 September with an unqualified announcement. On 12 September another case was confirmed. Great Britain-wide controls were re-introduced and EU export controls were imposed again. The second was restricted to six cases. Its associated control measures were cautiously wound down during October and finally removed altogether on 31 December.

In Phase 1 the mood of the farming community was supportive, co-operative and confident. By Phase 2 the mood was impatient and ready to challenge and question. Defra's authority had been weakened.

This Review was set up in mid-September by the Prime Minister and the Secretary of State for Environment, Food and Rural Affairs to review the Government's handling of the outbreak (see Appendix M).

That is what has been done. In the chapters that follow, the Report analyses the response against each of the major lessons identified in *Foot and Mouth Disease 2001: Lessons to be Learned Inquiry* (the 2002 Report) and assesses how well government and its agencies responded.

Summary and recommendations

Overview of recommendations

Introduction

The overall response in handling the outbreak was good. Many of the lessons identified in the 2002 Report had been acted upon and performance, taken as a whole, was much improved. This report however, makes a number of recommendations.

Lesson 1: Maintain vigilance

Compared to 2001 the nation is now far more vigilant and aware of the threat posed by FMD but the risk is real and likely to increase. Better controls are in place to reduce the risk of an exotic animal disease entering the country.

It is regrettable that the virus escaped from a government-licensed facility. This is discussed in more detail in Section 4.

- **We recommend that Defra work with the new UK Border Agency to ensure that vigilance is maintained, and where possible, strengthened.** (p.23)
- **We recommend that Defra consider the case for a standing zone around Pirbright with higher levels of surveillance and greater awareness-raising of the potential risk.** (p.25)

Continued vigilance to prevent the entry of FMD and other exotic diseases into the country must remain high.

Lesson 2: Be prepared

Contingency planning in Defra and government has undergone a step-change in quality since 2001. Many improvements have been made in levels of preparedness and Defra was much better prepared in 2007 than six years ago. Emergency preparedness is taken seriously by Animal Health and is fully understood to be a core function. Nevertheless there is still work to be done.

- **We recommend that Defra place greater emphasis on testing the full emergency response chain, involving critical contractors and operational partners.** (p.30)
- **We recommend that there be a fundamental overhaul of the arrangements for selecting, training, deploying and rewarding the Regional Operations Directors (RODs) and Divisional Operations Managers (DOMs).** (p.30)
- **We recommend that Animal Health review the skills, experience and general level of preparedness of their staff in key skills such as data handling** so that the organisation is well prepared and can scale up its response to a future outbreak. (p.30)
- **We recommend that Defra review the scalability of its existing contingency plans and emergency staffing models.** (p.35)
- **We recommend that Defra, drawing on the experience in 2007, should do more to prepare generic licences for use in a future disease outbreak, ensuring that all documents are in plain English.** (p.32)
- **We recommend that Defra continues to develop and test its policies and arrangements for emergency vaccination, as a central element of its FMD control strategy, ensuring that the full implications of vaccination are thought through and widely understood.** (p.32)
- **We recommend that Defra look to increase the level of decision making it is possible to delegate to those on the ground, at the LDCC, during an outbreak.** (p.35)

Lesson 3: React with speed and certainty

Ministers, officials and stakeholders at all levels were seized by the critical importance of speed. There was a certainty and clarity in the Defra response that was absent six years ago. The preparations for vaccination are a good example. In only five days teams, equipment and supplies were in place, ready to vaccinate, should the Secretary of State have decided to do so.

However, as the disease continued, some aspects of the policy response were uncertain and, at times, confused. The shortcomings in the data and information systems did not help.

- **We recommend that the arrangements for responding to notifiable disease reports be rehearsed regularly.** (p.40)

Lesson 4: Explain polices, plans and practices

Communications were much better handled in 2007. Nevertheless the overall consistency of Defra's communication with stakeholders and the wider farming community could be improved. The challenge in 2007 was much less than in 2001. Communication technologies are changing rapidly, bringing new opportunities and new challenges.

- **We recommend that Defra continue to develop a 'menu of communication opportunities' for use in any crisis.** In particular, the Defra website (which was much improved compared to 2001) should be strengthened. Web pages should be written and structured in a clearly understandable and navigable way. It should be 'farmer-friendly'. (p.46)
- **We recommend that engagement with the local media be improved.** Defra and its agencies should initiate contact with local radio and service their needs during a crisis. (p.49)

Lesson 5: Respect local knowledge

The Government was more sensitive to the local and regional dimension of the disease in 2007. However, even with only one Local Disease Control Centre (LDCC), some local stakeholders did not feel fully integrated into the response, although relationships did improve over time. The Core Group of industry experts set up one week after disease broke out involved industry more in decision making. Specific concerns were felt in Scotland and Wales, especially during Phase 2 of the disease. The animal health concordats were out of date as were some of the working arrangements with the devolved administrations.

- **We recommend that Animal Health and its local managers pay greater attention to building relationships with key stakeholders**, such as local authorities, trading standards officers, the police and Regional Resilience Teams. (p.53)
- **We recommend that devolution issues concerning animal health be urgently addressed, and that the concordats be reviewed** – in consultation with all the relevant organisations – and that the contingency plans maintained by Defra, the Scottish Executive and the Welsh Assembly be updated accordingly. (p.54)
- **We recommend Defra reinforce and formalise the role of the Core Group in decision making as part of its move towards greater responsibility sharing.** (p.55)

Lesson 6: Risk assessment and cost benefit analysis

In 2007 Defra and Animal Health showed a far greater appreciation of risk and its importance in effective disease management. Defra recognises that its growing function as an emergency response department places risk at centre stage. Decisions are now far more routinely based on risk assessment – although the quality of some of these was hampered by poor data and evidence.

The decision to lift the restrictions after Phase 1 was based on a risk assessment that took into account all available epidemiological and veterinary knowledge and was in line with EU Directives. It is still important to record that this decision was wrong: it extended the timescale needed to stamp out the disease, and it added extra costs. Defra, in co-operation with EU colleagues, needs to ensure that all the learning points taken from this experience are built into future EU FMD control policies and contingency plans, and are widely shared.

- **We recommend that Defra adopt a more rigorous cost benefit analysis model for disease control measures** to inform future policy making. (p.60)
- **We recommend that Defra agree with the EU specific exemptions from trade restrictions on highly processed products of animal origin.** (p.61)
- **We recommend that Defra – in co-operation with the EU and the devolved administrations – build on the experience of 2007 and further develop a regionalised and risk-based approach to disease management.** (p.62)
- **We recommend that Defra's Audit and Risk Committee should review processes within Defra for identifying and elevating risks to board level. The Committee should publish its findings.** (p.58)

Lesson 7: Data and information management systems

The 2002 Report could not have been clearer in its criticism of Defra's information systems, and made several recommendations to tackle the shortcomings. It was disappointing to discover how little progress had been made over the last six years. During the outbreak, at those points where data were assembled and used to guide policy decisions and support operational practice, the systems in use were little different from those in operation six years ago. This lost time, caused mistakes and added to frustration. The reasons for this failing were explained to us and are described later in the report. The Business Reform Programme now being rolled out in Animal Health is planned to deliver a fully enhanced capability by 2011. In the meantime Defra remains in a vulnerable position in the event of a disease outbreak.

- **We recommend that the Business Reform Programme and the associated Livestock Partnership Programme be prioritised and appropriately funded by Defra and Animal Health.** (p.73)
- **We recommend the full potential of GIS technology with all its benefits be incorporated into future data systems.** (p.72)
- **We recommend that the information systems interface with Genus be subject to a simulated load test, end-to-end.** (p.74)
- **We recommend that Defra develop a contingency plan to secure its existing IT systems while the Business Reform Programme and Livestock Partnership Programme are being developed.** (p.74)

Lesson 8: Have a sound legislative framework

Government took seriously the recommendations in the 2002 Report and acted quickly to tackle the shortcomings in legislation. Government has made good progress since then in setting a robust legal framework for managing animal disease founded as it must be on the basis of EU law. In addition, the Civil Contingencies Act provides the legal powers for the wider framework for government management of emergencies. The legislative changes made since 2001 were critical in responding effectively to the 2007 outbreak but could be tested further in a larger outbreak.

Lesson 9: Base policy decisions on best available science

Government positioned science at the centre of its control strategies – a major lesson learned from 2001. Scientific advice and capabilities supported policy decisions and operations throughout the outbreak with good examples in risk modeling, vaccination decisions, epidemiology, nucleotide sequencing, rapid testing and diagnosis. Many of these techniques were pioneered by the Institute for Animal Health (IAH) at Pirbright. Although vaccination was not used in 2007, Defra had developed a methodology for its use. Most of the submissions we received, but not all, supported the Government's decision not to vaccinate.

- **We recommend that Defra increase the level of technical and scientific expertise available to contribute to the development of disease control policies on a day-to-day basis, not just during a disease outbreak.** (p.84)
- **We recommend that there be greater transparency in publishing scientific advice and risk assessments** to strengthen confidence in disease management overall. (p.83)
- **We recommend that Defra continue to drive the vaccination debate, ensuring that all of the issues are communicated clearly and properly explained.** (p.90)

Pirbright

We have identified one further lesson from the experience of FMD in 2007 and that is in relation to the role and management of Pirbright. The research conducted at IAH is world class and needs to be positioned at the centre of the national strategy for animal health.

The IAH is critical to the nation's capacity to prepare for, and respond to, the evolving animal disease and zoonotic risk. However, the facilities of IAH fall well short of internationally recognised standards. And the governance and funding arrangements are muddled and ineffective. There have been many warning signs that all was not well at Pirbright. There are lessons for all here and it would be irresponsible to allow time to pass without attending to each. That is why the current Pirbright Site Redevelopment Programme is so important. It is also why we recommend the establishment of a National Institute of Infectious Diseases to build on and extend the research done at IAH.

Section three

Lesson 1

Maintain vigilance through international, national, and local surveillance and reconnaissance

Introduction

The exact source of entry of Foot and Mouth Disease (FMD) into the country in 2001 was never established. However, the 2002 Report said it was most likely that the FMD virus was imported into the UK from the Far East, either in the form of imported meat (almost certainly illegally) or in the form of catering waste from ships or airlines.

The 2001 outbreak underlined the importance of having robust controls in place to reduce the risk of an exotic animal disease entering the country. The 2002 Report called for:

- best practice from import regimes elsewhere to be incorporated into UK practice;
- the EU to lead a risk-based approach to keep FMD out of EU member states;
- the UK prohibition of swill feeding of catering waste containing meat products to continue; and
- Defra to be given responsibility for co-ordinating all government activity to step up efforts to keep illegal meat imports out of the country.

The 2002 Report also underlined the importance of routine veterinary surveillance of animal health and the need to reduce vulnerability by increasing the level of knowledge among farmers, and across the livestock sector, of animal diseases and biosecurity.

Preventing the entry of exotic animal diseases into the UK

A number of changes to control and surveillance regimes have taken place since 2001. A Cabinet Office Review of controls on imports, published in 2001, considered the roles and responsibilities of the departments and agencies involved in the control of imports of animals, plants, fish and their products, meat and meat products and other foodstuffs. This led to a number of changes in the management of controls for legal and illegal imports of animal products.

Defra was given overall policy responsibility for preventing the illegal entry of products of animal origin into Great Britain (different arrangements apply to Northern Ireland), and Her Majesty's Revenue and Customs (HMRC) was given overall responsibility for enforcement at the border.

The endemic nature of FMD and other animal diseases in many countries around the world means there is a continuous, but low, risk of them reaching the shores of this country. Defra works closely with HMRC and other agencies to minimise the risks of importing disease. This work includes:

- monitoring the occurrence of disease outbreaks around the world;
- controls at the border on illegal imports as well as support for legal intra-EU trade and trade with non-EU countries; and
- publicity campaigns aimed at raising awareness of the rules on food imports and the possible disease risks.

Control of legal imports

All imports of live animals or animal products entering the country from outside the EU are required to pass through special control points on entering the country. For intra-EU animal product movements, random checks are carried out at the point of destination, but risk-based checks can occur as part of domestic border controls. Inspections of meat and other animal products for human consumption are carried out by local authorities. Live animal checks and checks on animal products not for human consumption are carried out by Animal Health.

Combating illegal meat imports

HMRC is responsible for anti-smuggling controls on animal products at the border, although this responsibility will transfer to the new UK Border Agency in the near future. Local authorities are responsible for dealing with illegal animal products when they are discovered inland at retail, catering, market stalls or other premises.

Controls are operated on a risk-assessed basis, targeting those routes of entry that pose the greatest likelihood of the introduction of disease into the country. A range of indicators is used to assist in tackling illegal imports including:

- latest information at international and national level about animal disease outbreaks; and
- high risk source countries for potentially infected products. Defra provides HMRC with a global risk map including disease information from OIE.

HMRC's control measures have been strengthened over the past few years. This has led to an increase in seizures from around 2,000 in 2001-02 to 35,000 in 2006-07, of which over 80% originate from designated higher-risk countries. HMRC's response is scaled according to the threat. During 2005, for example, the number of staff allocated to these controls was doubled in response to the perceived threat of the entry of Avian Influenza (AI H5NI).

The National Audit Office reviewed the effectiveness of these import controls in 2005 and gave the arrangements a clean bill of health.[1] However, the risks from illegal imports are ever present and evolving and continual vigilance is essential.

Future developments in border controls

Changes in climate and the growth in international trade are likely to alter the nature of the animal disease threat the UK faces. The future threat is detailed in the Foresight Review of infectious diseases.[2] Rises in temperature are expected to result in the growth of vector-borne diseases – for example, as shown by the recent spread of the Bluetongue virus.

It is important that the country remains responsive to, and anticipates, these changes. To that end, Defra should engage with the new UK Border Agency, which will subsume HMRC's current enforcement activity at the border, to ensure that appropriate priority continues to be given to the control of legal and illegal imports of animal products in the face of the evolving threat.

Reducing vulnerability in the country

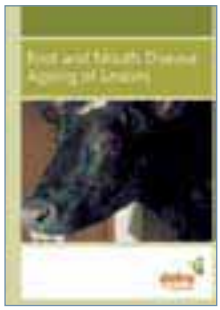
As part of its wider veterinary surveillance strategy, Animal Health and Defra operate a special regime for notifiable diseases, including FMD, Bluetongue and Avian Influenza. Anyone suspecting the presence of a notifiable disease must report it to their local Animal Health Divisional Office. Animal Health duty vets are on call 24 hours a day to respond to reports. The notification system is overseen by the Veterinary Exotic Notifiable Diseases Unit (VENDU) in Defra, which is responsible for seeing the investigation of all reported disease cases through to a clear conclusion.

The number of report cases has increased significantly in recent years with the growing threat from Avian Influenza and the arrival of Bluetongue from continental Europe (see Appendix B).

> …the disease was confirmed as quickly as it could have been. However, the bigger concern was the potential delay in a case being reported to Animal Health – a period over which it had no control. In this case the farmer at IP1 had acted reasonably in calling Animal Health when he did
>
> **Rob Paul, Director of Veterinary and Technical Services, Animal Health**

[1] HM Customs and Excise: Stopping Illegal Imports of Animal Products into Great Britain. A report by the Comptroller and Auditor General. HC 365 Session 2004-2005 — March 2005

[2] Foresight Review: Infectious Diseases: Preparing for the Future – April 2006 www.foresight.gov.uk




Examples of Defra leaflets on exotic diseases.

The handling of the report case that led to the identification of the 2007 FMD outbreak is described in more detail under Lesson 3.

Defra's current Animal Health Welfare Strategy recognises that those who work with animals need the skills and knowledge to appreciate and exercise good practice in animal health and welfare, including the prevention and detection of notifiable animal diseases. A number of initiatives have been developed with the livestock industry and veterinary community to develop skills. Defra also publishes a series of leaflets for farmers on identifying and responding to particular animal diseases and on reducing biorisk. All animal keepers also have a clear professional and personal responsibility to ensure their knowledge is up-to-date.

The importance of shared responsibility for vigilance between Animal Health and livestock owners is illustrated by their roles in detecting the individual infected premises during the 2007 outbreak (see figure 1). The risk of an exotic disease spreading is high if symptoms are not picked up by livestock owners and reported to Animal Health.

Figure 1: Details of who detected the presence of disease at each infected premises (IP) during the 2007 FMD outbreak

Infected Premises	How FMD was reported/detected
	1st FMD cluster
IP1	Farmer reported suspect disease
IP2	Animal Health surveillance activity
	2nd FMD cluster
IP3	Farmer reported suspect disease
IP4	Animal Health surveillance activity
IP5	Animal Health surveillance activity
IP6	Farmer reported suspect disease
IP7	Animal Health surveillance activity
IP8	Animal Health surveillance activity

Reforms to the Common Agricultural Policy – whereby subsidies are no longer paid on the basis of the number of animals on the holding – have led to a reduction in animal densities. This, in turn, has helped to reduce the risk of an infectious disease spreading.

The change to the subsidy regime sits alongside other legislative measures designed to reduce risk, such as the six-day standstill provisions in England and Wales for sheep, cattle and goats and the similar 13-day requirements in Scotland.

The National Farmers Union has also been promoting the development of its farm assurance scheme. A similar scheme operates in Scotland. Initiatives such as these can help to reduce risk by driving up standards of husbandry and farm biosecurity. This is discussed in more detail under Lesson 6.

Vigilance and Pirbright

In allowing live FMD virus to escape from Pirbright, there was a failure to observe the first lesson flowing from the 2002 Report – maintaining vigilance. The management and regulation of the Pirbright facility is discussed later in this report.

The escape of FMD from Pirbright is one of a number of known escapes from research institutions and vaccine production facilities that have led to FMD outbreaks – there have been at least 14 since 1960 (see Appendix I). The biorisk from working with pathogens such as the FMD virus is real. Good risk management and constant vigilance should not be compromised.

During the 2007 outbreak, Defra put in place temporary enhanced surveillance and biosafety arrangements around Pirbright. In the context of the future regulatory arrangements, Defra and HSE, which – following the recommendations of the Sir Bill Callaghan's *Review of the Regulatory Framework for Animal Pathogens* – will become the regulatory authority for Pirbright, should re-focus on the mitigation of risk. They should also consider the case for having a standing surveillance zone around Pirbright with higher levels of surveillance, greater concentration on raising awareness with farmers and robust management of the associated data and tracings.

Conclusions

Continued vigilance to prevent the entry of FMD and other exotic diseases into the country must remain high. The recent Foresight Review on infectious diseases has emphasised that the threat from exotic animal disease is likely to grow and evolve over time, not least as a result of climate change.

It is recognised that Defra, working with other government agencies and stakeholders, has taken action to improve arrangements for maintaining vigilance overseas, at our borders, and across the countryside. Building on the good work that has been done to date in developing controls and surveillance systems, Defra should work closely with the new UK Border Agency to ensure that vigilance is maintained and, where necessary, strengthened.

> By far the majority of livestock keepers take their responsibilities seriously, but it is the few that don't, either through ignorance or deliberate action, that threaten national disease security
>
> **British Cattle Veterinary Association**

Lesson 2

Be prepared with comprehensive contingency plans, building mutual trust and confidence through training and practice

Introduction

Contingency planning is the process by which organisations plan for uncertain events. Effective contingency planning covers all aspects of such preparations, including: the deployment and training of staff; communications, internal and external; decision making; information and management systems; and sourcing of essential goods and services.

The 2002 Report was critical of the extent of contingency plans in place at the time to deal with exotic animal diseases. It found these plans to be 'limited in scope, out-of-date in some respects, and not integrated into a national programme of rehearsal and testing'. One stakeholder at the time referred to the Government's contingency plans for exotic animal diseases as the 'best-kept national secret'.

As a result, the 2002 Report called for more emphasis to be placed on developing and resourcing contingency plans, for government to publish a biennial report on its preparedness for dealing with exotic animal disease, and for specific provision to be made for combating an outbreak beyond worst case expectations.

Preparedness in 2007 – an overview

Defra was much better prepared for an FMD outbreak in 2007 than it was in 2001. This was reflected both in its speed of initial response to the detection of the first infected farm premises (IP1) in Surrey – see Lesson 3 – and its success in containing the spread of the disease.

In 2007, Defra had a detailed contingency plan called the *Framework Response Plan for Exotic Animal Diseases*. This plan is published and revised annually in response to an open, annual consultation. The Scottish Executive and Welsh Assembly Government also publish their own contingency plans in accordance with their responsibilities for animal health policy in Scotland and Wales respectively.

The contingency plan, which is not FMD-specific, sets out the processes that must be followed in the event of a suspected or confirmed disease outbreak, as well as the associated command and control structures for managing such an incident. The plan was followed closely from the time of the first report on 2 August, thus helping to ensure a rapid response.

Defra and Animal Health also maintain detailed operational guidance – called *Veterinary Instructions Procedures and Emergency Routines* (VIPER) – which covers the management of specific exotic animal diseases. This was also followed closely during the outbreak.

Operational readiness

The experience of the 2001 outbreak was salutary for ministers and senior managers alike and has driven improvements in the UK's degree of readiness. This was reflected in a series of changes made to operational delivery and contingency planning. Animal Health – an executive agency of Defra – has the lead responsibility for this task.

Animal Health has established a clear programme to develop and promote its emergency preparedness. The programme is overseen by its Emergency Preparedness for Exotic Animal Diseases Board (EPEAD) and managed by a dedicated Contingency Planning Directorate. The aim is to plan, develop and assure, through exercises and other means, the capability, readiness and resilience of Defra and its wider network, in response to an outbreak of an exotic animal disease. This has given Animal Health's work on contingency planning clear direction and emphasis.

The development of an Emergency Readiness Management Assurance Scheme (ERMAS) and the appointment of dedicated Readiness and Resilience Managers (RRMs) to each Animal Health Divisional Office (AHDO) have driven up the quality of contingency planning in each of the 24 AHDOs and enhanced their emergency readiness. For example, 15 of the 24 RRMs worked at the Reigate and then the Guildford Local Disease Control Centre (LDCC) during the 2007 FMD outbreak as part of a concerted effort to give them direct exposure to managing an outbreak. This type of practical experience is invaluable.

The 2001 FMD outbreak was probably the most serious disease epidemic in Great Britain in modern times. It was a catastrophe… The 2007 outbreak has been a completely different story, not just because it was successfully contained, but because there were systems in place

National Farmers Union

Emergency Readiness Management Assurance Scheme (ERMAS)

The scheme, first used in 2005-06, provides an assessment of the preparedness of Animal Health to respond to an outbreak of an exotic animal disease. Assessments are undertaken by an independent assessor and measure the readiness of:

- AHDOs to operate in response to an animal disease in an emergency, to effect the transition to the status of a functional LDCC and to sustain operations at a reinforced level thereafter; and
- the corporate centre of Animal Health to support the actions of the LDCC and AHDOs during the initial stages of an outbreak.

There have been ten exotic animal disease outbreaks in the past two years (see box). The practical experience of managing these has also helped enhance Animal Health's readiness. Each outbreak has provided a real-world test of key procedures and accelerated the process of learning. The risk of exotic animal disease has also kept contingency planning at the forefront of Animal Health's and Defra's thinking.

Exotic animal disease outbreaks: 2006-08

- March 2006 – highly pathogenic H5N1 Avian Influenza in a wild swan in Cellardyke, Scotland
- April 2006 – low pathogenic H7N3 Avian Influenza outbreak in poultry near Dereham, Norfolk
- October 2006 – Newcastle Disease in poultry in East Lothian, Scotland
- February 2007 – highly pathogenic H5N1 Avian Influenza outbreak in poultry in Holton, Suffolk
- May 2007 – low pathogenic H7N3 Avian Influenza outbreak in poultry in Conwy, Wales
- August 2007 – FMD outbreak first cluster
- September 2007 – FMD outbreak second cluster
- September 2007 – Bluetongue first case in East Anglia
- November 2007 – highly pathogenic H5N1 Avian Influenza in poultry in Suffolk
- January 2008 – highly pathogenic H5NI Avian Influenza in wild swans in Dorset

Supplementing this real experience, Animal Health also operates a programme of national and local contingency exercises. The last national FMD exercise, Exercise Hornbeam, was held in 2004.

Exercise Hornbeam

Exercise Hornbeam, which ran from January to June 2004, was a series of linked exercises testing Defra's contingency plan for an outbreak of FMD. Tabletop tasks focusing on particular stages of disease progression were carried out prior to a real-time, two-day national event that considered decisions to be taken at days seven and eight of an outbreak. The final exercise built on decisions taken earlier which had looked at the initial phases of disease suspicion, confirmation and regional spread. More than 500 staff were involved.

The main learning points included:

- the roles and responsibilities at senior levels needed to be clearer, including the purpose and structure of the National Disease Control Centre (NDCC) and 'Birdtable' meetings;
- the clarity and presentation of contingency plans and operational instructions needed to be improved;
- policy readiness – for example, in identifying in advance trigger points for policy decisions during an outbreak – was critical;
- communications, both in terms of systems and procedures, needed to be improved; and
- information collection, sharing and dissemination needed to be improved.

We have looked at the pattern of exercises held since 2001. Many were simple desktop activities that did not test or rehearse existing practical arrangements. However, many lessons have been repeatedly identified in individual exercises – including the need for better training, improved IT systems and more detailed instructions.

Contingency plans and exercises must go deeply enough into all aspects of the proposed response. Most appear to focus on management of the first few days of an outbreak and the associated decision making.

The culling and disposal of carcasses were critical pressure points in the 2001 outbreak. One of the officials involved in planning for animal diseases told us that he was 'not aware that any of these exercises have ever covered events as far down as looking at carcass disposal problems'. This was supported by the experience of Wessex Incineration – the company used to dispose of the carcasses of culled animals during the 2007 outbreak.

Incineration is at the top of Defra's disposal hierarchy. Despite being one of the most advanced incinerators in the country, and therefore an obvious port of call during an outbreak, Wessex Incineration did not have a pre-existing contract in place with Defra. The company had been contacted in February 2006 about drawing one up, but this had not been followed through or signed off prior to the outbreak. As a result, Wessex Incineration had not been briefed on biosafety arrangements in advance or participated in any contingency preparations.

From the outset, Defra's contingency plans to manage disease control on this occasion were robust; the outbreak was handled both swiftly and decisively

Marks & Spencer

A total of 344 contingency contracts were in place at the end of 2007. These contracts give the contingency plans necessary depth. However, a number of proposed contracts have yet to be finalised. These may include important elements of the response 'jigsaw', so it is important that Defra's contract programme is completed and kept up-to-date. There should be a greater emphasis on testing the full emergency response chain, involving critical contractors and operational partners.

Staffing and training

Regional Operations Directors (RODs) and Divisional Operations Managers (DOMs) play a critical role during an outbreak in managing the LDCC. The ROD is in overall charge of the local response, including all local stakeholder interactions and dealing with the media on the ground, while the DOM manages the logistics of the response.

Neither the ROD or DOM is a standing position within Animal Health. Given their importance in leading the field response, we were surprised to learn that these roles are voluntary, that the individuals involved do not receive any special reward or recognition, nor do they necessarily have a background in animal health.

Individuals are recruited from across all parts of the Defra network. They are trained to undertake the role during an emergency on a voluntary basis. They are listed on a register and contacted in case of need during an emergency when they are asked to volunteer. They then have to seek permission to be released from their normal roles.

As at February 2008, there were seven trained RODs and ten DOMs in England. They are allocated to regional areas, both taking into account where they live and to give them a chance to develop working relationships with staff within individual AHDOs.

On day one of the 2007 FMD outbreak, there was only one ROD available. This individual had received one day's prior training and was only able to stay at Reigate for the first weekend (as was the initial DOM).

Experience in 2007 both demonstrates Defra's reliance on RODs and DOMs and the inadequacy of existing arrangements. It is time to overhaul the arrangements for selecting, training, deploying and rewarding them.

There is also an issue about the general level of preparedness of all staff in Animal Health. The experience in 2007 showed up some shortcomings in current arrangements for training and deploying staff in an emergency, recognising that at any stage they may be called upon. Animal Health did not have a complete picture of the emergency skills and competences of individual staff members. For example, there was a shortage of 'expert' users of Animal Health's Disease Control System – the data system used during an outbreak to record visits and inspections at suspected premises; staff, more generally, were also unfamiliar with it.

The currency and availability of skills across Animal Health should be reviewed, alongside its current training strategy. It may be appropriate to deepen the training of some staff so that they can take up key roles with

minimal supervision, ensure that critical teams are functioning effectively, and train other supporting staff on the job as necessary. The former CVO told us that she was attracted to the idea of a 'first response team' prepared to respond immediately and decisively to an exotic animal disease outbreak anywhere in the country.

Data management and systems

The quality of data and data systems is discussed in detail in Lesson 7. This is the one area where little progress has been made by Defra and Animal Health since 2001.

In the 2007 outbreak, access to timely and accurate data on the location and movements of farm animals was poor: there was both an in-built structural time-lag in the data available because of the time an animal keeper has to complete a return and the time taken then to process it, and because of the incompleteness of the data. Associated data and management systems also proved to be vulnerable. These data and associated management issues slowed and weakened the response. Significantly more manual intervention was required than would otherwise have been necessary. These delays also have an economic cost. The longer animal tracings take to complete, the longer movement restrictions have to remain in force.

The bandwidth at the Reigate AHDO proved to be insufficient to cope with the level of demand – this was one of the reasons behind the move of the LDCC to Guildford. We were told that there were similar bandwidth capacity problems at a number of AHDO sites. Defra needs to ensure that contracts with its IT provider for emergency IT provision are sufficiently scalable and responsive.

Policy preparedness

Policy preparedness is a significant part of the emergency response to an outbreak. Defra had anticipated a number of the detailed decisions that would be required during the outbreak and had developed a number of key decision matrices and algorithms to help speed up the response.

However, some aspects of Defra's policy response were criticised by stakeholders. It was not clear how deeply the commercial and welfare implications of Defra's decisions were understood within the Department. One example was the licensing of certain animal movements after the Great Britain wide movement ban was imposed. While the general feedback was that the situation had improved in comparison to 2001, specific criticisms remain. LACORS (Local Authorities Co-ordinators of Regulatory Services) told us: 'it is clear from the experience of LACORS and local authorities, that there were extensive problems with the timing and notification of changes to the movement regime during 2007 …we often received absolute minimal notice that changes to the licence regime were definitely going live... This left LACORS providing details of changes to local authorities at the same time the information was released to the public, yet local authorities are responsible for advising on and enforcing requirements.'

Delays in introducing the necessary licences to allow certain animal movements (for example, for transporting animals to slaughter, for veterinary treatment etc) to take place, despite the general movement ban, caused unnecessary difficulty for the industry and raised a number of avoidable welfare issues. This experience raises the importance of speed of issue of licences. The means to achieve this most effectively needs to be examined in the light of experience in 2007.

Defra told us that: '…many licences could not have been prepared in advance of the 2007 outbreak, as they required focused input from Animal Health, the Core Group and lawyers and were specific to the risks and circumstances of that outbreak. Nevertheless Defra was developing a systematic plan to be able to draw on the 2007 licences as a starting point in future outbreaks.' (See also p.47, Lesson 4.)

The wider food industry was also critical of Defra's handling of trade issues, with the licensing arrangements for processed food exports coming in for particular criticism. Marks & Spencer told us: 'Whilst we urgently need Defra to consider the introduction of an equally robust contingency plan (to facilitate continuation of exports during any future animal disease outbreak), we believe the issue is more deep rooted. From the outset, consideration must be given to the interests of all those in the food supply chain, including those who operate beyond the farm gate.'

We discuss this further under Lesson 6.

Vaccination

A 'decision tree' approach was used to weigh up the various elements of the decision to vaccinate or not, and the decision not to vaccinate was taken quickly and decisively after the discovery of each FMD cluster.

Defra had developed the capability to vaccinate through its contractor, Genus. Around 300,000 doses of vaccine were made ready for use and 50 vaccination teams were fully mobilised in premises just outside the SZ by 9 August. However, the data systems in place to manage the vaccination process had not been fully tested with a realistic volume of data, nor was there a tested arrangement to track vaccinated animals after the outbreak was over.

Stakeholders continue to have a range of practical concerns about vaccination, although increasingly they accept its use as a control measure. The British Cattle Veterinary Association (BCVA) said that: '…despite processes being laid down in the legislation for the handling of vaccinated animals and product from them, problems still exist in a practical sense with how this is done. More robust contingency planning is required so that all are aware of the practical consequences of a vaccination policy before such a policy is delivered to animals that may potentially become economically worthless as a result.'

Aspects of the science of vaccination are discussed under Lesson 9.

Involvement of operational partners and key stakeholders

The response to FMD relied on a number of local, regional and national stakeholders.

At the strategic level, operational partners and stakeholders were involved in key discussions at the NDCC. During the outbreak, this ensured that they were kept up-to-date with the strategic response to the outbreak and had the chance to contribute to the policy response. A 'Core Group' of experienced, industry practitioners was also convened to inform the development of policy on a range of issues during the outbreak. This was backed up by discussions with key representative bodies such as the National Farmers Union (NFU) and LACORS, who commented to us that they had: '…worked effectively with both Defra and Animal Health at a national level during the FMD situation in 2007. The mechanisms in place to support this relationship have vastly improved and brought direct improvements since 2001.'

While the contingency plan details the roles of operational partners and stakeholders during an outbreak, we found some criticism of Defra's and Animal Health's level of engagement prior to, and at the start of, the outbreak. Poor co-ordination between the LDCC, police and trading standards initially hampered smooth operations on the ground. The pressure of the world's media descending on the area made matters even harder to handle. We spoke to a number of members of the Local Resilience Forum – the cross-agency body responsible for emergency planning and response. A number of them commented on the limited engagement of the Reigate AHDO in the resilience process before the outbreak.

Tackling an emergency – but especially a serious animal disease outbreak – requires close co-operation and mutual support between all stakeholders at the operational level. It also demands their prior engagement in meaningful contingency planning and exercising. This is discussed in more detail in Lesson 5.

Readiness of the livestock industry

The livestock industry also has a big part to play both during a disease outbreak – helping to prevent the spread of infection – and in prior contingency planning. Promoting a greater understanding of biosecurity requirements both in normal farming practice and during outbreaks, including at markets and abattoirs, is vital. The NFU was particularly active during the outbreak in promoting awareness of farm biosecurity requirements including cleansing and disinfecting protocols. It also developed the concept of a local farm biosecurity 'tsar'. There is an opportunity for Defra to work with the NFU to embed this work more widely.

> In any outbreak, targeted licences are needed from the outset to allow low-risk activities to take place… The NFU's experience is that this was handled more efficiently than in 2001. However, there were unacceptable delays as licences were prepared from scratch rather than being taken off the shelf ready to use
>
> **National Farmers Union**

Many of the peripheral issues regarding vaccination have not been resolved. There are tremendous practical issues that should be addressed before vaccination is implemented

British Veterinary Association

Going forward, the livestock industry as a whole has responsibility for developing its own contingency plans for responding to outbreaks of disease. For example, the way in which the whole industry responded to the imposition of an immediate national movement ban on 3 August showed that it had learned the lessons from 2001.

Looking ahead, there needs to be a constructive dialogue between government and the industry around the imposition and gradual relaxation of movement restrictions during a disease outbreak, particularly the way in which controls might be eased on the basis of sound risk assessment. A more proportionate response could be one means to reduce the economic costs of future outbreaks.

Defra should take this agenda forward within the context of the wider cost and responsibility sharing dialogue currently under way.

Scalability

The 2007 FMD outbreak was much smaller than that of 2001. It was concentrated in one small area of the country, and there were eight infected premises, as opposed to more than 2,000 six years previously. That being so, the outbreak did not really test Defra's capability to manage a large and distributed outbreak.

The 2002 Report recommended that the Defra contingency plans should set out procedures to be followed in the event that an emergency expands beyond worst case expectations. The UK Government and devolved administrations have already made a number of important policy changes that reduce the risk of a large, widespread disease outbreak happening again: through increased vigilance of legal and illegal imports; and by introducing standstill provisions and separation agreements. Even so, the recommendation remains relevant. Scalability of contingency plans should be seen as an important feature of resilience.

Staffing

Animal Health has developed a staffing model to inform its planning of the resources needed in response to an outbreak. The model anticipates that Animal Health could staff up to three LDCCs from within its own resources, with limited support from Defra, before looking elsewhere for specialist and administrative support.

The model further anticipates that each LDCC would require around 70 dedicated staff to support its field and administrative functions. Whereas, on most days, around 250 people worked from the Reigate/Guildford LDCC, the figure rose to more than 400 during the enhanced surveillance period at the end of the second FMD cluster (see Appendix D).

The explanation given for this difference was the Government's determination to stamp out the disease as quickly as possible. This raises a question about the validity of Animal Health's modelling and its capacity to respond to multiple clusters. Existing staffing models should be revisited in light of the experience in 2007. Defra and Animal Health need to decide how many people, with what skills, need to be deployed.

Contingency arrangements also existed to secure additional vets. These arrangements were developed in 2001 when more than 1,800 vets were engaged.

Epidemiologists also play a critical role in the response to a disease outbreak. Animal Health can call on the Veterinary Laboratories Agency for additional epidemiologists (of whom there are fewer than ten) if necessary, and it has also developed its own, internal epidemiological training programme for vets. However, these measures would not deliver the additional resource needed to deal with a much larger outbreak.

Consideration should also be given to scalability in the context of other disease outbreaks. Defra and Animal Health had to deal with the first Bluetongue case in England during Phase 2 of the FMD outbreak and the NDCC dealt with it effectively. However, the demands of responding to Bluetongue are likely to increase significantly in the next few years.

Pre-planning is needed on how Animal Health and Defra would train and deploy the much larger numbers of staff that would be required under a worst case scenario. Defra does not currently have a formal system for identifying staff with the necessary skills or for ascertaining their availability, although this capability is being developed.

Policy and operations

Most of the key strategic, policy and operational decisions in 2007 were taken within the National Disease Control Centre (NDCC) and focused on a small number of individuals, above all the CVO. This placed great pressure on a few key individuals and stretched communication channels – a state of affairs that could not have been sustained in the event of multiple disease clusters.

Greater consideration should be given to which decisions could be delegated to those on the ground. Greater discipline should also be exercised in the information demands placed on the LDCC. In the first few days of the outbreak, the thirst for detail on what was happening on the ground meant that key staff trying to set up the LDCC were subjected to many demands for information, placing them under additional pressure.

In 2001 there were a number of critical bottlenecks in managing the outbreak, particularly the culling of infected animals, and the transport and disposal of carcasses. Animal Health has put in place a strategic procurement programme to reserve the necessary capability, but this process remains to be completed.

> The low numbers of epidemiologists available in Defra meant they would not prove resilient during a prolonged outbreak or if an outbreak of another disease occurred at the same time such as Bluetongue
>
> **Jane Gibbens, Head of National Emergency Epidemiology Group and Kate Sharpe, Divisional Veterinary Manager, Animal Health**

Defra and Animal Health should also consider what practical steps could be taken to minimise risk and pressure during an outbreak. As discussed earlier, they could, for example, build key contracts and stakeholders more closely into the contingency planning and testing process.

Conclusions

Many major improvements have been made in levels of preparedness by Defra and Animal Health since 2001. Virtually all submissions we received supported this view. Emergency preparedness is taken seriously by Animal Health and is fully understood to be a core function. It is given significant attention, and is increasingly being tested by real disease outbreaks.

There are areas where improvements can be made. The ERMAS system, which is used to address preparedness in Animal Health, has recently been introduced. So has the process of resourcing each AHDO with a Readiness and Resilience Manager. Both can be used to good effect to drive continuing improvements. Defra and Animal Health should also review the scalability of their plans. The current staffing models for dealing with an outbreak do not appear valid.

The arrangements for selecting, training, deploying and rewarding RODs and DOMs must be overhauled. The wider emergency training and staffing strategy should also be revisited. The goal should be to develop and refine plans as new tools and techniques become available, in the light of experience, and as the disease threat evolves.

There are also continuing challenges to raise the levels of preparedness of operational partners, wider stakeholders and the livestock industry itself.

At the policy level, the experience in managing the licensing process for animal and trade movements and the improved appreciation of welfare issues gained need to be built upon.

There is an explicit cost benefit trade-off to be made between the expenditure needed to prepare for an outbreak and the potential benefit this investment brings. However, not all preparations involve significant extra costs; Animal Health's contingency procurement programme is a case in point.

Defra and Animal Health have taken significant steps forward in their ability to vaccinate. However, more work remains to be done to address the many practical issues that would arise if vaccination were sanctioned.

Lesson 3

React with speed and certainty to an emergency or escalating crisis by applying well-rehearsed crisis management procedures

Introduction

Speed matters. A report to an Animal Health Divisional Office (AHDO) of a suspected case of FMD is a very serious matter, and Animal Health vets are well versed in the detail of their response. Where there is any suspicion of FMD, speed and certainty of action are essential: 'speed' because the virus is so infectious and may inadvertently be spread far and wide – as happened in 2001; and 'certainty' because a false positive diagnosis would be costly and disruptive, while a false negative could be disastrous.

The first clinical examination of suspect animals may be challenging. In a situation where no FMD is known to be present in the country, the expectation may be that a positive diagnosis is unlikely. Animal Health vets though – as a group – are experienced in dealing with such challenges, being called on quite regularly to investigate suspected FMD infection. Their guiding principle is either to rule out with confidence the presence of a notifiable disease based on clinical signs or, in the case of any doubt, to submit samples for laboratory testing.

In 2001 when the first case of FMD was confirmed, the virus was already incubating in an estimated 57 further locations. Even once it was identified, the response from Government, its agencies and from the rural community more generally was not decisive enough. That is why the 2002 Report emphasised the paramount need to react with speed and certainty to any suspected case of FMD.

Speed of response in 2007

Once the presence of the disease was formally confirmed on 3 August, the reaction of Defra and government more widely was impressive and much improved, compared to 2001. COBR, the Government's crisis management mechanism for directing a major national emergency, was convened within three hours of the first case being confirmed. By contrast, in 2001 it did not meet for 31 days.

The LDCC in the Reigate area office began operating and building up its resources over the weekend following the identification of the disease on Friday 3 August. In 2001, the equivalent arrangements took more than a month to become operational.

Across the country, in 2007, an immediate ban on the movement of all animals was put in place and widely observed by the whole farming community the length and breadth of Great Britain. Different procedures operated in Northern Ireland (see box below). By comparison, in 2001, the national movement ban was not imposed for three days and even then it was controversial.

The response in Northern Ireland

In response to the RED teleconference confirming the presence of FMD at 19.30 on Friday 3 August the Department of Agriculture and Rural Development in Northern Ireland immediately initiated its animal disease contingency plans.

Port inspectors were used to enforce the animal movement ban and stop animals entering Northern Ireland from Great Britain. A team of more than 40 vets were also mobilised to trace all the animals which had been imported since July 1 and to confirm that those animals were free from clinical signs of FMD. With the completion of this work, the movement ban in Northern Ireland was lifted at 12.45 on 5 August.

These measures taken preserved Northern Ireland's status as part of the Ireland epidemiological unit, and distinct from restrictions imposed in Great Britain. The European Commission agreed Northern Ireland was exempt from the UK export ban; a decision ratified by the member states.

Many stakeholders agreed that the overall national response in 2007 was quick and decisive. For example, the BCVA commented:

'The quick application of the FMD Contingency Plan provided for rapid containment of the outbreak. Swift decision making, particularly in respect of the immediate national movement ban of susceptible livestock, mitigated the risk of wide dissemination of infection. The rapid deployment of Animal Health staff to undertake active surveillance patrols in the Protection Zone first and foremost, and subsequently in the Surveillance Zone, enabled containment and further identification of Infected Premises (IPs) to achieve eradication.'

Undoubtedly, the lead set by the Prime Minister and the Secretary of State in returning prematurely from their holidays – as did many Government officials – gave a clear message of the importance and potential severity of the outbreak. The Prime Minister's decision personally to chair COBR in the early days also emphasised the need for rapid and decisive action. The Prime Minister told us that, bearing in mind the delays in taking swift action in 2001, he was focused on the necessity for speed at all stages, particular in the early hours. That was why he had wanted COBR convened as quickly as possible and why he had taken such a personal lead early on.

COBR

Central Government's response to a major emergency is often run through the Cabinet Office Briefing Room (or COBR). The underpinning Concept of Operations for responding to a range of emergencies sets out the key procedures by which the full machinery and resources of government can be drawn together to tackle any crisis or emergency. These procedures include:

- The provision of accurate and up-to-date information
- The provision of regular reports to all relevant departments and agencies
- Quick decision making leading to prompt actions to tackle the emergency

COBR can be chaired by the Prime Minister, the Secretary of State from the lead government department or a senior official. All relevant departments are represented at ministerial or official level.

During the 2007 outbreak, COBR met more than 40 times. At the start of the outbreak the meetings were twice daily. From mid-September onwards, it combined managing the FMD situation with handling the Bluetongue outbreak. It first met at 21.00 on the day of the first confirmed FMD case (3 August), a few hours after the disease was declared. Its final meeting was on 15 October.

In managing the crisis, the CVO was in charge – as set out in the Contingency Plan. From day one of the outbreak, both internally within government, and externally via the public role she played with the media, the CVO took a decisive lead. This sent out a clear message in terms of overall crisis management that there was one person in charge, that the crisis was being tackled, and that the key decisions were being driven by veterinary imperatives and science.

The initial tasks on the ground

The first indication of any possible disease was on Sunday 29 July when a farmer at Woolford Farm, near Godalming, noted that his cattle were 'off colour'. When the cattle did not get any better, he called his local AHDO in Reigate early in the evening of Thursday 2 August. Subsequent

> The authorities – both central and local – were quickly on top of the situation, fully aware of the risks that needed to be addressed and what should be put in place to address them. In short, our perception was that an agreed national control strategy was in place within hours, at most, of the disease being confirmed
>
> **National Farmers Union**

work has established that the cattle were probably first infected on 26 July – the most likely date of the virus leak. The events of this early phase serve to emphasise the important role that farmers and animal keepers have in terms of disease control. Only if they are alert, only if they regularly inspect their animals and only if they report anything unusual can rapid action be taken. In 2007, early reporting undoubtedly helped to contain the disease. Just as the absence of such reporting six years previously exacerbated its spread.

The vet from the Reigate AHDO who was sent to investigate the report on 2 August was sufficiently concerned, even before getting to the farm, to consider the possibility (based on the symptoms reported by the farmer) that this might be a case of FMD. Before arriving at the farm she had explored what the symptoms would be with a veterinary colleague who had experienced the outbreak in 2001. Night was falling when she arrived at the farm, so she was unable to examine the cattle properly that evening, but she returned with a colleague at 06.00 the next morning – Friday 3 August. The timeline of events (see Appendix A) describes in greater detail the events of those first few hours and days.

Analysis of the events at Woolford Farm on 2 and 3 August reveals both the strength of Defra's Animal Health response mechanisms and some weaknesses. The vet sent to the first report case was conscientious but inexperienced and, recognising the seriousness of a false alarm, was equivocal in telephone discussions with her immediate superior and unsure about whether to send samples to the laboratory. It was the timely intervention of the senior duty vet in Defra's Veterinary Exotic Notifiable Diseases Unit (VENDU) who insisted on immediate laboratory tests that led to the samples being collected and dispatched. The result was that the formal confirmation of a positive diagnosis took a few hours longer than it might have done.

It is now clear that nothing was lost in these hours as there was no spread of disease at that time. Nevertheless, some lessons should be reinforced. As part of contingency planning, the procedures for responding to cases of notifiable disease reports should be strengthened and should continue to be rehearsed regularly.

The samples arrived at IAH, Pirbright, at 12.15 that day. A teleconference of Defra's key vets, together with officials from elsewhere in government and the devolved administrations, took place at 10.30 that morning. An hour later, a precautionary meeting with stakeholders was held to inform them of the situation. A media line was agreed, which noted the proximity of the potentially infected premises to Pirbright and emphasised that it operated to the highest standard of biosecurity. The CVO alerted the Director of Animal Health within the EU, as required under EU law.

By mid-afternoon, when the investigating vet returned to the Reigate AHDO – which was to become the LDCC, preparations were not in hand for a possible disease outbreak because the view was that this was probably not FMD. A text message sent by Animal Health to all its offices at just before noon on Friday stated that, 'Vesicular disease investigation

in cattle in Surrey. Samples not fully characteristic of FMD. Results likely late today. 1km restriction zone', and did not convey any sense of urgency. The Divisional Veterinary Manager (the Head of the Reigate office) learned that the first laboratory tests for FMD were positive in a teleconference with the CVO and others at 18.00.

Consequently, setting up the LDCC only began on Friday evening, after many staff had gone home. Had the Reigate office automatically been put on higher alert earlier in the day, the initial setting up of the LDCC would have been smoother – particularly given that this was before a weekend when many people were preparing to take annual leave.

The speed of culling operations on infected premises and dangerous contacts was vastly improved compared with 2001. In addition, in accordance with the revised contingency plan, vaccination teams were ready to vaccinate within five days.

Hours matter

Hours can be critical in managing an FMD outbreak. They matter not so much in setting up the LDCC, important though that is, but in establishing a national movement ban at the earliest possible stage. On day one of an outbreak, nothing is known, save that there is one confirmed case of FMD. Its source cannot be known, nor whether there are already more cases elsewhere in the country. Stopping all livestock movements as quickly as possible is critical. The sooner the disease source is identified and controls established, then the sooner all potentially infected animals are traced and a sound, more comprehensive body of evidence and facts about what is happening can be compiled. Only then can the process of combating the outbreak begin in earnest. That, in turn, can reduce the economic and wider collateral costs to the nation.

Certainty

The need for speed was clearly in the minds of those at the centre of crisis management. There was also a certainty and clarity of response in those early hours, which were absent six years before. For example, the exact strain of the virus and its source were identified within 48 hours. Management roles and responsibilities were clear and accepted. Government also acted promptly to establish the HSE and Spratt investigations in biosecurity at Pirbright.

Nevertheless, as the disease outbreak continued, there were some areas in which lack of knowledge and inadequate planning led to uncertainty and sometimes confusion. Some policies in the contingency plan revealed shortcomings in their practical application. For example, the pre-planned legislation on footpaths allowed only for those paths running directly through the IPs to be closed. In practice there was great pressure from the farming community, the public and industry to close footpaths throughout the Protection Zone. Surrey County Council was eventually granted this power but the delays caused concern in the rural community due to fear of disease spread. The policy on fallen stock also presented challenges during the outbreak. Livestock carcases could be buried or

burned on site but had to be collected or taken to an approved disposal facility. As the NFU noted in their submission: 'Following confirmation of the outbreak, one disease control measure (the movement ban) rendered another impossible, resulting in the build-up of animal carcases on farms.' In the height of summer this was highly impractical. Scotland, by contrast, permitted on-farm burial from 5 August while restrictions in collection were in force.

As the disease restrictions began to bite, there was uncertainty on how to handle licensing variations to allow for limited animal movement, as we discuss under Lessons 2 and 4. Often decision making was hampered by the imcompleteness or inaccuracy of data. We discuss under Lesson 7 the shortcomings of some of the date and information management systems.

The level of certainty and the accuracy of information and evidence was also central to the decision, agreed with the EU on 23 August, to reduce restrictions and allow the exporting of animals from outside the surveillance zone. We were told that the Deputy CVO took a body of evidence to the Standing Committee on Food Chain and Animal Health (SCoFCAH) and, in advance of the meeting, set out the comprehensive work that had been done on tracing the movement of animals from the PZs and SZs.

On the basis of that evidence, all member states at SCoFCAH agreed to the relaxation of movement restrictions which were announced on 23 August. Similarly, the decision to declare the disease over on 7 September was taken 30 days after the preliminary cleansing and disinfection process had been completed at IP2. This was the earliest the decision could be taken, subject to all surveillance testing producing negative results. Yet, in fact, the disease had not been totally eliminated and was to reappear only four days later.

During the second phase of the outbreak Defra and Animal Health continued to focus on speed of response. They had the advantage of having rehearsed some of their arrangements in Phase 1 and had learned lessons as they progressed. Activities such as surveillance and serology were completed at speed. Disposal was completed promptly and many of the initial uncertainties of Phase 1 were addressed. In part this was because Defra drew upon a wider group of stakeholders for decision making and operations. At the centre, the Core Group helped inform policy options for ministers. At local level there was improved co-operation than there had been at the start of Phase 1. As a result decisions tended to be acted on more quickly and with greater clarity of response.

The speed with which the vaccination teams were put on standby ready to be deployed if required, was a positive feature of both Phases 1 and 2. Similarly the ongoing delivery of scientific support and analysis via IAH and the Veterinary Laboratories Agency was impressive.

Conclusions

Taken as a whole, the immediate response in Phase 1 made a significant contribution to the eventual containment of the disease. Officials and stakeholders at all levels were seized by the critical importance of speed. There was a sense of leadership and central control at political and veterinary levels. The effort on the ground was ramped up quickly. The COBR crisis management mechanism worked well. Work started quickly to trace the potential spread of the disease. In Phase 2 the speed and certainty of response improved. In areas such as speed of culling, preparedness to vaccinate and the provision of scientific support and testing the lessons of 2001 were learned. But sound data on which to base decisions with confidence was too often lacking.

On the basis of the tracings work done and surveillance operations within the PZ and SZ, the restrictions were relaxed and, in early September, the disease was declared over. The fact that the disease had not been eradicated at the end of Phase 1 suggests that a more cautious approach should be adopted in future. Any announcement of the end of an outbreak should be tempered by caution.

Lesson 4

Explain policies, plans and practices

by communicating with all interested parties comprehensively, clearly and consistently in a transparent and open way

Introduction

The 2002 Report was critical of the Government's communications performance during the outbreak, and made a number of recommendations designed to improve it in emergency conditions. Our review of communications in 2007 has shown how much progress has been made. In terms of organisation, management, speed of response, and range and variety of information provided to all parties concerned, it represented a huge stride forward compared to 2001.

As in 2001, communications was a recurring theme in our discussions with stakeholders, and in many of the submissions received. This time Defra was not caught unawares; it was prepared for the unexpected. The contingency plan was rolled out promptly and the communications organisation as a whole swiftly fell into a working rhythm. New technology was, in general, used efficiently, with policies being generally explained well to stakeholders and the general public alike.

More fundamentally, Defra communications were sometimes hampered by out-of-date records such that calls or information packs failed to reach their intended recipients. As noted elsewhere in our report, a number of databases carrying key details were not always up to the job.

Defra was also not sufficiently proactive in giving information to local radio stations. One BBC station told us that it would have willingly given more air time to the fight against the disease, had it had a better flow of current information.

Defra's use of the internet was mixed. Undoubtedly the Defra website was much improved compared to 2001. But it can be wrong to place too much reliance on the web. Many farmers, for example, do not have day-to-day access to it. When they do, it is essential that web pages are written and structured in such a way that they are easy to navigate and understand – which was not always the case.

The outbreak

In overall terms, as a media story, FMD in 2007 attracted a far lower profile than in 2001. Only in those areas most affected by the disease, and for the relatively short time that the virus was active, was it the main news story. But in Scotland, far away from the active virus, especially in Phase 2, FMD remained a bigger story as the stress on hill farmers grew more severe.

The immediate response was, on the whole, good. The NFU stated in its submission to our Review that: '…the authorities – both central and local – were quickly on top of the situation, fully aware of the risks that needed to be addressed and what should be put in place to address them.' The NFU also commended the Government in its initial communications to farmers and the general public: 'It is difficult to see what more Defra could have done to get news of the immediate ban to farmers. There was widespread coverage on national and local news, from late Friday evening [3 August] onwards.'

Defra included the NFU in its local and national disease control centres, making good use of the NFU's networks to communicate with the farming and agricultural community across the country.

Both Houses of Parliament were in recess for the duration of the outbreak. However, the Secretary of State, Hilary Benn, has been complimented for the time he devoted to debates regarding the outbreak. Once the House returned in October, Junior Minister, Jonathan Shaw, was also complimented by opposition MPs for the efforts he took to brief them.

The overall consistency and constancy of Defra's communications with stakeholders and the wider farming community could be improved. The NFU pointed out that more could be done by making better use of the internet, and mobile phone technology (for example, the Single Farm Payment System could have been used to collect mobile details).

At the start of the outbreak, the CVO was an important and powerful voice in the media. However, there should be a range of 'voices' available to put across the different messages required.

Devolution and the devolved administrations mean that there are subtle differences in the policies around the control and eradication of the disease, as covered elsewhere in this report. However, despite the differences, there still needs to be consistency of messaging across the administrative boundaries.

> [There should be:] Clear lines of communication from the centre to divisional offices; Clear lines of communication between the centre and all partner agencies; Timely communication from the centre to all relevant partners
>
> **Central England Trading Standards Authorities**

The presentation of information on the web is critical for the farmer, landowner and public alike. An appraisal of how the wealth of information is clearly set out and remains easily accessible as the management of the disease progresses should be undertaken

National Trust

This obviously applies within the administrative boundaries as well. Surrey County Council told the Review that there was conflicting advice given by Defra in some instances – highlighting the complexity of the legislation: 'For instance: Defra initially gave conflicting advice regarding horses –

- they can go in and out of PZ – DEFRA helpline
- they can't go in and out of PZ – DEFRA website Q&As

and there were delays in resolving this issue.'

Direct contacts

Direct contact was made with farmers in three ways: information packs were despatched to the affected areas through the postal system; SMS text messages were communicated where mobile contact details were known; and automated telephone messages were sent where possible.

The information packs were welcome but, unfortunately, did not arrive at all the required addresses. SMS messages were regarded as a helpful means of communications. The Welsh Assembly Government, in particular, found that its SMS messaging was well received and came in for praise in a number of submissions to the Review. However, not all farmers have signed up for this option, nor are their mobile numbers kept up-to-date on the databases.

Automated telephone messages also worked to some extent. But sometimes they were missed because farmers did not know when to expect them or were without an adequate message answering facility as back-up.

All of the above communications were patchy in their effectiveness because of the incompleteness of much of the data – including addresses, telephone numbers and other contact details – available to Defra and Animal Health. It is crucial to an effective and efficient response that contact details be up-to-date. Farmers, too, have a responsible part to play in this aspect of prior preparation.

As well as the data often being incomplete, there are examples of the communication links between agencies being patchy or non-existent. For example, Sandylands Farm (IP7) was culled out in September, '...forms were completed and the animal passports were taken by the controller of the team.' Two months later in November, the farmer received a letter from the British Cattle Movements Service (BCMS) asking '...where the animals were taken and if they were exported...' and copies of the export documents should be returned '...within the next 14 days... In future these documents should be sent to BCMS at time of export.' Better links between agencies need to be established in advance of an outbreak.

Website

Defra's website has improved significantly from six years ago. The site carried a wealth of information and was updated regularly, although it was not always easy to navigate to find particular information. The site should be tailored to provide all necessary information in plain language and structured in a more user-friendly format. Resources should be dedicated to the site to ensure it is kept fully up-to-date.

The Defra Helpline and the website were well integrated. Callers to the Helpline were directed to check information on the website as a quicker way of answering their enquiry. Almost 34,000 telephone calls on FMD were received by the Defra Helpline from 4 August 2007. Roughly 13,000 of the total number of FMD calls were taken within the first two weeks of the outbreak.

However, Defra may have relied too much on its website. A recent survey of farmers, conducted by the NFU, found that as many as 40% do not have access to the internet – although this figure is reducing all the time.

Greater use of the internet is undoubtedly the direction in which progress is moving. Access should be a priority for those with responsibility for livestock. Livestock owners should ensure that they are connected; Defra should ensure accessibility, readability and intuitive signposting. The aim should be to be prepared to use whatever new technology offers as part of the communications strategy.

Leaflets and licences

The 2002 Report recommended that advice be sought from the Plain English Campaign on composing leaflets and, particularly, for wording of licences. We saw examples of some of the leaflets prepared for farmers and others on spotting the symptoms of FMD. They were impressive; clear and well written. On the other hand, we were told often that many licences were unclear: for example the Central England Trading Standards Authorities submitted to the Review that: 'Recommendation 4: Review the language and length of the movement documents and guidance. Use plain English and ensure that all communication routes are considered to ensure no one group is disadvantaged.' We recognise that many have to be tailored – often at short notice – to particular circumstances or to respond to a specific eventuality during an outbreak. As discussed in Lesson 2, we were told by Defra that many licences could not have been prepared in advance. Nevertheless Defra was developing a systematic plan to be able to draw on the 2007 licences as a starting point in future outbreaks. We recommend that everything possible is done to prepare generic licences ready to be applied to specific needs during any future outbreaks.

Two-day-old vesicles on a pig's snout, gum and lips. *Foot and Mouth Disease Ageing of lesions* leaflet

Mr. Tim Boswell MP (Daventry) (Con): Does my hon. Friend agree that one problem that Defra has, and which Whitehall has more generally, is assuming that everybody is connected to the internet? We may have to be, but a lot of my farming friends are not and are simply left in the dark

Debate on FMD Outbreak, House of Commons Hansard, 17 October 2007

Contingency plan

As the 2007 outbreak was declared, the contingency plan for communications was rapidly rolled out. It had been thought through in some detail, to cover all aspects of communication, from the farm gate to national news networks. Pre-prepared material for the website and information packs for farmers were all ready, standing by for instant dissemination, as soon as the outbreak was officially declared.

There was a well-defined allocation of responsibilities, with the Animal Health communications team mainly dealing with issues of animal health and veterinary matters, and Defra looking after the media and other external relations, the website, as well as its own internal communications. Defra's press office, already geared up for working a 24-hour day, increased staff numbers in anticipation of the needs of the 24/7 media.

From day one, the communications activity followed a clear, pre-planned rhythm. The CVO's morning birdtable meeting was held at either 07.30 or 08.30. At 08.15, Defra's Director of Communications or his Head of News chaired a short communications conference call. Participation varied, but typically included the CVO, key NDCC officials, the Secretary of State's and ministers' offices, the Number 10 press office, Defra press office and Cabinet Office communications staff. This call set the shape of the day and was viewed as an effective mechanism within the communications strategy. Communications staff also attended COBR.

In addition, from around the second week of the outbreak, there was a further, local co-ordination conference call at 09.00 chaired by the lead Defra press officer and involving the local Government News Network (GNN) press officers on the ground, local police and the local authority.

In the second week of the outbreak, GNN staff were brought in to supplement the work of the Animal Health press officers and spokespeople in Surrey and Berkshire. The CVO and Minister Lord Rooker also made visits to the LDCC to attend press briefings and speak to the staff involved.

It was always clear that physically managing the press was a police task, while managing the media's needs rested with the GNN. However, despite these clear lines of responsibility, Surrey Police were unhappy with Defra's management of the GNN: '…GNN was effectively a subcontractor and there appeared to be a poor relationship between them and Defra Communications leads … inadequate consideration was given to the difficulty of dealing with a dynamic event on location … it was important to be much more proactive in terms of media handling (for example in offering regular on-location briefings and photo opportunities).' The Review was told that the GNN officers, while willing, were poorly trained in the specific FMD issues and Defra's activities more generally. Furthermore Defra appeared unwilling to devolve any significant communication activity to the GNN staff at the scene, which left them powerless to influence and control an increasingly frustrated, and consequently disruptive, media.

Officials at COBR also questioned the degree to which the GNN had experience and capability in the on-scene management of emergency situations.

News helicopters

For a brief period in August and September 2007, the world's press descended on the Surrey and Berkshire countryside. The narrow roads and unusually high traffic volumes made access to the farms increasingly difficult. Furthermore, GNN did not make proper provision to service the needs of journalists on the ground, to get them to the right place at the right time and in particular, to let them have photo opportunities. Some of the press took matters into their own hands. Their solution was to use helicopters to position photographers and reporters over farmyards and fields. However, the helicopters often frightened livestock and made the job of gathering, checking and, in some cases, culling, extremely difficult, and their downdraught increased the risk of spreading the virus to neighbouring farms.

Acting on the request of NDCC officials, Defra's press office had to try to persuade media organisations not to fly over the area. Eventually, the Department for Transport and the Civil Aviation Authority declared no-fly zones.

Referring to both examples above, the GNN and the 'news helicopters', effective engagement with the media in a crisis needs to happen at a local level. The GNN should liaise with the police and the LDCC more and all parties need to engage proactively as well as reactively with the press. Such on-the-ground matters cannot be managed centrally and there is still much to be done in relationship building before all the benefits can be realised. Setting out plans for this may be an appropriate task for the National and Regional Media Emergency Forums to consider.

Local media

In 2001, the role played by the local media was important. The BBC's local radio stations in Devon and Cumbria broadcast special bulletins to inform farmers and the public at large about the progress of the disease and measures being taken to eradicate it. Unfortunately, the BBC told us that it often found it very difficult to get clear messages from MAFF/Defra. That is why the 2002 Report commented that: 'The local media should be used to the full. Defra should provide tailored information to local radio stations or local newspapers in time for their deadlines…'

Disappointingly, we were told that during the 2007 outbreak no approach was made by Defra to BBC Southern Counties: an important communications opportunity missed. Defra and its agencies should initiate contact with local radio stations and develop plans to work together during such a crisis. Local radio stations should be looked on as stakeholders and fully involved in the contingency planning process.

> BBC News 24 and Sky News were the best source for up-to-date information whilst we were waiting for communication from Defra officials
>
> **British Cattle Veterinary Association**

Although GNN was present locally, it seemed the media were to be managed centrally. This did not work very well, and indeed locally GNN seemed equally unaware of the role of the local authority. A much better media strategy needs to be developed. This should definitely include proactive opportunities for them at a local level, and involving the local operational partners

Surrey County Council

We are not alone in recognising the value of local radio during emergencies. Sir Michael Pitt's interim review *Learning Lessons from the 2007 Floods* commented: 'Many people interviewed for the Review highlighted the pivotal role of the media, particularly local radio, in passing important information to the public during the floods.'

The primary local newspaper for the Guildford area is *The Surrey Advertiser.* A weekly publication, it reported on the outbreak from the outset. The lead journalist involved told our Review that he had received useful contributions from press officers at the LDCC. *The Surrey Advertiser* also took part in weekly press conferences. However, BBC Southern Counties told the Review that it was not informed about some press conferences until the last minute.

Managing the flow of information

The 2007 outbreak raised some important questions about the control of information. We learned, for example, that, on a number of occasions, the BBC or Sky broadcast details about a new FMD case before the NDCC, LDCC or even ministers knew of it. A number of operational partners, and Animal Health staff, also pointed out that Defra released information to the media often before they themselves were informed.

Some media outlets sourced their news from BBC and Sky, rather than Defra. Indeed, even Defra officials and key stakeholders themselves used news channels to keep up-to-date and, sometimes, to glean important information concerning their areas of responsibility. This is not satisfactory. It may be impossible to compete with the efficiency of major news networks when it comes to collecting and disseminating live news from the countryside. Even so, steps can be taken to ensure that policy announcements are communicated as far as possible internally before being released more widely. From many of our discussions, it is clear that this would remove a source of inefficiency and irritation.

Conclusions

Communications were better handled in 2007 than in 2001. Lessons have been learned, and a well-prepared communications framework is in place. The task now is to continue to develop the strategy, paying special attention to improving performance at local level.

The progress made in six years is encouraging, but the challenge was less; the outbreak was much smaller, geographically well-contained and better controlled. It is an open question whether an adequate communications structure was in place to cope with an outbreak on a much larger scale.

Communication technologies are changing dramatically, bringing with them new opportunities and challenges. Defra can position itself at the heart of government work in this regard. In taking into account the need for timely and accurate external and internal communications, it should give priority to ensuring that farmers and those stakeholders and local people most affected are kept well informed in clear, unambiguous

language. To that end, Defra should continue to develop its 'menu of communications opportunities', such as automated telephone calls, SMS text messaging, the internet, delivery of information packs to the farm gate and so on.

Based on the comments we have received, we recommend special attention be paid to developing a tailor-made disease emergency website based on best practice, as well as detailed plans to incorporate local radio stations into the heart of the response.

No one communication route will suit all. A national news strategy, tailored use of local news outlets, including local radio, clear well-written leaflets and web pages, and best use of modern technologies (including mobile devices and the internet) should all form part of the communications mix.

The improvements in communication have certainly been assisted by the greater use of, and access to, the internet and much better FMD web site pages on the Defra site

National Foot and Mouth Group

Lesson 5

Respect local knowledge and delegate decisions wherever possible, without losing sight of the national strategy

Introduction

In 2001 the response to the FMD outbreak was run from the centre – first by MAFF and then, as the crisis deepened, direct from the centre of government using the co-ordination mechanism of COBR to frame policies for halting the disease and bringing it under control. But this one-size-fits-all approach had its drawbacks. The infection was widely spread throughout the country and had taken hold with different degrees of severity. Many of the control methods were blunt instruments, applied uniformly across different areas and regions. Many local stakeholders felt sidelined from the fight against the disease.

That is why the 2002 Report commented that: 'In order to build support, steps should always be taken to explain the rationale of policies on the ground, particularly where implementation is likely to be controversial.' Furthermore, 'wherever possible, local circumstances should be taken into account without undermining the overall strategy'.

Those general principles prevailed in 2007 when there was better recognition of the local dimension, both in preparing for disease and in responding to the outbreak. The policy of establishing a LDCC also devolved some of the decision making, involving local stakeholders in the response. Nevertheless, some stakeholders felt that their concerns were not sufficiently taken into account, and that the response remained over-centralised.

More specific concerns were increasingly felt in the devolved administrations. Responsibility for animal health policy was already devolved to the Scottish Executive and Welsh Assembly Government in 2001. But there was more potential for divergence in 2007 in the response across Great Britain to an England-only outbreak, as policy makers reacted to their own national circumstances. The fact that the outbreak was concentrated and contained in a small area of South East England meant that, certainly in the second phase of the disease, there

was a feeling that policies applied to the South of England were having a disproportionate effect north of the border and in Wales.

Responding to the outbreak at the local level

In 2007 the NDCC was responsible for policy and operations at national level, while the LDCC, initially based in Reigate, but later transferred to Guildford, was responsible for the control and co-ordination of operations on the ground. The FMD outbreak was limited in its geographical spread and management of the disease was tightly controlled by the NDCC.

Defra's contingency plan envisaged the close involvement of local stakeholders and operational partners in the local response, including the police, local authorities and trading standards, and the regional resilience community. We found that these relationships were often stronger on paper than they were in practice. Local stakeholders did not appear to be fully integrated, although relationships did improve as the outbreak wore on. For example, greater use could have been made of the knowledge that trading standards officers had of local farmers and farming practices. The experience of the police could have been exploited more in managing the media on the ground and in helping to plan and co-ordinate operations. The Government Office for the South East could also have provided further support for administrative and wider government co-ordination tasks via its Regional Resilience Team. Animal Health and its district managers should give greater emphasis to building these relationships in advance of a disease outbreak. The close involvement of local operational partners in local contingency exercises and planning is essential.

Devolution arrangements

The Memorandum of Understanding and Supplementary Agreements for devolution set out the terms under which the devolved administrations in Scotland, Wales and Northern Ireland take responsibility for some matters (devolved matters) and the UK Government for others (reserved matters).

Animal health policy is devolved. Decisions affecting the devolved administrations are, therefore, taken by their ministers, with advice from their respective Chief Veterinary Officers and officials.

An overarching concordat between the UK Government and each devolved administration outlines, at a strategic level, how they will work together. This concordat is supported by a series of working-level concordats on specific issues, such as animal disease compensation and European policy.

However, the animal health policy concordats are out-of-date. This did not cause any major problems in responding to the 2007 outbreak because, in practice, working relationships had developed beyond the language of the concordats. On the whole, and certainly in the first phase of the disease, decisions were taken quickly with a high level of consensus. This reflected the shared experience and memory of 2001 and established agreement on the immediate introduction of a nationwide animal movements ban in response to an FMD outbreak. The farming industry, mindful of the catastrophic effects of animal movements

We felt a sense of frustration that the need for a relaxation in drivers' hours rules due to the shortage of livestock haulage capacity, and the narrow time window for movements, was not being fully understood by all the departments within government

Scotland and Northern Ireland Road Haulage Association

in spreading the disease in 2001, supported this and continued to show close co-operation at all levels in the initial stage of the outbreak.

During the second phase of the disease, however, there was greater concern about the effects of the nationwide policies on the economies of the devolved administrations – neither of which were experiencing the disease directly. For example, the harsher weather conditions in Scotland and Wales raised welfare concerns about light lambs stranded on the hills during movement bans, while delays in easing drivers' hours restrictions caused problems for the haulage industry. A larger outbreak, or one of a different nature (for example, affecting Scotland only or straddling the border into England), could stretch the working relationships and the current arrangements. In situations such as these, written, agreed concordats provide an essential basis on which to make decisions.

While some people thought that certain decisions were politically motivated, we found no evidence of this. However, due to the devolution of powers for policy matters to Scotland and Wales, decisions were taken at different times, based on different evidence. In a system with some devolved responsibilities, this is probably inevitable. It was though, at times, confusing for farmers, especially for those with holdings on both sides of the borders.

The devolution of policy, but not operations, may also cause tension in future. As things stand, for any future outbreak in Scotland or Wales only, policy would be decided by Scottish or Welsh Ministers, while operations would be delivered by Animal Health, funded by Defra. This would leave scope for disagreement if a Scottish or Welsh policy decision were to have significant additional cost implications for Defra. These are complex issues which will take time to resolve. We believe it is important that these issues are addressed as a matter of urgency, and that the animal health concordats with the devolved administrations should be reviewed in consultation with all the relevant departments and agencies.

The contingency plans maintained by Defra, the Scottish Executive and Welsh Assembly Government, should then reflect the agreed concordats. The administrative arrangements for underpinning the concordats with day to day working practices and a UK-wide strategic overlay are critical. These should include plans on how to handle an outbreak occurring in another administrative area or on the borders between different administrative areas.

The Core Group

By the second week of the outbreak, Defra recognised that industry knowledge should be further involved in contributing to forming policies and how they should be applied. On 12 August a 'Core Group' of individuals from across the farming industry was convened in an environment in which all parties were prepared to share information, to step outside traditional roles representing particular interest groups and develop soundly-based solutions to shared problems. The group held frank discussions with Defra in order to make recommendations

to ministers which were firmly grounded on industry knowledge. The establishment of this group and its role in working with government was an important step, and one which should be formalised in future, as part of the development of the cost and responsibility sharing agenda.

Local knowledge – the EU perspective

The UK is represented at the European Union by Defra's Chief Veterinary Officer. Defra officials attend the Standing Committee of the Food Chain and Animal Health (SCoFCAH) meetings at which decisions are taken about export restrictions and the application of EU law to animal disease outbreaks. This is explained in more detail under Lesson 8. The EU dimension was very important to the way in which the FMD outbreak was managed in Britain.

There was some concern in the devolved administrations that their voice was not heard in European negotiations. For example, in Phase 2 of the outbreak, some thought that restrictions should have been eased in Scotland and Wales as it had become clear that the disease had been contained in South East England. Some Scottish and Welsh stakeholders and other commentators felt that Defra was representing more the interests of English farmers and may not have adequately put the regional case for easing the economic hardships being faced by Welsh and Scottish farmers. In any future outbreak, government has to strike a balance between the overriding national priority of disease control and the inevitable costs to those parts of the country less affected by, or further from, the disease.

Conclusions

The Government was more sensitive to the local and regional dimension of the disease in 2007 than in 2001. This time Defra increased its use of local knowledge in its response. The LDCC gave central government a presence at the site of the disease and involved local responders to a greater extent than in 2001. The Core Group which was set up one week after the disease broke out involved industry expertise closely in decision making – an important step along the way to responsibility sharing.

The NDCC kept a close grip on the response and could have delegated more authority to those on the ground. Many local stakeholders felt that their contributions on practical matters were not taken fully into account in the fight to control the disease.

The 2007 outbreak highlighted once again the far-reaching effects of FMD. Unlike in 2001, the disease itself was contained within eight premises in a small geographic area – but its impact was felt throughout Great Britain. Defra, with Animal Health and the devolved administrations, should continue to work together with the Core Group and with stakeholders to ensure that exotic disease control policies are built on a full understanding of their economic consequences.The animal health concordats and the devolved contingency plans should be revised and updated. Particular attention should be paid to how disease outbreaks within the devolved regions or cross-boundary outbreaks will be managed.

Lesson 6

Apply risk assessment and cost benefit analysis within an appropriate economic model

Introduction

In 2001, disease control strategy was developed at short notice as the crisis evolved. The response was often not in proportion to the nature of the risks. At the start of the outbreak, some control measures were too limited or too late for the scale of the risks posed by the infection. However, by the height of the 2001 outbreak, some of the control measures applied uniformly across the country were disproportionate to the levels of risk in specific regions. As a result, industries other than livestock – notably the British tourism industry – were disproportionately affected. That is why the 2002 Report said that: 'Accepted best practice in risk analysis should be used by Defra and others in developing livestock health and disease control strategies.'

Recognising the exceptional economic cost of the 2001 outbreak, the 2002 Report also stressed the need to assess the cost and benefits of disease control policy decisions.

Applying risk assessment in 2007

The response in 2007 showed a greater awareness and appreciation of risk across Defra's Food and Farming Group and Animal Health. In response to the 2002 Report, Defra took steps to reduce the risk from exotic animal disease entering the UK, and the potential cost in the event of an outbreak.

To reduce the vulnerability of the UK to an outbreak, Defra has strengthened its awareness of the international and European disease situation, enhanced its border controls on a risk basis to limit the threat from legal and illegal meat imports, and raised standards of vigilance within the country. These actions are detailed in Lesson 1.

Risk assessments and border controls

Defra has introduced more routine risk assessments to identify significant changes to the level of disease threat. Now, when a new disease outbreak is identified within the EU, a state bordering the EU or a third-country trading partner, Defra undertakes a specific qualitative risk assessment. This enables border control to target its inspections on products from high-risk countries which are more likely to pose a disease threat to the UK.

In the event of an outbreak, Defra has reduced the likely impact of the disease by developing a legislative framework which enables it to implement key disease control policies immediately after an outbreak is confirmed. The ability to implement the livestock movement ban immediately on confirmation of an outbreak, combined with peacetime policies such as livestock standstills, significantly reduced the risk of spread of disease.

These developments are supported by a clear and tested plan for managing the first phases of a disease outbreak. Defra's contingency plan is based on the principle of reducing risk and aims to prevent the spread of disease in the first few days while the information and evidence are gathered to support a tailored response. However, in 2007 the evidence base was acknowledged to be poor due to longstanding problems surrounding animal health data and systems. In light of this, Defra should consider the weight that is given to evidence in making some policy decisions. A more proactive, risk-based approach which is not reliant on the provision of evidence may have significant benefits in pre-empting the spread of disease.

> Defra had been aware that some of the apparent evidence received in any outbreak (for example initial information about numbers of livestock on IPs) was not reliable and so it had to rely on a risk-based approach, rather than one based on evidence in some policy decisions
>
> **David Dawson, Director of Exotic Disease Policy**

Following the 2001 outbreak Defra had put a lot of resource into mitigating any risks of FMD entering the country and FMD was not expected to return in the short term

Jane Gibbens, Head of National Emergency Epidemiology Group and Kate Sharpe, Divisional Veterinary Manager, Animal Health

Risk is also integrated into the policy response during an outbreak. There is a degree of uncertainty in any disease outbreak about how the infection is likely to spread. Defra used risk assessments to target disease control policies towards those areas of highest risk. The assessments also helped Defra to vary policies between regions, according to their associated risk level.

Results from the report commissioned by Defra on the *Cost Benefit Analysis of Foot and Mouth Controls* showed that the combination of legislative controls and the revised contingency plan were likely to contain the size and cost of any future outbreak from escalating again to the scale of 2001. When modelling a small outbreak, the average projected size was six infected premises, at an average cost of £20 million, while a large outbreak had an average of 534 infected premises with the associated average cost of £440 million.[1]

We were told that senior managers were not aware of the weaknesses at the Pirbright site. Defra Permanent Secretary, Helen Ghosh, told us that although she acknowledged there were increased risks around the Pirbright facility, at the time: 'The dialogue between the Defra regulator and the licence-holders at Pirbright would not have been raised to management board level as they had faith in local processes of risk-based work in the department.' There is a challenge for staff and managers in Defra and its wider delivery network to understand and communicate the implications of this throughout its business. The limits of what is acceptable risk in areas as fundamental as this need to be judged at the top of a department, not within the confines of one professional group. Although Defra's top management does not believe there is such systemic weakness in the department, we recommend that Defra's Audit and Risk Committee probe this further and publish its findings.

Risk assessments during the outbreak

During the outbreak, Defra and Animal Health used several epidemiological and veterinary risk assessments to form the basis of its policy decisions. These looked at the possible causes of the disease and modelled its likely spread – based on knowledge of transmission mechanisms such as livestock movement or airborne infection. This information was used to target surveillance on areas subject to a greater risk of infection.

Risk assessments also informed the decision on the size of the Protection and Surveillance Zones around IP1. There has been criticism over the size of the control zone because surveillance failed to pick up the disease which had spread to IP5. However, the Head of the Veterinary Exotic Notifiable Diseases Unit (VENDU) told the Review that: 'The epidemiological advice was that the PZ and SZ were appropriate in size… There was currently a global agreement on the measures to control FMD on the basis of a three-kilometre PZ and ten kilometre SZ. These were minima and could be extended in particular directions if there were concerns about the likely direction of spread. This had

[1] Risk Solutions: Cost Benefit Analysis of Foot and Mouth Controls, May 2005. www.defra.gov.uk/footandmouth/pdf/

not been the case in Surrey.' Defra should continue to investigate the transmission of the FMD virus to IP5 to inform future understanding and risk assessments.

The risk assessments were limited by the data and information available. The Head of the National Emergencies Epidemiology Group told us that: 'Data about movements was not available from the Great Britain animals database for at least ten days after the movement and so data on animal movements made in the same period of 2006 was examined to get a sense of trends.' Reliance on out-of-date and inaccurate information placed a limit on the quality of risk assessments.

Transparency of decision making based on risk assessment is important to foster public confidence in policy decisions. There is more that could be done. The BCVA wrote: 'The risk assessment system needs to be much more transparent, with regular reports of decisions made and the reasoning behind them. Few risk assessments were published by Defra, but the Scottish Executive Environment and Rural Affairs Department (SEERAD) published many.' As of February 2008 there were five risk assessments available on the Defra website, and 16 available from the Scottish Executive. The department should take steps to improve the quality of its evidence base and take opportunities to refine the techniques available in its scientific analysis.

In May 2007, the Defra Science Advisory Council also highlighted the need for the department to establish a more robust and consistent approach to evaluating risk. In response Defra is establishing a three-year partnership with the Research Councils whereby Defra and the Councils will invest up to £1 million over three years to tap into world-class expertise and good practice in risk appraisal. This is a vital contribution to ensuring that risk-based policy decisions are fully informed by best science.

Cost benefit analysis

In 2001, the disease and the resulting control measures led to a total cost to the UK of some £8 billion – as estimated by the National Audit Office. This demonstrates the potential scale of the effects, not only on the wider livestock business, but also on the food and tourism industries.

Robust cost benefit analysis can help inform decision making and ensure that costs are kept as low as possible.

Defra commissioned a cost benefit model from Risk Solutions, which combines epidemiological and economic factors to predict the likely cost of a future outbreak of FMD. For a given set of starting conditions and control strategies, the epidemiological model calculates the likely spread of disease in terms of infected premises, animals infected and duration of the outbreak. The economic model then uses these results to calculate the cost of the outbreak on a national, regional and sectoral basis. This, in theory, allows policymakers to develop policies that would tackle disease in the most cost-efficient way for the country as a whole.

> Defra needs a system of risk appraisal that is transparent, acknowledges uncertainty and encompasses an appropriately wide range of techniques. Until such a system is in place it is not clear to us how the Department can properly compare the risks in its policy portfolio. This is a capability that Defra needs to develop as a priority…
>
> **Science Advisory Council Report, May 2007**

The economic effect is completely disproportionate to the threat posed by this particular disease outbreak

Country Land and Business Association

Although the model provides a framework to combine the epidemiological and economic factors of an outbreak, it was not used during the outbreak as a cost benefit analysis tool. The model was used to forecast the likely spread of the disease, but there does not appear to have been any quantitative analysis to weigh up the economic costs of the available disease control options against their benefits.

A cost benefit analysis model would enable policymakers to evaluate the economic and financial costs of different disease control strategies against their associated benefits in reducing disease spread. Defra should consider whether it needs to develop a more rigorous cost benefit analysis model capable of capturing the costs and benefits of various disease control measures and their effects on the economy as a whole.

To date, Defra has provided an assessment of the cost of the outbreak to the Department itself (estimated at £47 million) and to the British livestock industry (£100 million). Further work should be considered to capture the full cost of the outbreak to the economy – not just the livestock industry. A full assessment of costs, broken down by industry, would allow Defra to assess the specific implications of various disease control policies. Such an assessment could inform future policies and whether they could be altered to lessen costs in some areas, without damaging the disease control effects.

The wider effects of disease control strategies

In the absence of such a cost benefit model, Defra incorporated the wider impacts of disease control strategies into its decision making using a more qualitative methodology. Policy decisions were made by the Animal Disease Policy Group which met throughout the outbreak. The Group considered the evidence offered by risk assessments and papers, presented on subjects such as the economic or trade impact of different control strategies, in order to formulate their policy decisions.

The 2002 Report recommended that: 'The interests of all the sectors likely to bear the brunt of any costs be properly represented and taken into account when designing policy options…' During the 2007 outbreak Defra set up several stakeholder groups to keep in touch with the views of industries most likely to be affected by disease controls. Also, the Core Group of livestock industry specialists advised the policy making decision process by drawing on its expertise.

This Core Group included experts from the livestock and meat processing industry. However, the opinions of the wider supply chain were not consulted as part of the Core Group. A submission received from Marks & Spencer commented that: 'Defra appeared to focus exclusively on the management of disease control and initially seemed unable to fully understand trade issues.'

Several submissions from food suppliers expressed concern that some exported goods were affected by restrictions which were disproportionate to the FMD risk. The Food and Drink Federation commented that: 'FDF members would wish to avoid the situation of an outbreak having a totally disproportionate impact on products which do not pose a risk from a FMD control perspective due to the processes by which they are manufactured or the origin of their relevant ingredients.' It was also concerned about the time taken to issue export certificates. This caused a build up of products waiting for their export licences.

Defra had little flexibility – particularly at the beginning of the outbreak – because export policy was largely dictated by the rules agreed at EU level. The focus was on the containment and eradication of the disease in the shortest possible time to lower the costs to all sectors affected. As a result, some goods based on animal products, but posing no possible disease threat could not be exported. During an outbreak member states must be assured that there is no disease risk from exported products. In preparation for any future outbreak Defra should discuss specific exemptions with the Commission.

We recognise that the impact of the outbreak on retail and other industries was not as direct as it was on the livestock industry. Even so, there is a lesson here. The full costs and benefits of disease control strategies in the wider economy should always be taken into account. Everything that can be done should be done to open up trade in areas which pose no disease risk.

Proportional response: regional risk analysis

Risk varies regionally according to proximity of the infected area and exposure to animal movements from the region. Developing a regional approach can reduce the overall cost. There was some differentiation on movement policies during the outbreak – for example the immediate lifting of the movement ban for the Scottish islands during the second cluster. But examples such as this were limited. The BCVA told us that: 'Despite the local nature of this outbreak, the effects of FMD control measures have been felt throughout the industry and the full ramifications upon the viability of many farm units still remains to be seen. Methods of mitigating these effects in similar restricted circumstances must be found for future outbreaks.'

The Scottish and Welsh governments justified their earlier relaxation of movement restrictions (by a matter of days) on the basis of 'the best scientific advice' and 'epidemiological analysis'. As the NFU noted: 'It appears that we must either accept that an administrative border also delineates a distinct epidemiological zone or we must look elsewhere for the reasons behind these asynchronous actions.' The suspicion that policy decisions may have been driven by political concerns undermined the public's trust in the authorities at a time when it was most needed.

It is difficult to defend measures based on administrative boundaries when parts of Wales, for example, were closer to the Surrey outbreak than the North of England. Confidence and compliance suffer as a result

British Cattle Veterinary Association

If policy is to be regionalised according to a genuine risk-based analysis, it should be shaped by objective evidence, not simply follow geographical or man-made border lines. In short, this policy should be backed up by the best available science.

Disease control measures targeted at reducing the overall economic damage to the nation and, in particular, those areas least affected by disease should be pursued wherever possible. As the next section of the report makes clear, the ability to do that and to do it as soon as possible is highly dependent on the quality of the data and information systems related to livestock movements and tracing.

Scottish Model

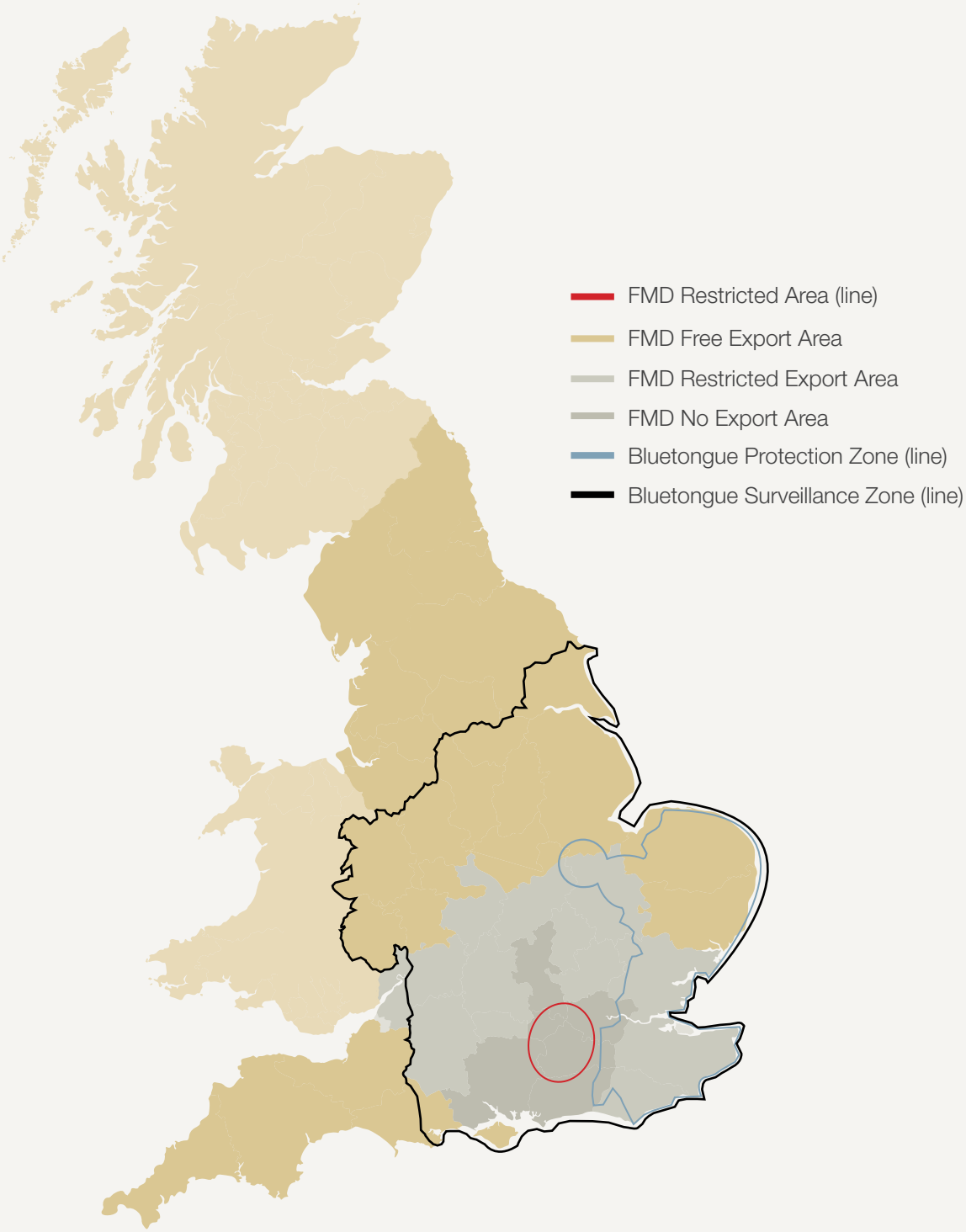
The Scottish Executive commissioned researchers at the University of Edinburgh to assess the risk that FMD had spread to Scotland. Risk was assessed in two steps: contact tracing of animal movements from farms in Surrey into Scotland; and daily calculation of the chance that there was still undetected infection in Scotland.

Following the confirmation of the disease in Surrey, movement restrictions were put in place in Scotland to protect Scottish interests. The researchers conducted 16 veterinary risk assessments in total to support the decisions taken to lift the restrictions gradually when the risk was considered to be sufficiently low. This was to prevent costs being imposed on Scottish industry which were disproportionate to the risk.

If based on good evidence, risk assessments can be used to target policies on areas where there is the greatest risk. This was practised at the end of the outbreak. On 6 November, Defra – in consultation with the European Commission – split the country into an FMD Free Export Area, an FMD Restricted Export Area and an FMD No Export Area. The risk-based division of the country enabled trade and movement restrictions to be lifted at different stages to minimise unnecessary costs to the wider economy. The situation was complicated by the arrival of Bluetongue virus to the UK which generated its own Protection and Surveillance Zones.

This approach was developed on an ad-hoc basis during 2007. It is important to capture the lessons from this experience and build them into the consideration of future disease exit strategies.

Zones for Intra-Community Trade



Source: Defra

A mechanism needs to be in place which ensures that biosecurity measures are adhered to now and in the future. As a first step, it is incumbent upon the farming unions to ensure that their members follow best practice relating to this issue. We would ask Defra to consider how this could be achieved

RSPCA

Assurance

Farm assurance schemes are voluntary schemes which producers can join to assure customers that certain standards have been maintained in the production process.

The 2002 Report concluded that there is a limit to what government can do to prevent the spread of animal disease. It recommended that 'the livestock industry should work with government to undertake a thorough review of assurance and licensing options…' and that 'farm assurance schemes should take account of animal health and welfare, biosecurity, food safety and environmental issues.'

Take-up among career farmers is generally high, covering between 65% and 90% of output in the main commodity sectors. The President of the NFU, told us that the NFU promotes farm assurance as an alternative to government regulation or licensing: 'The farm assurance inspection was the most rigorous inspection that most farmers would get.' He thought that the professional industry would 'actually welcome a move to raise standards in this way'.

In the absence of widespread insurance to cover for animal disease-related losses, the role of assurance schemes is increasingly important to ensure a minimum standard of livestock practices spans the industry.

Responsibility and cost sharing: progress to date

In light of the enormous cost of the 2001 outbreak, the 2002 Report recommended that, whereas there are wider benefits to the public of controlling FMD, the farming industry should recognise that it has responsibilities for the rural economy. In an effort to increase accountability, the Joint Defra Industry Working Group for Animal Disease Insurance has been considering the options for cost sharing. The resulting Responsibility and Cost Sharing programme presents the Government's proposals to share both the costs, and the decision making, associated with ensuring animal health and welfare.

The programme considers a framework to allow for more involvement in decision making from farmers and other experts from industry. It proposes forming joint industry-government groups at the initial stage, to be formalised at a later stage in legislation. The programme also addresses cost sharing. Currently the costs of the government response to an animal disease outbreak are met by the taxpayer, but the benefits are divided between the public, industry and individual farmers. The Government is now considering cost sharing mechanisms which ensure that costs are paid according to the benefits received; for example that livestock producers pay for the benefits they receive from disease control practices.

The draft Responsibility and Cost Sharing document is out for consultation with industry until 15 April 2008.

Conclusions

Risk assessment and risk management are critical to any organisation. All organisations, at corporate and individual level, have a responsibility to manage overall risk by identifying, assessing and mitigating individual risks and to pass concerns to the appropriate level.

Defra recognises that its role as an emergency response department places risk at centre stage. In its 2007 document assessing its position on risk, the Defra Management Board commented that: 'With a portfolio that includes such high-risk policy areas as climate change, floods, Avian Influenza and air quality, we can never call ourselves a high-performing department until we are widely acknowledged for how we handle risk.'[2]

There has been progress in the Department since 2001. Defra has reduced the risk of an animal disease outbreak arriving in the UK in the first place, and enhanced preparations have been put in place to act immediately should an outbreak occur. Policy decisions in 2007 were based largely on risk assessments, although the quality of some of these was limited due to the poor evidence base. In the absence of a reliable, up-to-date evidence base, Defra should consider giving more weight to risk-based techniques within its policy process.

Working more closely with the industry helped to bring its concerns into account at the policy level. The impact on the wider food chain, however, appeared disproportionate. Defra should work to address this. The development of a more comprehensive cost benefit analysis model would be a good starting point.

Costs to the wider economy were lessened, to a degree, through risk-based zoning of the country towards the end of the outbreak. Lessons should be captured from this experience and built into future disease exit strategies.

[2] Risk in Defra: Taking a Fresh Look, July 2007

Lesson 7

Use data and information management systems that conform to recognised good practice in support of intelligence gathering and decision making

Introduction

Knowledge is power – especially when fighting a serious disease outbreak.

The initial telephone call only provides information on the location and breeds of the first infected animals. An effective response requires information within the first few hours on the number of livestock in the area, their location, their owners and how to contact them. It requires facts about livestock density and husbandry practices, land holdings, and patterns of markets and movements. Without such a body of knowledge, understanding the extent of disease spread and how best to tackle it will be that much harder. In short, the more comprehensive and accurate the information, the easier it will be to control the disease.

Robust data and reliable data systems are essential. The data need to be accurate, complete and up-to-date. The systems must be flexible enough to process a vast set of data in the event of many different possible requirements.

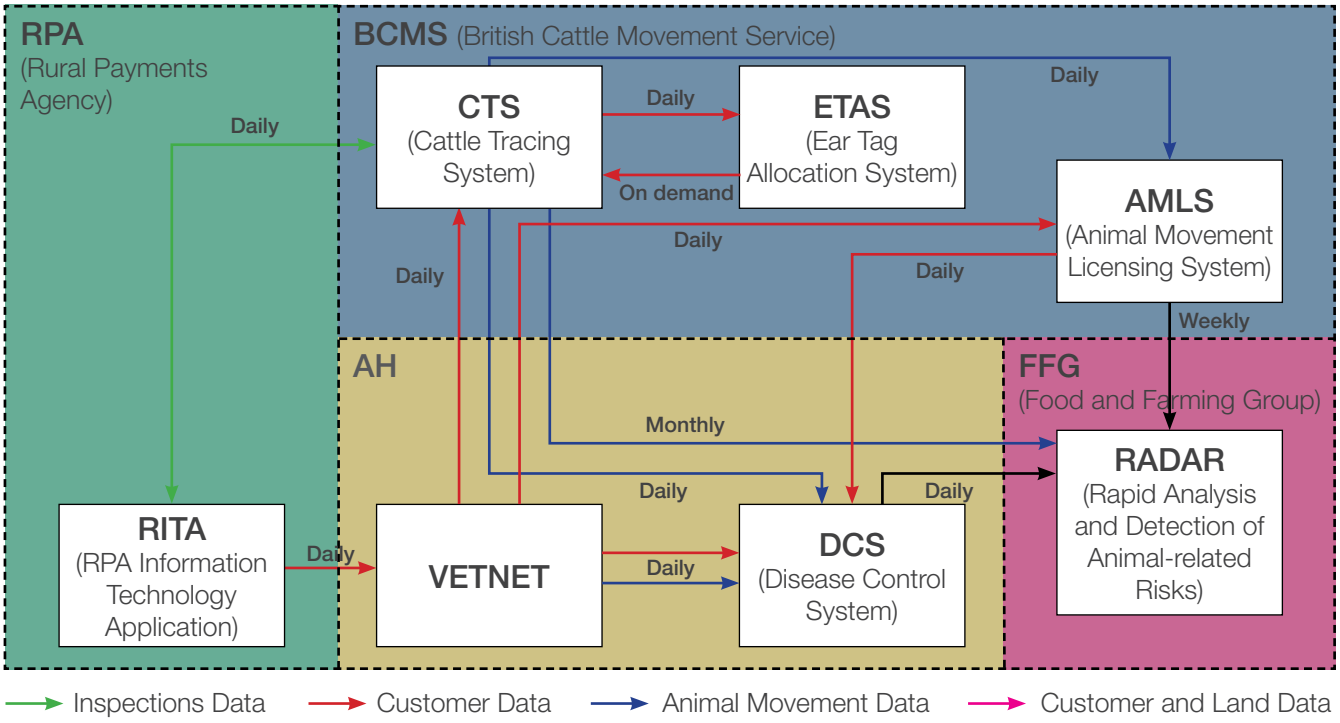
The management of data and information in the 2001 outbreak was the subject of several recommendations in the 2002 Report. The Department was operating with a multitude of disconnected, outdated systems storing data in ways which were incapable of managing a disease outbreak effectively. The 2002 Report recommended that Defra 'lay out milestones for investment and achievement for improved management information systems'.

Developments since 2001

Defra accepted this set of recommendations and started work on possible solutions. One was chosen and work on its implementation began, but it was abandoned in 2004 when it was identified as not meeting requirements. At this point Defra began from scratch to redesign a new system. The initial stages of the resulting Business Reform Programme were only just beginning to be delivered at the time of the FMD outbreak in August.

This diagram demonstrates the current links between the various systems operating in the field of animal health. Ownership of the systems is split between Defra, Animal Health and the Rural Payments Agency (which also owns the British Cattle Movements Service).

Current Interfaces to Animal Health and Food and Farming Group



Current data systems

Vetnet: Animal Health's registration database storing names and addresses of livestock keepers and their holdings, species and flock or herd numbers

Cattle Tracing System and Animal Movements Licensing System: movements systems, owned by the Rural Payments Agency, which record animal movements between different holdings

Disease Control System: Animal Health's database which manages records of all visits and inspections to a particular premises in a disease outbreak

RADAR: Defra system which brings together key surveillance information collected in other systems about animal diseases and conditions to enable, for example, epidemiologists to compile lists of premises at risk of disease infection

Source: RPA

There is an EU requirement to identify cattle, sheep and pigs. The main database storing this information in Great Britain is currently a system called Vetnet. This stores location data using County Parish Holding (CPH) numbers and is based on a legacy system which is at risk of collapsing. The data it holds on livestock, their owners and locations are of poor quality, because there is no incentive to encourage accurate livestock registration. Livestock data rely entirely on owners notifying Animal Health of changes in stock. Land registration, in contrast, is a pre-requisite for claiming European farm payments.

The requirement to register – even in the case of owning just one sheep or goat – is not well-known, and there is no legal requirement to de-register in the event of livestock deaths. As a result, the data held are often inaccurate and out-of-date. Movement data are held by the Cattle Tracing System (only for cattle) and the Animal Movements Licensing System (sheep, pigs and goats). Movement data are submitted to the local authorities by farmers using paper forms, which means that there can be significant delays before information is updated. In the event of an animal disease outbreak, the data stored are likely to be some weeks out-of-date. These systems are owned by the Rural Payments Agency, despite the fact that Animal Health is the main user. We understand that the possibility of transferring ownership from the Rural Payments Agency to Animal Health is being considered.

In the event of disease, Animal Health operates a separate data management system to manage records of all visits and inspections to a particular premises during a disease outbreak. The Disease Control System is only used during an outbreak and is unlike the day-to-day systems. In an emergency, it is vital that data are recorded quickly and accurately. This will not happen if staff are unsure of how to use the data system, and valuable time will be wasted in emergency training. Appendix F lists more details of the current data systems deployed by Defra.

The data process for a livestock owner or keeper

If you are a livestock owner or keeper there are several steps you have to go through to register your livestock with the relevant authorities.

1. Register with the Rural Payments Agency or the devolved administrations to obtain a County Parish Holding number (CPH). This identifies your agricultural premises. While this is not a legal requirement, a CPH number is needed to register with Animal Health.

2. Register with Animal Health using your CPH number to obtain a flock or herd mark. Registration to obtain a flock or herd mark with Animal Health is a legal requirement enforced by the Local Authority but the degree of regulation varies nationwide.

3. Provide Animal Health with your name and address and the name and address for your 'holding'. The definition of a holding is ambiguous but denotes a piece of agricultural land which does not have to be located at your residential address. The registered holding address would not necessarily be where stock is kept and can therefore be misleading in the event of a disease outbreak. This information is kept on the Vetnet database.

4. Report, throughout the time of owning livestock, all your animal movements. Cattle movements are recorded on an individual basis on the Cattle Tracing System (CTS); pig, goat and sheep movements are recorded by batch on the Animal Movement Licensing System (AMLS – applies to England only). The CTS can be accessed online while movements for AMLS must be recorded on paper and sent to the local authority to be updated.

Data problems

From the start of the 2007 outbreak, unreliability of livestock data was a problem. When the first case of FMD was confirmed, Vetnet was searched to find a list of all premises located within the Protection or Surveillance Zones recorded as having livestock. This search produced a list of 300 premises. However, the data were so unreliable that this list was disregarded. Instead, the search was widened to find all premises with a CPH number. This produced a list of all registered agricultural premises in the area: 1,600 in total. Each of these then had to be visited or telephoned to confirm the presence of livestock. The ensuing list contained 300 premises with livestock, but it was a very different list from that produced originally by Vetnet.

Recognising the problem of poor quality data, the 2002 Report recommended that 'use be made of alternative sources of information and intelligence during crises'. This does not appear to have happened. For example, one submission told us that: 'Trading Standards had completed a full audit of premises in Surrey within the last month – yet

Data Control did not seem interested when I suggested they cross reference their data with this more recent audit. I was told the absolute definitive PZ list was coming from Carlisle.' Animal Health told us that information collected by the local authorities was not necessarily compatible with Animal Health systems.

Systems Problems

The data systems themselves also contributed to the problems arising during the outbreak.

The continued reliance of the movements system on farmers to submit paper records means that, at the point of imposing the movement ban, livestock location data could have been up to three weeks out-of-date. The CTS has an online function which enables farmers to update their records in real-time, although take-up of this function is variable. The CTS collapsed at the start of the second phase, leaving a complete gap in knowledge of cattle locations for four days.

The inefficiency of the systems also slowed the speed with which Animal Health was able to task its staff to undertake inspections out in the field. The Disease Control System is the key management tool in the event of an outbreak. But it is only operated during an outbreak and does not resemble the systems used by Animal Health staff for their day-to-day work. Unfamiliarity with the system led staff to set up their own spreadsheets, meaning there was no central repository for data on all visits and inspections of premises.

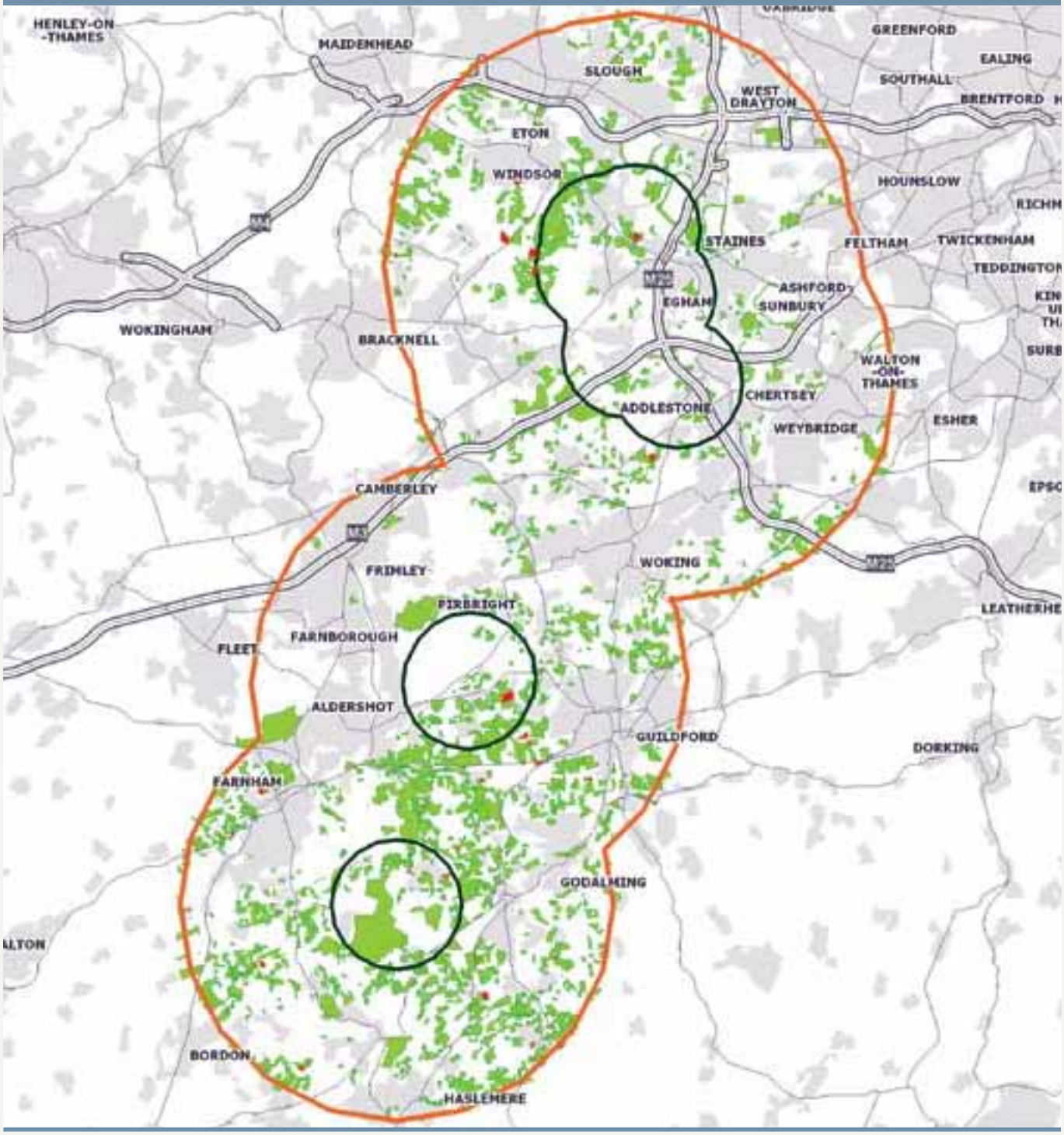
Early on in the outbreak, data systems were identified as a potential risk in the event of significant disease spread. A paper submitted to Defra's Emergency Management Board noted that: 'The data situation is not necessarily hampering our efforts at the moment, but this could change if the situation escalates. It is not straightforward by any means to manage the relevant information with current systems.' The CVO concluded, in the Emergency Management Board meeting on 3 September, that Defra's systems and resources could not cope with more than one disease outbreak at a time.

Geographical Information Systems

Geographical Information Systems (GIS) allow users to search and analyse spatial information, and generate and edit maps. It can be a valuable tool to help emergency planning and response.

Current systems in Defra are incompatible with GIS technology, and so GIS teams were instead embedded within the National and Local Disease Control Centres. The NDCC used GIS to generate maps of the PZs and SZs, which changed as infected premises were discovered. Presentation of the data pictorially was an effective way of displaying data, making it immediately obvious which premises had yet to be inspected by the epidemiological teams.

Distributed Land Ownership



OS MAP

On a visit to Ordnance Survey in Southampton, we were shown a range of tools which could have been used during the outbreak. This map was compiled using Rural Payments Agency Land Register data and shows all registered agricultural land parcels within the control zones. A land parcel chosen at random from within the PZ is highlighted in red, and all associated parcels of land (i.e. registered under the same name) are highlighted as well. This shows the fragmentation of land holdings and consequently gives information on the risk of disease spread across a large area.

Current systems do not allow visualisation of data on to maps, meaning that all teams have to rely on GIS cells (centrally and locally) to distribute maps and data

Defra Emergency Management Board

GIS technology and all its benefits should be incorporated into any future data systems developed by Defra. In addition, the Department should take steps to make full use of best practice and expertise available, particularly within Ordnance Survey.

Current developments

Defra and Animal Health have taken steps to mitigate the risks presented by their existing data and systems. Lessons from animal disease exercises have led to updates in Vetnet, which has also been subject to a data cleansing exercise to prevent a complete loss of knowledge if the system were to collapse. As part of the Veterinary Surveillance Strategy in 2003, Defra established a new information management system known as RADAR (Rapid Analysis and Detection of Animal-related Risks). Its purpose is to collect and collate veterinary surveillance data from different sources, including agricultural holdings and livestock data from UK government databases.

The Defra submission to our Review said that: 'During the 2007 FMD outbreak, RADAR was used for a variety of purposes including to produce a complete list of premises with susceptible stock within the protection and surveillance zones, and to provide epidemiological modellers with a single source of data, allowing robust and comparable analyses to be carried out.' However, RADAR was using data from Vetnet and the tracing systems which were recognised as being of poor quality. Thus, any resulting list of data in RADAR was subject to the same caveats. The LDCC still had to carry out a manual assessment in order to compile a list of premises which had confirmed stock.

Future systems

The Business Reform Programme has been designed to replace the current suite of data systems. Work on the initial replacement programme from 2003 was stopped a year into its development because it failed to meet specified requirements. Ideally, the replacement system would be similar to those used on a daily basis but flexible enough to respond to changing technology and information requirements. Following this specification, a team was set up within Animal Health to lead the resulting Business Reform Programme (BRP).

BRP is the overarching term covering the suite of information systems which will be used in the domain of animal health. The new system will store customer contact details along with data on the location of batches of livestock. The 'primary location' attached to a batch of animals (as opposed to individual animals) would be the location at which they would normally be gathered for an inspection. BRP is being designed to allow for any number of associated premises to be recorded and linked to a batch of livestock and their primary location. This will allow the programme to provide information on a total list of all possible locations for livestock. In an outbreak, the programme will replace the DCS function of monitoring disease control work and will also incorporate a work management system for scheduling visits. This function was carried out manually in 2007.

BRP is recognised by the Defra Management Board as a departmental priority. It is critical that sufficient funding is allocated in order to provide some assurance that data systems will not again be a significant barrier to an effective response in a disease outbreak. If the project goes according to plan, it should come progressively online, becoming fully operational by 2011.

Animal Health is also developing the Livestock Partnership Programme (LPP). This aims to implement a solution to the problems of collecting and maintaining accurate and up-to-date livestock data. The programme would register births, deaths and movements of individual cattle (and potentially sheep depending on a proposed EU decision) and batches of animals (currently sheep, pigs and goats).

Collecting livestock data is not a new challenge. Following the problems arising from poor-quality data in 2001, the 2002 Report recommended that: 'The Government should build an up-to-date database of livestock, farming and marketing practices. This should include research to examine the evolution of regional livestock stocking densities and implications for disease risk and control.'

In particular, the LPP will incorporate an improved method of recording movements using Livestock Movement Units (LMUs). An LMU is a grouping of land parcels and buildings between which there are routine movements of livestock, people and machinery. For the purposes of disease control, what matters is that Defra and Animal Health know the farming practices for an infected area. Agricultural land owned or used by farmers is increasingly fragmented, with land holdings being widely dispersed throughout the country. If a farmer frequently travels between his holdings, transporting vehicles and animals, these premises would be linked as an 'epidemiological unit'.

The LPP is in its early stages and its precise scope and outputs have not yet been fully defined. The Animal Health Transformation Director told us that: 'The Livestock Partnership Programme was subject to significant risks delivering a programme for identification and movement information because 'the industry' covered a wide range of interested parties with strongly held views.' The LPP is an essential part of overall strategy and should be allocated sufficient resources.

> We have a significant risk around tracing should this outbreak spread. We know that the movement record systems (CTS and AMLS) are not sufficiently up-to-date… Our current tracing system…is a 'clunky' system that does not service needs in an emergency
>
> **Defra Emergency Management Board**

On data, Debby [CVO] stressed that the data systems remained fragile and not significantly further forward than in 2001

Defra Emergency Management Board

Current state of readiness

We are concerned by the relative lack of contingency planning for data management and data systems, given the extent of the known weaknesses. While still developing its data system capability, Defra remains in a vulnerable position. This should be addressed by thorough contingency planning. The data systems did not significantly hinder the response to the FMD outbreak in 2007 but, as explained in an Emergency Management Board paper in September: 'The data risks… become more serious as the scale of any disease outbreak progresses: it becomes increasingly and exponentially more difficult to manage the information using crude systems and quality management checks.'

While improving data and data systems is a matter of urgency, it does need adequate time and resources. The temptation to rush the process to achieve immediate benefits would only store up problems for the future. The state of animal health data and systems undermined the significant progress Defra had made in other areas since 2001. The BRP is due to be fully implemented by 2011 and it must be maintained as a priority throughout this time. This, and the LPP, address some significant failings in one of Defra's core capabilities and must be prioritised accordingly.

Links to other information systems

Vaccination has not yet been used in controlling an FMD outbreak. Should this happen, another dataset would need to be recorded and processed by systems which are already over-complicated. Genus is the company contracted by Defra to run the vaccination programme. Genus would use information from the DCS on livestock locations and proximity to infected areas to arrange its workload, using its own scheduling system. Then all visits, vaccination and contact details would be recorded back onto the DCS. Both the Genus and the DCS would need to be up-to-date and capable of maintaining full records of vaccinated and unvaccinated animals.

Vetnet, Animal Health's 'peacetime' livestock record, does not have the ability to record vaccination details.

We recommend that the interface with Genus be subject to a simulated load test end-to-end. This would not only test the system's performance from the decision to vaccinate, right through to tracking vaccinated animals after an outbreak, but also its ability to process at speed a realistic workload.

Links with the Devolved Administrations

All Animal Health systems such as Vetnet or the DCS cover England, Scotland and Wales. However, the movement systems are owned by the RPA, rather than Animal Health. There is a separate Scottish movements system. Information from this system is downloaded at least weekly to the AMLS which operates in England. This represents a further obstacle to the timely and accurate transmission of information. In designing the BRP, it is vital that full consideration be taken on how to record livestock

data in the devolved administrations. The future data system will need to account for livestock in the whole of Great Britain, not least because Great Britain is classed as a single epidemiological region.

IBM

Defra's information technology and systems were outsourced to IBM in 2004, making IBM central to the Department, at both the strategic and operational level. At the strategic level, IBM is working in partnership with Animal Health to develop the BRP and transform the way in which Animal Health works. Operationally, there is a service contract which covers all classic outsourcing requirements such as running the infrastructure, hardware, applications and helplines.

IBM is also contracted to provide the necessary IT infrastructure needed by the LDCC in an emergency. The company was involved in some contingency planning exercises run by Animal Health and had a 'handbook' to follow in the event of an animal disease outbreak. We heard some criticism that the provision of IT services had been a restricting factor in setting up the LDCC, even though IBM was on-site at the Reigate LDCC within 12 hours of disease confirmation. IBM does not run an emergency on-call rota for staff, and so the timing of the outbreak – 18.00 on a Friday in August – was a hindrance. The on-duty manager did, however, arrange for a team to be available over the weekend.

Conclusions

Good data management and information systems – including GIS – are needed for the effective management of an outbreak of exotic animal disease such as FMD. The 2002 Report made this clear and stressed the importance that Defra should attach to this task.

However, in 2007, Animal Health was still operating a confusing network of incompatible systems which processed incomplete and inaccurate data on livestock registration and movements. It is disappointing to record that so little has been achieved over the past six years. This is a lesson not yet applied from the 2001 epidemic.

The BRP and the LPP that will be rolled out over the course of the next three years are intended to deal with these weaknesses. It is essential that Defra and Animal Health maintain these as central programme priorities. In the interim, both remain exposed to risks. These risks should be regularly assessed by the Management Board, and steps taken to mitigate them.

It is important that, in contingency planning, interim arrangements are held in place to support policy and operational responses in the event of another disease outbreak. This contingency planning should include a full test of the information interface with Genus.

> The major additional risk in this scenario is that the interface between the vaccinators and DCS has been tested but never used in anger. We do not know how resilient it will prove
>
> **Defra Emergency Management Board**

Lesson 8

Have a legislative framework that gives government the powers it needs to respond effectively to the emerging needs of a crisis

Introduction

The outbreak of 2001 was unexpected – it had certainly not been planned for. The response was consequently based on outdated legislation, with some deleterious results. The disease raged while vital time was lost debating the legality of policy decisions based on a legislative framework that had passed its use by date. Time and again, farmers' organisations and other stakeholders challenged the legal basis of many of the Government's disease control mechanisms. The 2002 Report concluded that there needed to be 'a legislative framework that gives government the powers needed to respond effectively to the emerging needs of a crisis'.

Legislative changes since 2001

By 2007, the position was much improved. The legal framework enabled ministers and officials to take decisions based on appropriate pre-existing arrangements. The Animal Health Act 2002 provided a legal basis for a number of disease control measures – including contiguous culling along the lines used in 2001 – the legality of which had been challenged at the time. In addition, EU legislation, developed out of the experiences of 2001, gave new powers to government in responding to an animal disease outbreak.

The legislative framework was also strengthened by the Civil Contingencies Act of 2004. This placed legal duties on certain bodies (such as the emergency services) to plan for, and respond to, civil emergencies. It allowed for special temporary legislation to be passed, if necessary, during an emergency. The passing of the Civil Contingencies Act was an acknowledgment that much emergency legislation was still framed on the basis of combating the type of threats faced by the nation several decades earlier.

Civil Contingencies Act (2004)

The Civil Contingencies Act was passed in 2004 to provide legal powers to respond to emergencies such as animal disease outbreaks, flooding and terrorism. It established a new statutory framework for civil protection at the local level using local responders: Category 1 (e.g. emergency services) are at the heart of risk assessment, contingency planning and response; whereas Category 2 responders (e.g. HSE, utilities and the transport sector) are less involved at the planning stage but become involved if emergency preparedness and response work relate to their sector. Both categories come together to form Local Resilience Forums, of which there are 47 in England and Wales.

The Act also repealed out-of-date legislation (including the Emergency Powers Act 1920) and allowed special temporary legislation to be passed, which might be needed to deal with a serious emergency. The Act allows for the use of emergency powers on a regional or devolved administration basis.

Emergency powers remain a reserved matter, although the devolved administrations are consulted.

The European Union – setting the framework

As a member state of the EU, the UK is required to abide by Council legislation in preparing for, and responding to, animal disease outbreaks.

The UK has made a significant contribution to setting the agenda in Europe. IAH is an EU reference laboratory, and its scientists are well-respected internationally. Much of the way that FMD is treated in Europe has been learned from the lessons of the 2001 outbreak in Great Britain. This gives the UK considerable influence at policy discussions in Europe.

The extent to which government decisions are restricted by EU law is often underestimated. The UK Government can only act in accordance with the disease control framework set by Brussels. Many of the decisions taken by government during an FMD outbreak are directly related to maintaining the confidence of the EU – and of the World Organisation for Animal Health (see box on p.80) – both to avoid trade sanctions and to ensure a swift return to normality after the outbreak has been eradicated.

> Declaration of national FMD-free status one week before [the] reappearance of [the] virus... [was] damaging, not least as Europe and OIE had shown great courage and foresight in stretching parameters in our favour
>
> **European Livestock Association**

The World Organisation for Animal Health

The World Organisation for Animal Health (OIE – the acronym is a legacy from the previous name, Office International des Epizooties) operates under the agreement of the World Trade Organisation. The Chief Veterinary Officers of member countries meet annually to agree the *Terrestrial Animal Health Code* for safe trade in animals and animal products based on current veterinary science. This does not have the same force as EU legislation but could be invoked in a World Trade Organisation trade dispute. The OIE also supports animal health worldwide including the reporting of disease outbreaks, publication of laboratory standards and promoting the role of veterinary services in developing countries, working with the World Health Organisation and UN Food and Agricultural Office.

In view of its significance for animal health and trade, FMD is one of the few diseases for which the OIE publishes a list of disease-free countries and regions on the basis of evaluations by its Scientific Commission. FMD-free countries enjoy relatively free export conditions but, once this status is lost, other countries are liable to introduce export bans which may go beyond the restrictions recommended by the OIE Code. These are economically damaging to the food and farming industries.

Following notification of the FMD outbreak in Surrey in August 2007, the UK's status as a 'FMD free country where vaccination is not practised' was suspended. The UK applied for this status to be renewed by submitting its evidence on 31 December – three months after the last case. The OIE renewed the UK's status on 22 February 2008.

EU legislation was updated following the 2001 FMD outbreak in Britain. The EU Council Directive 2003/85/EC (Community measures for the control of FMD) was passed in September 2003 and set out powers for member states in tackling FMD. The Directive described appropriate measures for controlling and eradicating the disease, including requirements for member states to hold and renew contingency plans and vaccine banks.

The main features of the new legislation include:

- the power to declare a temporary control zone on suspicion of disease;
- provisions for emergency and protective vaccination as key control strategies;
- minimum requirements for Protection and Surveillance Zones (PZs and SZs) to be declared in the event of confirmation of FMD (three kilometres and ten kilometres minima, respectively);

- the power to declare a national movement ban on susceptible animals; and
- rapid implementation of EU emergency safeguard decisions.

Application of EU law in Great Britain

The 2003 EU Directive is implemented in England, Wales, Scotland and Northern Ireland through the FMD Orders passed in 2006. (The Orders are made under the Animal Health Act of 1981, other than the Northern Ireland Regulations which were made under the European Communities Act 1972.)

The Orders set out the legal powers around:

- notification, suspicion and investigation of disease (including the establishment of a temporary control zone and movement control zone);
- measures following confirmation of disease (including tracing work, slaughter and implementing PZs and SZs); and
- general and supplementary provisions (such as the production of licences and duties of local authorities).

The Animal Health Act 2002 amended key areas of the 1981 Animal Health Act to allow further powers – notably around rights to slaughter, testing and vaccination.

Under the Animal Health Act 1981 (as amended in 2002), Defra is obliged to publish a national contingency plan. This comprises the *Framework Response Plan for Exotic Animal Diseases* and *An Overview of Emergency Preparedness*. Together, these set out in detail the structure, systems, roles and responsibilities involved in disease control so that, in the event of an outbreak, there is absolute clarity about what needs to be done and by whom. The contingency plan is reviewed at least annually and updated to reflect latest experience. It is subject to extensive consultation before being laid before Parliament, and it should take into account lessons learned from exercises or disease outbreaks.

The most recent draft of this plan was laid before Parliament in December 2007. Next year's iteration will address the lessons emerging from the experiences of 2007.

Implementing the legislation: the role of SCoFCAH

EU policies are debated by the Standing Committee on the Food Chain and Animal Health (SCoFCAH), which normally meets twice a month to discuss matters of animal health, with further meetings on public health. If an animal disease outbreak requires urgent action, the Committee holds an extraordinary meeting – as it did seven times from August to December 2007.

> ... It would seem appropriate to have a comprehensive review of the FMD control legislation and feed back results to Europe for further discussion
>
> **Local Authority Co-ordinator of Regulatory Services**

The conditions that the Commission attached to the progressive easing of export restrictions... were cumbersome, complicated to operate and... arguably disproportionate to the real disease risk

Meat and Livestock Commission

SCoFCAH is chaired by a senior European Commission official, with proposals presented by other Commission officials. Member states are represented by experts from their respective national competent authorities, or by delegates from member states' Permanent Representations to the EU. The UK is represented by a Defra official, with the Deputy Chief Veterinary Officer attending key meetings during the 2007 outbreak to update other member states on the latest position in the UK.

SCoFCAH has a central role in the response to a notifiable animal disease. At its meetings EU 'safeguard' decisions are agreed within the framework set by the relevant disease control Directive. The affected member state reports on the epidemiology of the outbreak and the control measures in place. This is then challenged by experts from the Commission and other states before agreement is reached on any rule changes.

SCoFCAH decisions can impact beyond the obvious implication on trade in live animals and meat. For example, the 2007 FMD safeguard decision applied to medical devices (replacement heart valves taken from pigs) and to personal exports of food (for self-catering holidays).

Some problems with the implementation of EU law were brought to our attention during the course of the Review. For example, Marks & Spencer felt that the legislation was open to variable interpretations and 'created considerable confusion for regulators, enforcement officers, port health officials and industry alike' as different export rules were implemented for its stores in Northern Ireland, Republic of Ireland, Isle of Man, Jersey and Guernsey.

In Lesson 6 we have suggested that it is important that this issue is addressed as soon as possible with the EU. It is in the interest of all EU members to resolve this quickly since any one of them could suffer an outbreak of disease and, as a consequence, have trade restrictions placed on their goods.

Food and Veterinary Office

The Food and Veterinary Office (FVO) of the European Commission supports the Commission in ensuring that Community legislation on food safety, animal health, plant health and animal welfare is properly implemented and enforced. It conducted a review into whether the UK complied with the EC Directive throughout the 2007 outbreak. The report was published on 21 February 2007. It found that 'no problems were detected in relation to FMD legislation', but made recommendations to improve the UK's implementation of FMD control measures. The report stated that 'some possible means for the escape and spread of virus were not adequately investigated.'

Conclusions

Government acted quickly to tackle the shortcomings in legislation identified in the 2002 Report. Lessons were learned, and the legislative framework was strengthened to provide the powers needed. The provisions under the Civil Contingencies Act provided a framework for wider civil emergencies co-ordination. All these changes were critical in responding effectively in 2007.

We have made recommendations in Lesson 5 about necessary updating of the protocols and administrative arrangements for tackling cross-border outbreaks.

We recommend that the Government should work with SCoFCAH to look again at the wider trade implications of restrictions on export of animal biproducts.

> The re-vamped FMD Orders and Animal Health Act provided a comprehensive framework within which this outbreak could be managed. But there are still some outstanding points which need to be cleared up
>
> **National Farmers Union**

Lesson 9

Base policy decisions on the best available science and ensure that the processes for providing scientific advice are widely understood and trusted

Introduction

The contribution made by science to the 2007 outbreak showed marked improvements over 2001. Then, the scientific input was mixed. MAFF lacked a mechanism for integrating the expertise available and presenting it to policy makers. This role fell to the CVO. However, he was under intense pressure trying to manage the day to day response to the outbreak. The weaknesses in the process were well illustrated by the extended debate that took place on the possible use of vaccination. Two months elapsed before policy makers were able to consider vaccination as a control option, although it was ultimately not used.

In the event, the newly appointed Government Chief Scientific Advisor filled the vacuum, drawing on available scientific advice, and recommending a contiguous cull policy as the best means for controlling the outbreak. This proved to be highly contentious. However, it was considered to be the only realistic approach at the time, given the accelerating spread of the disease.

The 2002 Report subsequently recommended that: 'Defra's Chief Scientist should maintain a properly constituted standing committee ready to advise in an emergency on scientific aspects of disease control.'

The role of science in the 2007 response

The lessons from 2001 were largely applied in 2007. There was recognition within Defra that science needed to drive many of the policy decisions. Scientific input was central to the development of detailed contingency plans. It was also central to the way in which the FMD outbreak was managed, both in the putting in place specific control and surveillance strategies, and in providing the evidence necessary to demonstrate to the EU and OIE that the disease had been eradicated.

In the words of the British Cattle Veterinary Association (BCVA) 'a scientific approach to FMD containment and eradication appears to have been adopted with the opinion of both in-house and independent epidemiologists and other scientists being sought continually throughout this outbreak.'

Defra's contingency plan for exotic diseases set out the mechanisms for building expert advice into decision making. Four main sources of advice were used:

- the Science Advisory Council provided validation of the advice and evidence on key issues like vaccination;
- the National Emergencies Epidemiology Group (NEEG) brought together epidemiological expertise from IAH and across the Defra network, to analyse patterns of disease, assess risk factors and advise on control measures including surveillance and vaccination. The CVO also held a series of science stocktakes to promote wider discussion on key policy issues.
- the National Experts Group, chaired by the Deputy CVO, provided factual advice and recommendations on the disease and its control to the Animal Disease Policy Group (ADPG). It brought together scientists from IAH and VLA, vets, modellers and epidemiologists from within Animal Health and Defra, including the head of NEEG. The Group met more than 20 times during the outbreak; and
- the Animal Disease Policy Group (ADPG), usually chaired by the CVO, brought together officials and technical specialists from across Government, including the devolved administrations, and provided disease control policy advice and strategy recommendations to Defra ministers.

All scientific data collected during the outbreak should be published, enabling a full analysis of the outbreak and to promote wider learning from the experience.

> If the public are to be reassured that state of the art science and technology are driving policies there must be true openness and transparency...
>
> **Mary Critchley, Warmwell.com**

The relationship between IAH and Defra in the 2007 outbreaks was unusual. The fact that the IAH was under investigation as a cause of the outbreak undoubtedly affected the balance of two-way sharing of information and led to a reduced IAH input into decision-making, especially early in the epidemic

Institute for Animal Health

The role of epidemiology

The role played by epidemiologists was essential to the disease response both at the strategic and operational level. They provided input on control strategies, such as vaccination, and the risk of further spreading of the disease. The epidemiologists also led the work on tracing animal movements and identifying dangerous contacts all of which built a rational foundation on which livestock movement restrictions were based.

In addition Defra was able to draw on expertise from within IAH on surveillance, gene sequencing, diagnostics, and epidemiology. Experts from IAH helped date the age of the lesions of infected animals at IP1 and others.

Given the centrality of epidemiology to the response, we have concerns about the level of current resourcing and training of epidemiologists in Animal Health and Defra. Animal Health's ERMAS assessment of the epidemiological function within Animal Health from March 2007 identified a number of potential deficiencies in its training and emergency capabilities. We were told by Animal Health that: 'investments in Animal Health's epidemiological capability and improvements would be made as a result' and that 'Animal Health planned to create a dedicated post of Head of Epidemiology Team'. However, we were also told by the former CVO that 'there were not enough epidemiologists…[and that]…the National Emergencies Epidemiology Group required further investment to take on more work'.

The NEEG is only convened during an outbreak. This raises questions about the technical expertise available to contribute to the development of Defra policies on a day-to-day basis. Both Animal Health and Defra should explore how to generate more resources for this type of work, available on a regular basis and not just at times of disease outbreak.

Defra's mantra during the outbreak was 'we are following the science'. This was largely the case. But it is also important to demonstrate this. Veterinary and epidemiological risk assessments were published at certain points, but, as we show in Lesson 6, this was not done on a systematic basis. The Scottish Executive took a more proactive role, publishing all the assessments underpinning its key policy decisions.

The FMD outbreak was first declared over on 8 September. In acknowledging the progress made, and recognising that the decision was taken on the basis of all available epidemiological, as well as veterinary, advice, it is important to recognise that this decision was wrong, and to learn from this experience. The BCVA in its submission commented that:

'Specific epidemiological features of this outbreak that allowed the second phase to occur should be analysed against the Directive with suitable amendments being made to reduce the risk of such a scenario being repeated. Particular areas to be considered include the extent and designation of the control zones, aspects of surveillance that should be undertaken in those zones and the timescales that should remain in place; were they lifted too soon after the first wave?'

The availability and use of diagnostics

The availability, use and reliability of diagnostics were critical to the speed of diagnosis of the disease and to the overall management of the outbreak.

Since 2001, FMD scientists worldwide have been developing new technologies that have speeded up the diagnostic process and enabled quick genetic fingerprinting of the virus. There have been significant advances in nucleotide sequencing along with improvements in other diagnostic tests.

In 2007 a range of different tests, offering different degrees of confidence were deployed according to the levels of certainty needed and the urgency with which results were required. The fastest tests were used for samples from reported cases within the Protection Zones and Surveillance Zones. In areas away from those zones, and judged to be of lower epidemiological risk, other slower but more certain tests were used to avoid the unnecessary culling of animals and the creation of new temporary control zones.

Many of these improvements in diagnostic technology were pioneered by IAH at Pirbright. For example, research investigating the accumulation of changes in the FMD genome, as the virus circulated through animal populations during the 2001 outbreak, has increased the rapidity of FMD nucleotide sequencing. During 2007, this research allowed near real-time genome sequencing of the FMD virus, allowing the movement of the infective organism between farms to be determined. This provided significantly more epidemiological information than had been available in 2001. In the longer term, pinpointing the movement of the virus with this degree of precision will help to improve epidemiological risk models and control policies.

...it was important that there should be a balance between embedded competence within Defra and independent consultation with external scientific institutions

Debby Reynolds, former Chief Veterinary Officer

Nucleotide sequencing

The genetic fingerprint of a sample of the FMD virus can be obtained by analysing its genetic material, using a method called 'nucleotide sequencing'.

As the FMD virus multiplies in infected animals, changes in its genetic material (mutations) occur at a relatively high rate. These mutations are identified by nucleotide sequencing. The rapid rate of evolution of the virus means there are many differences in the nucleotide sequences of different strains from outbreaks around the world.

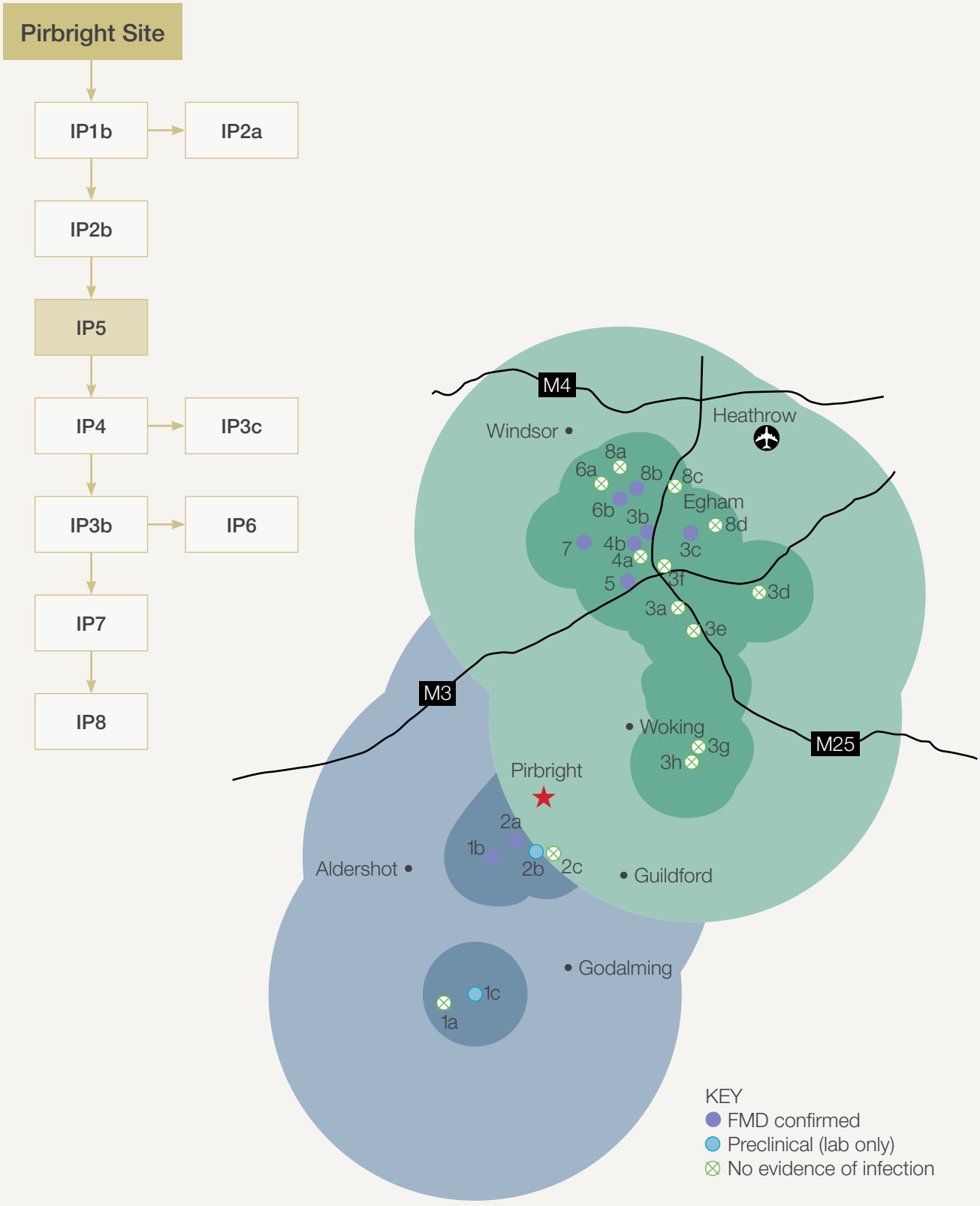
The sequencing of the FMD virus's genetic material in 2007 was carried out rapidly by IAH at Pirbright, allowing the specific strain of the virus responsible for the outbreak to be identified as O_1BFS 1860, within 24 hours.

This rapid evolution of the FMD virus can also be used to track the way it spreads during an outbreak since, as it moves from farm to farm, small changes in the nucleotide sequence of the virus occur. To do this tracking, the sequence of the complete genetic material of the virus needs to be obtained. This work was also carried out by IAH at Pirbright. This type of sequencing enabled the spread of virus from farm to farm to be deduced with considerable certainty. It also predicted the presence of unknown infected premises prior to their discovery, suggesting that the virus did not spread directly from IP2 to IP3.

The sequencing data also showed that the second cluster of infections was related to those in August and was not due to a separate escape from the Pirbright site. The chart on p.87 shows the transmission pathway of the FMD virus through the course of the outbreak.

During the 2007 outbreak, IAH also deployed a range of diagnostic tests each with different characteristics and uses. The speed and precision of these tests – much improved by IAH and others since 2001 – meant the disease could often be confirmed much more rapidly. For example, a lateral flow device developed by IAH, developed to detect virus particles, enabled clinical cases to be confirmed as FMD within one hour. By comparison the fastest tests available in 2001 took four to five hours.

Transmission pathway supported by molecular epidemiological data



Reproduced courtesy of the Institute for Animal Health

It was welcome to see the tests being widely used in the field to increase their validity for future use, and also to see the balance that was achieved between waiting for a diagnostic laboratory confirmation of infection and the need for removal of potentially infected animals on clinical signs or evidence of dangerous contact prior to laboratory confirmation

British Cattle Veterinary Association

Diagnostic tests for FMD

Key diagnostic tools include:

1) Lateral flow device (LFD). This is used to test for virus particles and confirm the presence of FMD. This test can give results within an hour and is typically used to confirm the presence of the virus when animals show FMD symptoms. Similar to a pregnancy test device, it has the potential to be used in the field by non-experts. It has a false positive rate of about 2%. It cannot be used to rule out FMD in the absence of vesicular lesions, such as may occur in animals that are not showing obvious signs of the disease.

2) Antigen ELISA test. This is used to confirm the presence of the virus and to establish the serotype and will identify pigs suffering from a clinically indistinguishable disease, swine vesicular disease. It can be completed within four to five hours of receipt of samples. False positive results are very rare but as for the LFD, it cannot be used to rule out FMD in the absence of vesicular lesions, such as may occur in animals that are not showing obvious signs of the disease.

3) RT-PCR (polymerase chain reaction) test. This is used to detect viral RNA. Work by IAH has improved the sensitivity and turn around times for these tests and they can be completed within five hours. The test is now extremely sensitive and can be used to detect the very low levels of virus in animals before the onset of obvious signs of disease as well as after they have recovered. It can be automated so as to give a higher sample throughput than other tests for the presence of the FMD virus. In the 2007 outbreak, the improved test significantly enhanced surveillance capability on the ground and reduced the pressure for pre-emptive culling.

4) Two types of tests for antibodies are used to detect prior infection in recovered animals. The first detects antibodies to the structural proteins of virus particles (SP tests) which are elicited by infection but also by vaccination. The second detects antibodies to the non-structural proteins of virus particles (NSP tests) which are elicited by infection but not by vaccination. The NSP test, therefore, has the potential to distinguish between infected and vaccinated animals. The tests take four to six hours to run and when large sample numbers are processed results can be produced within 24 hours.

5) Virus detection in a cell culture. This is used to make a primary diagnosis following clinical signs and to provide large quantities of virus for further studies. It is a ‘gold standard’ test with a high sensitivity and reliability. However, it takes two-to-four days to provide a result and the procedure cannot be readily automated.

Further work is well advanced at IAH to develop lateral flow devices and PCR tests into field tools.

Vaccination

The EU FMD Directive requires member states to consider using emergency vaccination in the event of an FMD outbreak and to have the capability to vaccinate within five days. The use of vaccination is detailed as an option under Defra's contingency plan and was considered at the start of both phases during the 2007 infection. In both cases, while vaccination teams had been mobilised and were ready within five days, the decision was taken by Secretary of State not to vaccinate on the basis of advice from the Animal Disease Policy Group and on the outcomes of internal cost benefit modelling and epidemiological advice on the risk of the disease spreading.

Maintaining the capability to vaccinate will continue to be important as a potential disease control strategy.

The 2002 Report recommended that 'the Government should establish a consensus on vaccination options for disease control in advance of an outbreak.' In 2007 there was a limited number of calls for a vaccination policy to be adopted from very early on in the disease. Despite the work undertaken by Defra to explore and explain its vaccination policy after 2001, there remains confusion over the pros and cons of adopting such a policy for the country as a whole. Vaccination still remains a highly complex area. Defra should continue to engage with its community of interest to explain the issues and how the key scientific, risk, economic and welfare factors are integrated into decision making.

The ability to use serology to detect infection in vaccinated animals is an important factor if using vaccination. However, conventional serological tests, the SP tests, do not distinguish between an animal's immunological responses to vaccination and infection. This was one of the major factors shaping the reluctance of Defra and the farming community to use FMD vaccines during the 2001 outbreak.

New NSP tests have been developed which can detect infected animals regardless of their vaccination status. However, there is no relevant precedent for use of NSP in this way. Some questions remain about the level of certainty that must be provided for the country to regain its disease-free status with the OIE. NSP testing also remains only one element among a range of measures that provide the overall level of confidence that infection has been eradicated.

Defra told us that: '…vaccination decisions had been discussed with retailers, consumers and others following the 2001 outbreak, but these discussions could be refreshed in light of the 2007 outbreak, and it would be useful to be clear about the trigger points at which vaccination would be used. It was also important to communicate the fact that there was no 'magic bullet' and that further work needs to be done on FMD vaccines.'

> In 2001 the NFU had opposed vaccination because it had not been persuaded that it offered a better way of eliminating the disease, in the circumstances of that outbreak. In 2007 the NFU said it would follow epidemiological advice
>
> **National Farmers Union**

The high quality of the work undertaken at IAH's laboratories throughout the outbreak under such close and often negative scrutiny is commendable

British Cattle Veterinary Association

Questions also remain about the economic value of vaccinated animals after an outbreak. Industry was concerned in 2001 about marketability of products from vaccinated animals and whether vaccination would create a two-tier market. This debate may have fuelled confusion over the pros and cons of adopting such a policy for the country as a whole. Imported meat products from vaccinated animals in South America are used in the UK so the marketability of products from vaccinated animals is likely to be less of an issue than it was.

However, questions over the impact of movement restrictions likely to be placed on vaccinated animals remain. The BVCA told us: 'Some pertinent questions will need to be asked including: Are the purchasers and processors of product from vaccinated animals ready to handle it, and what price differential could be expected at the farm gate for this product? What happens to vaccinated animals after freedom status is achieved? They can't be exported to other member states, so will anyone want to buy a vaccinated animal on the basis of an unvalidated differentiating NSP test?'

The experience of this outbreak has revealed that many issues surrounding vaccination policy are still not fully resolved. Defra should continue its work to develop and apply policies for emergency vaccination, in a practical and economic manner, as a centrepiece of its FMD control strategy.

A range of practical issues also remain around implementing a vaccination programme. These are discussed in Lesson 2.

The role of IAH

The 'surge capacity' ability of IAH and the Veterinary Laboratories Agency (VLA) – the ability to turn around rapidly large numbers of diagnostic and surveillance test samples, and generate high quality reports to help determine disease control policy – is central to the response to exotic animal disease outbreaks. In the context of the 2007 outbreak, IAH and VLA provided the capacity to respond to the EU's request for the extended serological surveillance of animals in the PZs and SZs and surrounding area at the end of Phase 2.

The IAH played a key role in the initial confirmation of the disease, including the sequencing work to identify the FMD strain responsible for the outbreak. This was important for identifying the potential source of the outbreak and critical to the speed at which an appropriate vaccine could be brought into play if needed.

The IAH also provides access to training in exotic diseases. It holds annual diagnostics courses on FMD and Bluetongue, among others, during which Animal Health field staff are taught the latest methods in diagnosis and surveillance and the correct samples needed for laboratory tests. They also observe affected animals at first hand.

Conclusions

Since 2001, there have been improvements in the integration of scientific advice into the management of exotic disease outbreaks. Defra has recognised the need to put informed scientific input at the heart of policy and decision making.

Veterinary and epidemiological risk assessments are now central to the overall process. In order to strengthen confidence in their ability to handle any outbreaks, Defra and the devolved administrations should publish as much of the background information and analysis behind their decisions as possible. This should include epidemiological and veterinary risk assessments and supporting scientific data.

Recognising the importance of having epidemiological advice in developing policy, Defra and Animal Health should explore how to make the resources of NEEG available in peacetime as well as during an outbreak.

By 2007 the uncertainties that characterised the policy and practicalities of vaccination during the 2001 epidemic had largely been addressed. The capability was in place and ready to be used. Defra had a clear methodology for coming to the decision whether to recommend vaccination or not including the critical 'trigger points'. And there was a far greater degree of consensus about when and how it would be used, if necessary.

Uncertainties remain though in the science of vaccination and over the validation of tests used to differentiate between infected and vaccinated animals. Further research is needed to improve understanding in these areas, working within the framework of the EU and OIE.

There are also uncertainties about the detailed implementation and delivery of a vaccination policy in the field, and the economic value of vaccinated animals.

Finally there remains a low level of understanding of vaccination issues within the farming community in general and the wider population at large.

These are major challenges for Defra. We believe they should continue to drive the vaccination debate forward and maintain a high profile commitment to resolving all the outstanding issues.

> The IAH is central to Britain's ability to protect itself against future outbreaks of animal disease, whether unleashed by natural causes, human error, or enemy action. It also has a vital role in these issues internationally. To fulfil these roles the institute requires (and indeed has) a world-class research base that lets it address key scientific questions and at the same time maintain and develop the techniques needed to identify and deal with diseases
>
> ***Nature*, 20 September 2007**

Section four

Pirbright

Introduction

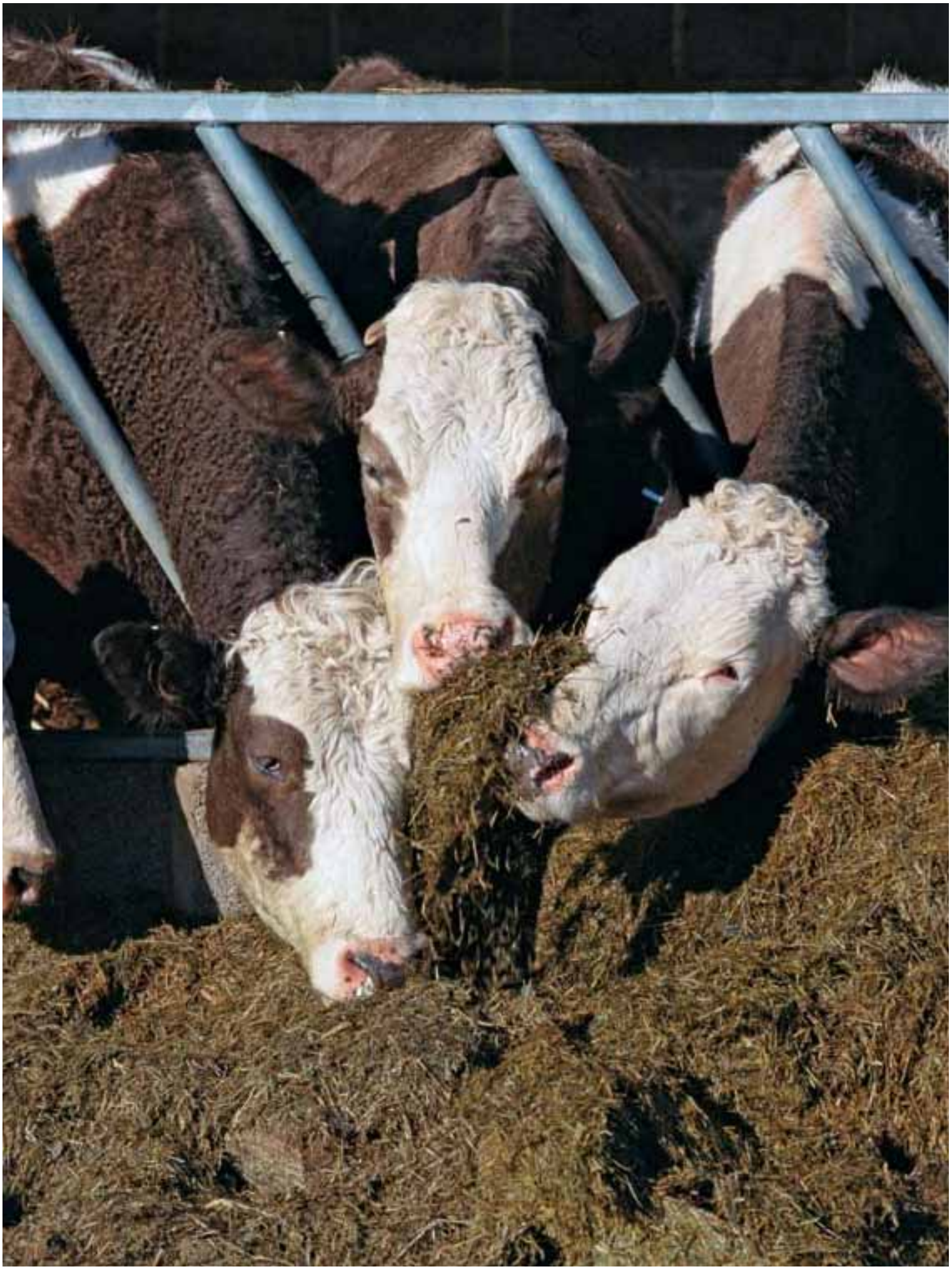
For over 50 years Pirbright has been a centre of scientific expertise in exotic animal diseases, carrying out research and developing technologies to protect the nation from the effects of exotic animal disease. Never had it hit the headlines in the way that it did in 2007 when it was revealed that the FMD virus that caused the outbreak had escaped from this site.

The 2002 Report recommended that the Pirbright laboratory resources, and research programmes, be integrated into the national strategy for animal disease control and budget provision be made accordingly. The case for this now is as strong as ever.

As part of the Government's handling of the 2007 FMD outbreak three reviews were established:

- The HSE Review investigated potential breaches of biosecurity at the public and private laboratory premises at Pirbright
- The Spratt Review investigated the biosecurity arrangements in place at Pirbright and whether these controls could have led to the outbreak.
- The Callaghan Review considered the regulatory framework for handling animal pathogens, including at Pirbright.

As part of this Review into the handling of the outbreak we met all three review chairmen and studied their reports.



The Pirbright site

Pirbright is in Surrey's commuter belt, some 60 kilometres from central London. The site is owned by BBSRC. It leases the site and buildings to IAH, which, in turn, sub-leases part of the site to Merial Animal Health Limited (Merial). The two organisations have co-existed here for just over ten years. Merial inhabits a plot of land separated from IAH by a fence and operates independently from the Institute. A small company – Stabilitech Limited – is also based on the site, conducting research with FMD virus within IAH laboratories.

Source: Surrey Police

Some of the buildings and facilities at Pirbright are visibly substandard – in contrast to the world-class scientific work carried out there. In his 2002 report[1], into the funding and governance of IAH Pirbright, Professor Keith Gull (currently Chairman of IAH Governing Body) observed that the facilities were 'shabby'. This view was endorsed by Professor Brian Spratt in his 2007 independent review of the safety of UK facilities handling FMD virus.

Institute for Animal Health

The Institute for Animal Health (IAH) is funded by the Biotechnology and Biological Sciences Research Council (BBSRC). Its staff are all BBSRC employees. IAH carries out leading edge research into exotic and endemic animal diseases, as well as providing diagnostic services for the government and international agencies. There are two sites, one at Pirbright and the other at Compton in Berkshire. The Pirbright laboratory employs around 170 staff.

IAH Pirbright facility is a world reference laboratory for the Food and Agriculture Organisation (FAO) of the United Nations for FMD and a range of other exotic diseases. It is the Community reference laboratory for the European Union for both FMD and Bluetongue. It is widely recognised as a world leader in its field.

[1] Review of the Institute for Animal Health – Pirbright Laboratory (a report for BBSRC Council July 2002)

Merial

Merial produces a range of pharmaceutical products. At Pirbright it manufactures vaccines for livestock, pets and wildlife – including FMD and Bluetongue vaccines. Merial employs approximately 5,000 people and operates in more than 150 countries. Its 2006 sales were over $2 billion. Merial's customers include Defra and vaccine banks worldwide. At the Pirbright site it employs 80 people.

Pirbright Site Redevelopment Programme

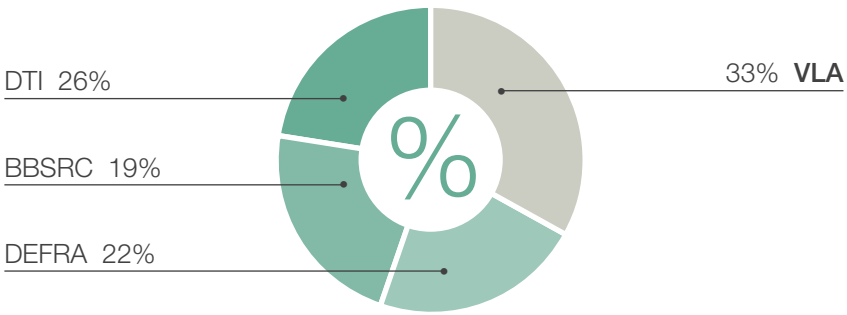
The Pirbright Site Redevelopment Programme (PSRP) was commissioned in response to the Gull report. It is a major programme for building new facilities for IAH at Pirbright, and housing approximately 70 staff who will transfer from the Veterinary Laboratories Agency (a Defra executive agency providing research, surveillance and emergency capacity) at Weybridge. It is due to be completed in 2011.

The PSRP is overseen by a Programme Board which includes representatives from IAH Governing Body, the Veterinary Laboratories Agency (VLA), BBSRC, Defra and the Department for Innovation, Universities and Skills (DIUS).

In 2005 a long term capital funding agreement for the PSRP was reached between Defra and the Department for Trade and Industry (now being taken forward by DIUS).

The proposal was costed at £121 million. Of this, the VLA component will cost £40 million and IAH component £81 million. IAH funding is split between DIUS, BBSRC and Defra in the proportions shown below. The funding for the VLA component, as VLA is an Executive Agency of Defra, will also be met by the Department.

PSRP Funding



Governance and financing of IAH

The governance and funding arrangements of IAH are complicated. IAH is a Public Sector Research Establishment sponsored by BBSRC. Yet, as a private company limited by guarantee with charitable status, IAH is constitutionally autonomous.

As a charity, IAH is entitled to tax benefits and must be overseen by a Governing Body, the Chairman of which is appointed by the Chief Executive of BBSRC. The Chairman and the Chief Executive then jointly appoint the other members. The existing shared arrangements for the governance of IAH between IAH's governing body and BBSRC lack clarity. The Chair of the Governing Body told us that the governance arrangements were 'deeply unsatisfactory'.

BBSRC, one of the UK's seven Research Councils, is funded by the government's science budget, administered by DIUS. The Chief Executive of BBSRC reports to the permanent secretary at DIUS (as government accounting officer) and, as such, is held accountable to Parliament for all of its Institutes including IAH. However, because of the independent status of IAH, government control over its activities is limited.

Sir John Beringer is currently chairing a review into the governance, funding and risk management at IAH, and is due to report to BBSRC in April 2008.

IAH is funded from multiple sources. The table below shows funding for IAH as a whole (including that allocated to its Compton site) and funding for the Pirbright site of IAH alone. Diagnostic and research contracts with Defra provide the largest single source of funding (43%). It also has research contracts with other government departments, the EU, international agencies and industry. It receives funding from BBSRC via the core strategic grant and research contracts.

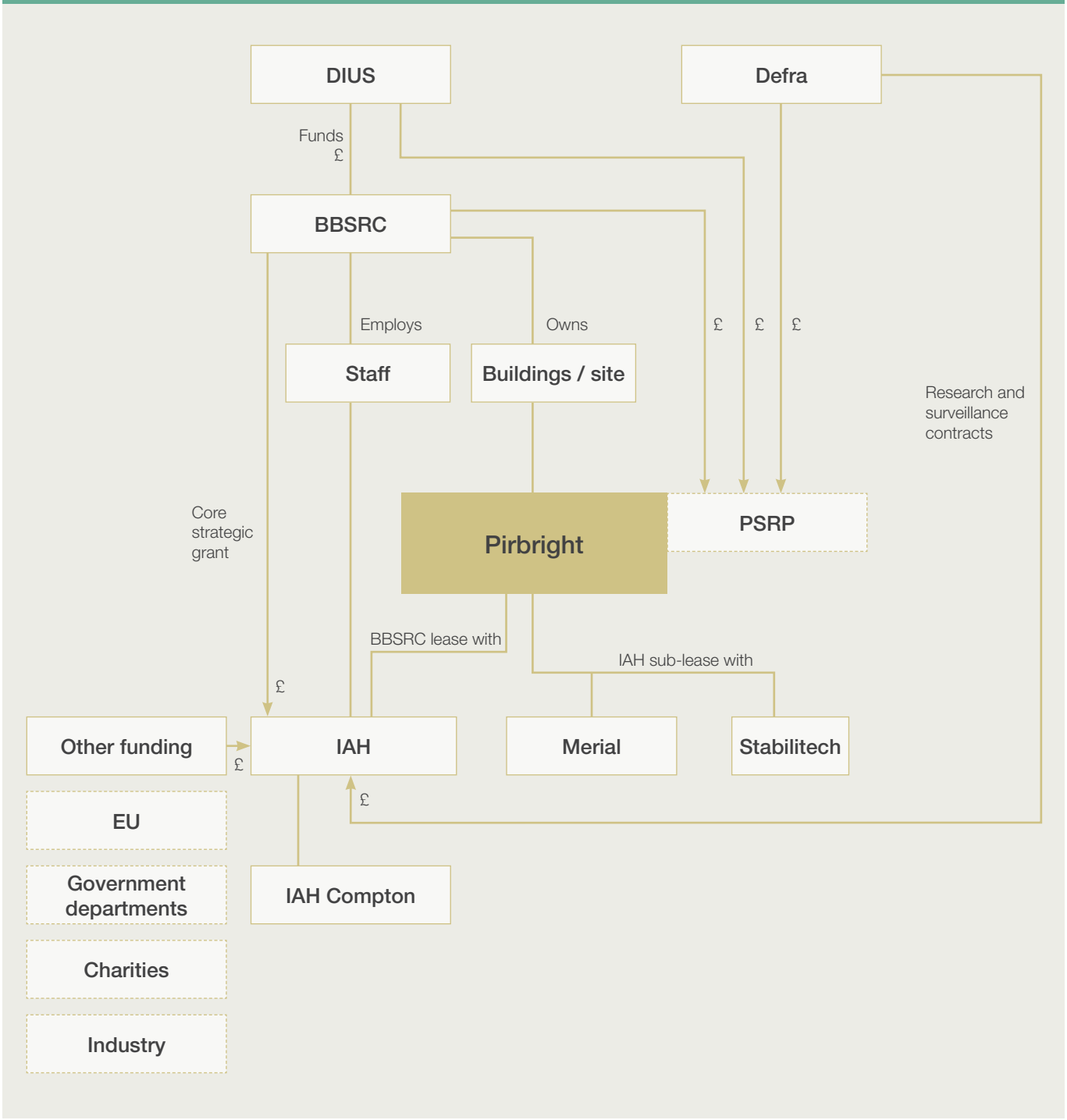
The Institute for Animal Health: Funding Sources

£000s, 2007-08								
	BBSRC Core Strategic Grant	BBSRC other funding	Defra	Industrial contract income	Other research income (incl from charities and other Government departments)	EC/ International	Other	Total
IAH	13,961	4,446	7,745	28	287	1,454	2,938	30,859
Percentage	45%	14%	25%	0%	1%	5%	10%	100%
IAH Pirbright	3,351	984	4,975	0	252	1,090	951	11,603
Percentage	29%	8%	43%	0%	2%	9%	8%	100%

Source: IAH Pirbright[2]

[2] Figures based on anticipated budgets for the 2007-08 financial year and calculated on an accruals basis. Funding sources in percentage terms have been rounded to the nearest percentage point.

Pirbright Governance Chart



Following recommendations from the RIPSS report (see box on p.98), IAH now bases its contracts on Full Economic Cost funding. This is calculated to take into account the full cost of carrying out research, including the cost of upkeep for the laboratories. Defra was not given any extra government funding to cover the increased cost of supporting research and, as a result, is now able to finance fewer research projects.

Research Council Institute and PSREs Sustainability Study (RIPSS)

Public Sector Research Establishments (PSREs), including Research Council Institutes such as IAH, collectively represent a world-class resource for UK science. Their sustainable performance, alongside universities, is of strategic importance to the nation.

In 2004 the Office of Science and Technology published a study of the sustainability of the UK science base: the Research Council Institute and PSREs Sustainability Study (RIPSS). The report found that the long-term sustainability of PSREs was under threat from a combination of factors including low cost recovery, complex lines of strategic responsibility, and inadequate investment. It concluded that, if this were allowed to continue, the ability of the UK to maintain a world-class research facility would be jeopardised.

The report set out a number of recommendations directed at the three main stakeholder groups: government departments, Research Councils and the PSREs themselves. The recommendations focused on establishing clear lines of responsibility and accountability and a commitment to long-term finance, including the need to maintain research facility infrastructure.

The Government accepted the RIPSS principles and incorporated them in the ten-year *Science and Innovation Investment Framework 2004-2014* which set out the Government's commitment to the sustainability of the UK research base, including PSREs. It stated that each government department should ensure that the principles were adhered to through the annual monitoring exercise on PSRE sustainability run by DIUS.

Regulation of Pirbright

IAH is licensed by Defra to hold and work with animal pathogens, including FMD virus, under the Specified Animal Pathogens Order (1998) – or SAPO. This order sets out the conditions under which animal pathogens should be stored, worked with and transported[3]. The site director holds the licence, with support and advice from the on-site biosecurity officer. Merial is also licensed by Defra to hold and work with FMD and Bluetongue viruses, under a separate SAPO licence. It is also regulated by the Veterinary Medicines Directorate (an executive agency of Defra), which aims to ensure the 'responsible, safe and effective use of veterinary medicinal products', under Good Manufacturing Practice legislation.

3 Containment requirements can be found on the Defra website: http://www.defra.gov.uk/animalh/diseases/pathogens/category4.htm

Specified Animal Pathogens Order (1998) (SAPO)

The main purpose of SAPO is to prevent the release of dangerous animal pathogens into the environment. It places restrictions on how specified animal pathogens (including FMD virus) can be held or worked with. Laboratories which intend to handle the specified pathogens must apply for a licence from Defra. These licences are usually granted on a five-year basis.

There are four levels of containment, licensed by SAPO: Categories 1 to 4. The criteria for each category are set out on the Defra website. The most dangerous pathogens – SAPO Category 4 – include those which are either exotic or produce notifiable disease and, if released, have a high risk of spread from the laboratory. They have potential to cause serious human/animal disease, in many cases also causing economic loss to the British livestock industry. They are subject to the most stringent handling conditions to ensure their safe containment and disposal. FMD virus is in this category. IAH and Merial are the only facilities in the UK licensed to work with FMD virus.

Defra issues licences following an inspection of the facility and the approval of standard operating procedures provided by the applicant laboratory. Routine inspections are then carried out by the regulator – usually every year – although these are not technical in nature and do not involve testing any aspect of the facilities. Failure to comply with the licence is an offence under the Animal Health Act, and the Secretary of State may also suspend or revoke a SAPO licence. Local authorities, specifically Trading Standards, are currently responsible for enforcement and prosecutions under SAPO. The maximum penalty for breaching the terms of a SAPO licence is a £5,000 fine.

Following the recommendations of the Callaghan Review the HSE will take over responsibility for inspection and enforcement for SAPO. They have already started a programme of routine inspections.

As part of our investigation of the handling of the outbreak and, in light of the three earlier reviews, we met the Defra official charged with regulating the site under SAPO (referred to as 'the Defra regulator'). He was a veterinary professional of considerable experience, well versed with animal pathogens and the associated biosafety requirements for their containment. He told us that he had been concerned about the physical structures at Pirbright. For example, the heat treatment plant had been unreliable and had been taken out of service in 2003. A chemical treatment had subsequently been used to treat liquid effluent as a 'stop-gap' solution and was still in use. The Defra regulator had been aware that Merial had been producing large volumes of virus and it was likely that live virus had been released into the drains but he had been confident that the final chemical treatment plant was sufficient

to inactivate the virus before release to the public drain. There was knowledge of these risks at Defra but the overall risk had not been escalated in a formal way and was accepted more as a 'tacit risk'.

The Defra regulator told us that Defra's relationship with IAH and Merial was founded on an appreciation of the benefits and the risks associated with both laboratories. Defra's role had been to apply the right levels of regulatory conditions for a consistently high level of biosecurity and to put responsibility for compliance on the licence holders. Although the Defra regulator was aware of the poor level of communications, and had held joint meetings with the aim of improving communications, there had been no formal assessment of what increased risk that posed.

The Chief Executive of HSE told us that he had been 'shocked at the gulf of communication between Merial and IAH at Pirbright'. Professor Spratt also told us that, in his view, communication between IAH and Merial had been poor. Risk management of the common areas should have been the responsibility of IAH but they did not have the information necessary to manage this risk.

Risk management at the Pirbright site: 'Joining the dots'

The prompt decision by the Government to commission the HSE and Spratt reviews as a response to the outbreak, followed by the Callaghan review of regulation, was in our view both sensible and timely.

As a result of the attention given by the HSE, Spratt and Callaghan Reviews to the facilities and activities on the Pirbright site and to Defra's regulatory system, many weaknesses in biosafety and biosecurity have been uncovered. From our overall analysis of these reviews, we conclude that these were weaknesses in the total regulatory system, not the failure of one individual. The Defra regulator, for example, was doing his best with limited resources.

These earlier reviews identified contributory factors extending from poor containment conditions that fell well short of internationally acknowledged standards, to risky working practices and poor communications between landlord and tenant. They also reveal that Defra's regulatory regime was insufficiently robust given the level of risks on the site, and that the governance mechanisms put in place by BBSRC and the Governing Body of IAH were not effective to mitigate the risks themselves. No-one took a 'whole picture' approach to join the dots on the multitude of risks which were being taken at the Pirbright site.

The second accidental leak

The suspension of production at the Merial vaccine plant and the subsequent withdrawal of its SAPO licence on 4 August were necessary steps. After the HSE and Spratt investigations had been concluded the focus turned to the conditions under which the licence would be reissued. Defra, working with HSE, set out for IAH and Merial all the mandatory changes in facilities and operating practices. These were inspected, tested or reviewed, and finally accepted, following which a recommendation to reissue the Merial licence could be made to the Secretary of State. Within the conditions of licence, there was now the need to have a protocol 'demonstrating that both institutes will co-ordinate discharge into the drain to avoid overloading it'.

The Secretary of State approved the renewal of the licence on 6 November 2007. Just over two weeks later, on 22 November 2007, he announced to the House of Commons that a faulty valve at the Merial plant had led to an accidental leak of FMD virus into the shared drainage and effluent treatment system where it had been contained.

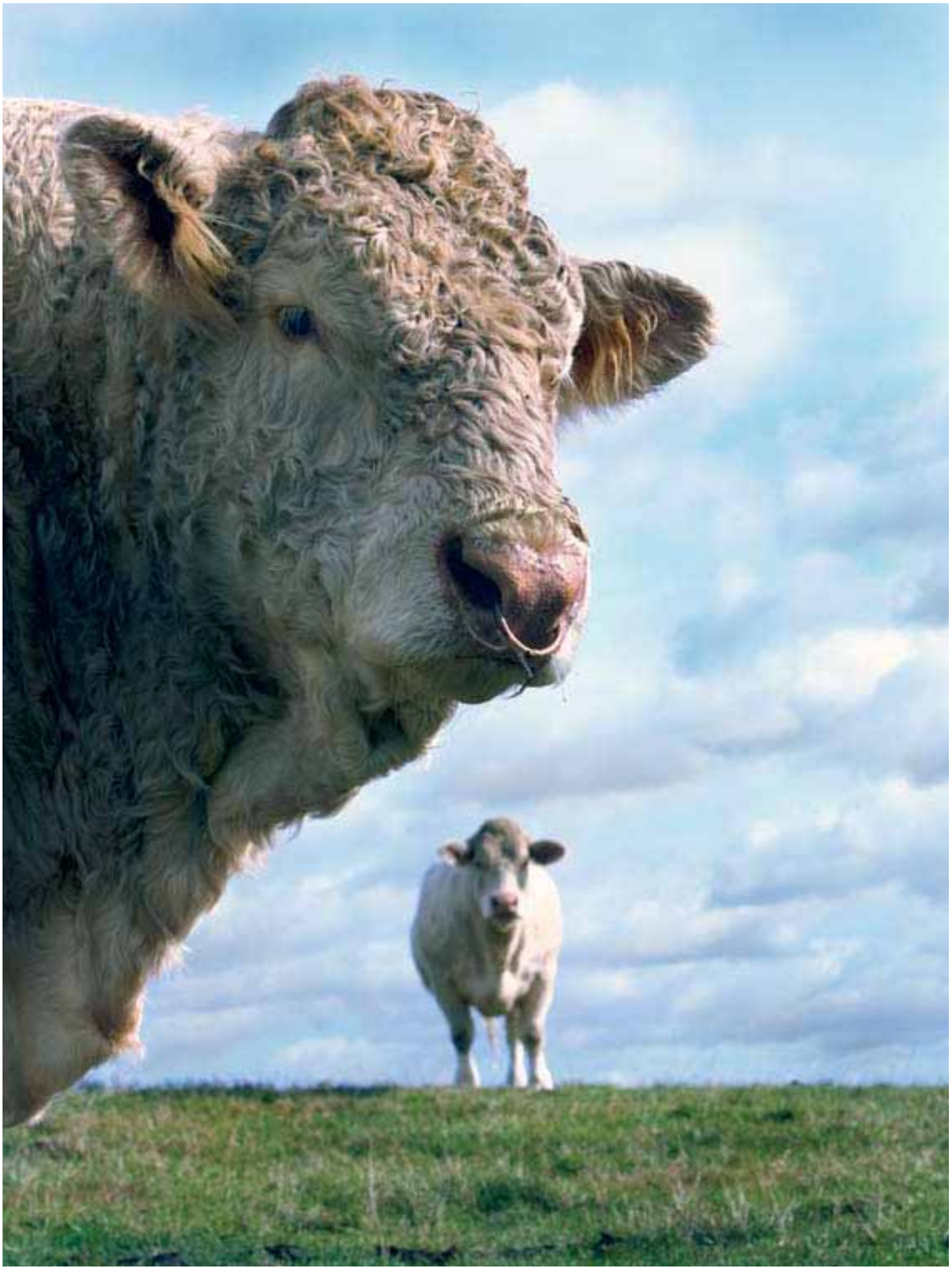
This unfortunate incident also revealed a continuing weakness in communications between IAH and Merial. A condition of licence – specifically a requirement to have an agreement between the parties of a protocol for information sharing – had not been met. We were told by IAH that, at the time of the unintended release of FMD virus, they had not been informed that Merial had already resumed vaccine production.

The Secretary of State told us that reinstatement of the Merial licence would not be approved by him until he was satisfied that appropriate agreements for information sharing were in place. This licence was reinstated on 25 February 2008.

Conclusions

We have tried to provide an integrated analysis of all the reviews, including our own observations. The three reviews carried out by the HSE, Professor Spratt and Sir Bill Callaghan demonstrated the acceptance by many of a creeping degradation of standards at Pirbright, combined with a lowering of expectations in spite of the potential dangers. The second accidental leak in November demonstrated that the levels of communication at the Pirbright site were still inadequate. Although it will never be possible to eliminate all risks, the circumstances that led to this outbreak must never again be allowed to happen at Pirbright or at any of the country's high containment, research facilities. This is the big lesson to be learned from the experiences of 2007.

FOOT AND MOUTH DISEASE 2007: REVIEW APPENDICES



Appendix A. Chronology of key events

Date	Event
26 July	Estimated date of infection at the first infected premises (IP1), based on the dating of tongue lesions
29 July	Farmer at IP1 spotted that one of his animals was 'off colour'
2 August	19.30 Farmer called the Reigate Animal Health Divisional Office on the advice of his vet
	20.15 The duty Animal Health vet arrived at the farm and placed temporary restrictions on the farm pending a proper clinical inspection at first light
3 August	06.00 Clinical inspection started
	09.30 Animal Health vet made telephone report to the Veterinary Exotic Notifiable Diseases Unit (VENDU) in Defra, who requested that the blood samples taken be submitted to Pirbright for testing. Defra's Framework Response Plan for Exotic Animal Diseases was activated and an AMBER teleconference was called. An immediate one kilometre temporary control zone was put in place around the premises
	10.30 First AMBER teleconference held to brief key players on the report case and notify them that samples had been sent for testing
	11.30 Teleconference held with key stakeholders to brief them on the report case. Other local stakeholders and Genus also contacted
	12.15 First samples arrived at IAH, Pirbright for testing. The second batch followed at 14.15
	17.50 Defra notified by IAH of the initial positive test for FMD
	18.00 Second AMBER teleconference held to discuss the actions that would be taken if FMD was confirmed in the second test. The Reigate Animal Health Divisional Office was notified of the result and activated its plans to set up the Local Disease Control Centre (LDCC)
	19.30 Third AMBER teleconference held. The Chief Veterinary Officer (CVO) confirmed FMD on the infected premises and the alert status was increased to RED. The culling of animals on the affected premises was ordered. A three kilometre Protection Zone, ten kilometre Surveillance Zone and Great Britain wide movement ban were agreed
	20.00 Genus, the vaccination contractor, put on standby
	21.00 First COBR meeting held
	21.30 The Order creating the Protection Zone, Surveillance Zone and Great Britain wide movement ban made

Date	Event
4 August	10.30 COBR meeting chaired by Prime Minister
	Foot patrols started in the Protection Zone
	Key staff started to arrive at the Reigate LDCC, including the Regional Operations Director and Divisional Operations Manager
	Test results confirmed the FMD strain which identified Pirbright as a possible source. A single Protection and Surveillance Zone created encompassing both the infected farm premises and the Pirbright site
	Merial voluntarily suspended the use of live virus at its production facility at Pirbright
	Government commissioned HSE and Spratt reviews
6 August	Presence of the disease detected following a veterinary inspection at a further farm – IP2. Protection and Surveillance Zone re-sized to reflect the new IP
	EU bans UK live animal and meat exports
7 August	Initial HSE report published on potential breaches of biosecurity at Pirbright
	Surrey County Council given right to close footpaths in the PZ around IP1 and 2
8 August	Genus vaccination teams fully mobilised
	EU SCoFCAH (Standing Committee on the Food Chain and Animal Health) meeting
11/12 August	Reigate LDCC moved to larger premises in Guildford
16 August	Genus vaccination teams stood down
23 August	Projected latest date at which animals at other sites infected by either IP1 or IP2 would have shown symptoms
	EU SCoFCAH meeting
24 August	The Protection Zone merged into the Surveillance Zone to create a single surveillance area
	The Great Britain wide movement ban was lifted for animals outside the Surveillance Zone, subject to a 20-day standstill for animals after they had been moved
25 August	Lifting of EU export restrictions on live animals and meat products
3 September	Resumption of markets and shows outside the Surveillance Zone
7 September	Publication of the HSE investigation of the Pirbright site
	Publication of the Independent Review of the safety of UK facilities handling FMD by Professor Spratt
8 September	The Surveillance Zone was lifted. This was the earliest that it could be done under European disease legislation
	The remaining restrictions on animal movements outside the Surveillance Zone were lifted at the same time. This included the 20 day standstill for livestock following movement and additional controls on livestock market and shows
11 September	Late evening: a farmer in Surrey reported a suspected case of FMD. An Animal Health vet visited the farm and imposed temporary restrictions
	EU SCoFCAH meeting

Date	Event
12 September	Samples taken and sent to IAH, Pirbright. A ten kilometre temporary control zone was immediately put in place. The culling of the animals was ordered on suspicion
	12.45 IP3 was confirmed. A new Protection Zone and Surveillance Zone were established and the Great Britain wide movement ban was reinstated, as was the EU export ban
	Genus put on standby again
15 September	Beef cattle adjacent to IP3 that had been culled on suspicion tested positive. This became IP4. The cattle were identified as having older lesions than IP3
17 September	Blood samples from sheep, taken during a routine Protection Zone patrol, tested positive. IP5 confirmed. A subsequent post mortem examination confirmed lesions that were more than ten days old
18 September	Genus vaccination teams partially stood down
	EU SCoFCAH meeting
21 September	IP6 confirmed
23 September	Detection of first confirmed UK Bluetongue case. The management of Bluetongue was integrated into the NDCC
25 September	IP7 confirmed (discovered and culled the previous day)
	Creation of FMD Risk and Low-Risk Areas based on the historic movements of farm animals from Surrey. Movement restrictions were progressively relaxed in the Low-Risk Area
30 September	IP8 confirmed
1 October	Genus vaccination teams fully stood down
2-3 October	EU SCoFCAH meeting
4 October	Markets allowed to resume in the Low-Risk Area
8 October	Secretary of State announces package of support, worth £12.5 million, for farmers in England. Statement to the House to Commons
17 October	Restrictions outside the FMD Risk Area lifted
19 October	EU SCoFCAH meeting
21 October	FMD Risk Area reduced in size
6 November	Merial allowed to resume the production of vaccine at Pirbright
	EU SCoFCAH meeting
19 November	EU Commission split UK into three export areas. In the FMD Free Export Area, exports were allowed to the EU subject to certification. In the FMD Restricted Export Area, exports of meat products were allowed subject to conditions. No exports were permitted from the FMD No Export Area. (Decision was made on 6 November but came into force on 19 November)
19 November	A faulty valve at Merial released live virus into the drains. The leak was contained

Date	Event
20 November	EU SCoFCAH meeting
	Merial SAPO licence suspended
22 November	Secretary of State statement to the House of Commons on SAPO licence conditions at Merial
3-4 December	EU SCoFCAH meeting
14 December	Lifting of the FMD Restricted Export Area. Great Britain subsequently divided into two different export areas: • FMD Free Export Area – including parts of Surrey and adjoining London boroughs – from where meat may be exported to the EU, but not live animals; and • FMD Live Export Area. The remainder of Great Britain from where live exports are permitted to the EU
19 December	EU SCoFCAH meeting
31 December	Removal of all remaining EU export restrictions
22 February 2008	OIE declared the UK FMD free
25 February 2008	Merial SAPO licence reinstated

Appendix B. Investigations of exotic animal disease

Total numbers of investigations into exotic animal diseases (2004-07)

	Negative cases	Positive cases	Total
2004	34	2	36
2005	143	2	145
2006	236	7	243*
2007	609	81	690*

Source: Defra
*The totals are high because of the number of tests undertaken following Bluetongue, Avian Influenza and FMD outbreaks

Total numbers of investigations for FMD, Bluetongue, and Notifiable Avian Diseases reports and cases (2004-07)

	FMD	Bluetongue	Notifiable Avian Diseases
2004	8 negative	–	12 negative
2005	13 negative	2 negative	72 negative
2006	10 negative	9 negative	3 confirmed 162 negative
2007	8 confirmed 223 negative (4 negative reports prior to outbreak in August)	66 confirmed 233 negative	5 confirmed 106 negative

Source: Defra

Appendix C. Key statistics

OVERALL STATISTICS

Number of cases

There were eight confirmed cases of FMD:

IP1 3 August 2007
IP2 6 August 2007
IP3 12 September 2007
IP4 14 September 2007
IP5 17 September 2007
IP6 21 September 2007
IP7 24 September 2007
IP8 30 September 2007

Number of animals slaughtered for disease control

Month	Cattle	Pigs	Sheep	Goats	Total
August	213	351	11	4	579
September	769	777	32	3	1581
Total	982	1128	43	7	2160

No animals were slaughtered for welfare purposes in England.

Main disposal methods

All carcases were incinerated

Affected counties

Surrey and Berkshire

Days with the disease

58 days between the date of the first infected premises and the discovery of the last.

Average number of vets working at any one time

Average for the first phase (August 2007) 47.5
Average for the second phase (September 2007) 54.1

Percentage of confirmed cases which tested positive for the virus

100%

Percentage of IPs where disposal completed within 24 hours of slaughter

100%

Appendix C. Key statistics (cont.)

Table showing time to slaughter at locations within infected premises from time of report and time of authorisation.

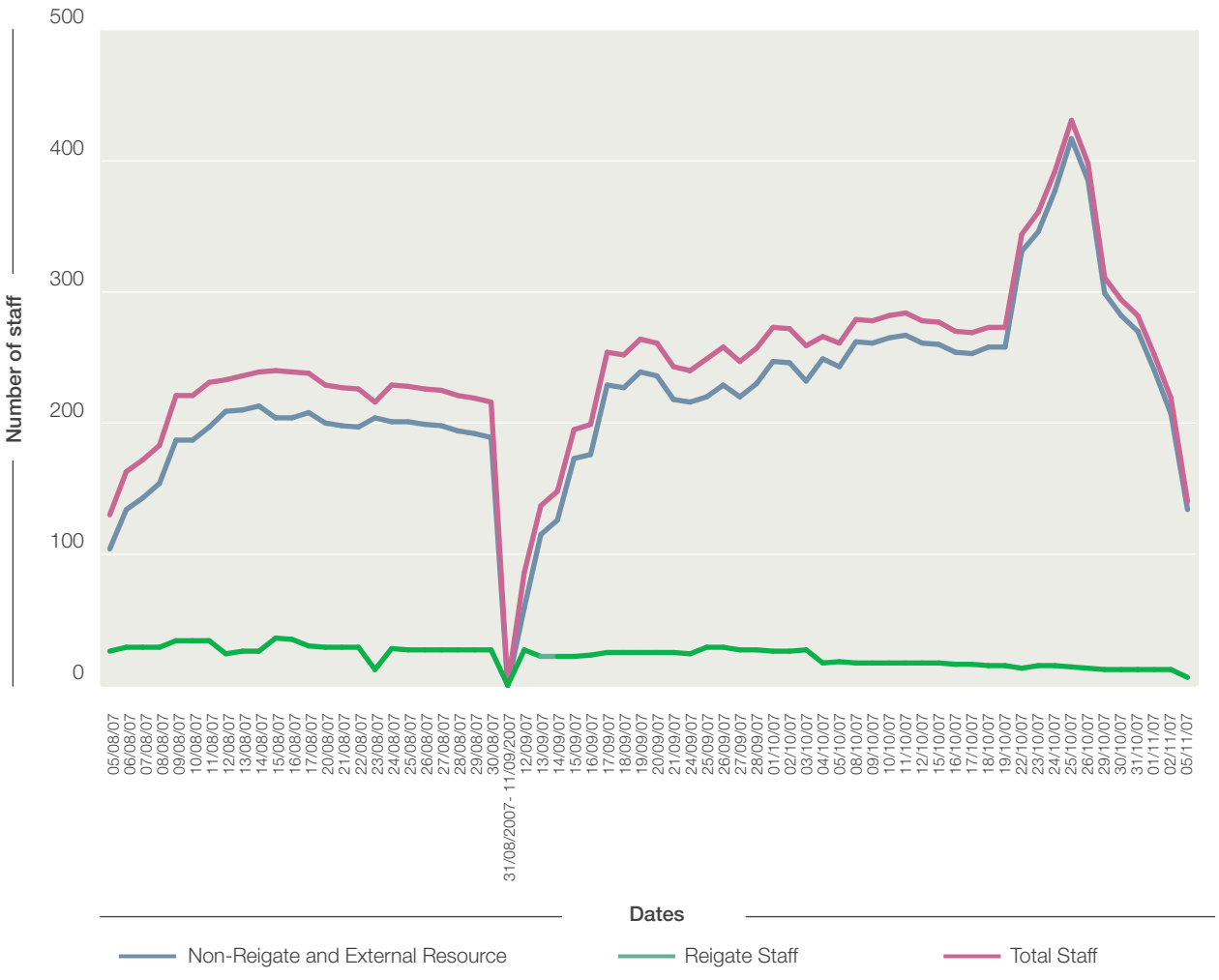
Address	Ref	Disease Control System ref	Disease reported
Woolford Farm, Elstead	IP 1A	FMD2007/0101	N/A
Westwood Lane, Warnborough	IP 1B	FMD2007/0102	2 Aug (19.00)
Guinea Fields	IP 1C	FMD2007/0103	N/A
Willey Green	IP 2A	FMD2007/0201	N/A
Russell Place	IP 2B	FMD2007/0202	N/A
Hook Farm	IP 2C	FMD2007/0203	N/A
Hardwick Park Farm, Chertsey	IP 3A	FMD 2007/0301	N/A
Milton Park, Egham	IP 3B	FMD 2007/0302	11 Sept (19.30)
Chertsey Lane	IP 3C	FMD 2007/0303	N/A
The Ranges, Shepperton	IP 3D	FMD 2007/0304	N/A
Spinney Hill, Chertsey	IP 3E	FMD 2007/0305	N/A
Woodcock Hall Farm	IP 3F	FMD 2007/0306	N/A
Grayshot Farm, Ripley	IP 3G	FMD 2007/0307	N/A
Paper Court Farm, Ripley	IP 3H	FMD 2007/0308	N/A
Stroude Farm, Virginia Water	IP 4A	FMD 2007/0401	N/A
Whitehall Farm, Egham	IP 4B	FMD 2007/0402	N/A
Klondyke, Virginia Water	IP 5	FMD 2007/0501	N/A
Beaumont College Farm	IP 6A	FMD 2007/0601	N/A
NT land at Runnymede	IP 6B	FMD 2007/0602	21 Sept (14.07)
Sandylands Home farm, Englefield Green	IP7	FMD 2007/0701	N/A
61 Welley Road	IP 8 A	FMD 2007/0801	N/A
Ankerwyke farm, Staines	IP 8B	FMD 2007/0802	N/A
Lower Mill Farm, Staines	IP 8C	FMD 2007/0803	N/A
Manor Farm, Laleham	IP 8D	FMD 2007/0804	N/A

Note: IP A, B, C, D etc refer to different plots of land worked by the same farmer

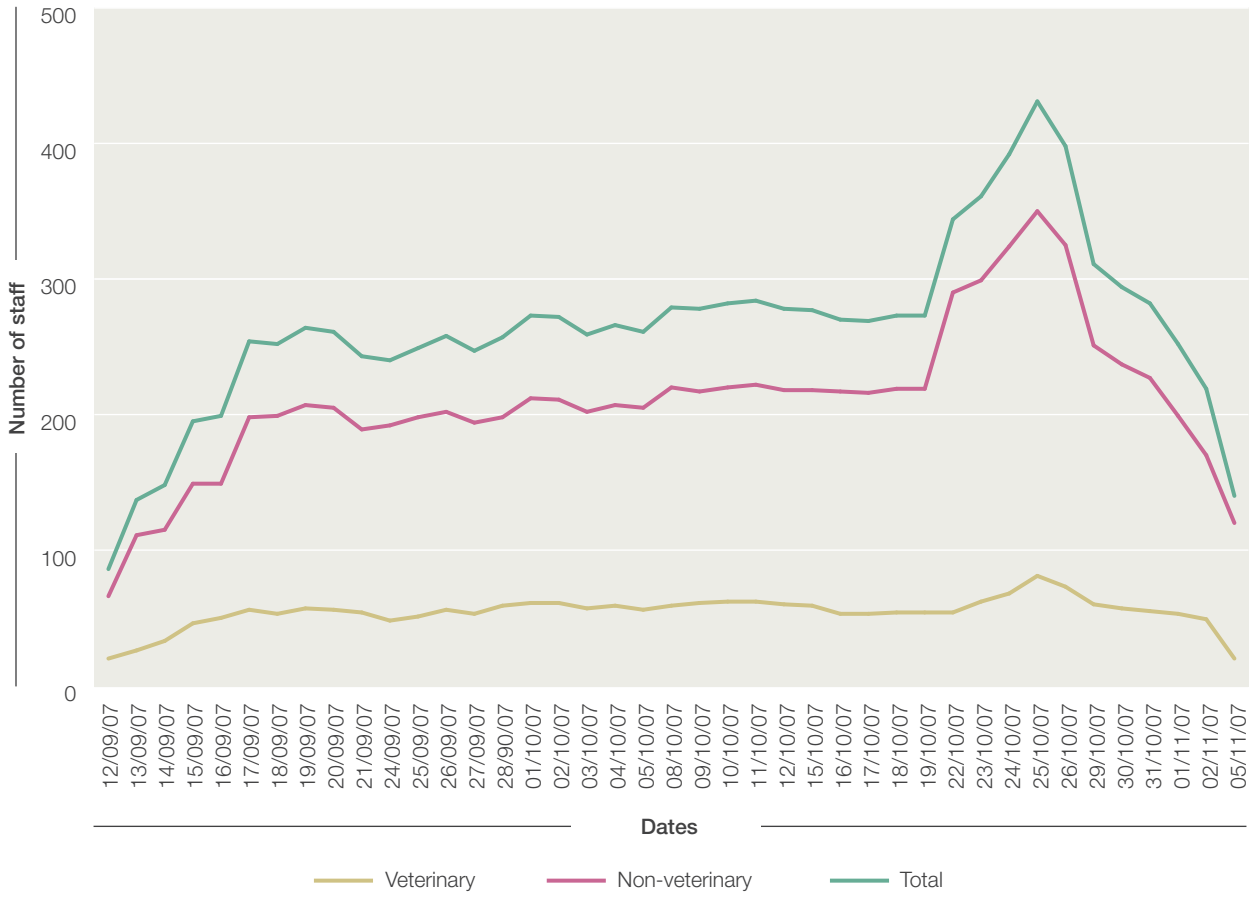
	Culling authorised	Culling completed	From disease reported to cull completed (hours)	From authorisation to cull completed (hours)
	4 Aug (08.40)	4 Aug (16.00)	N/A	7.3
	4 Aug (08.40)	4 Aug (20.45)	49.8	12.1
	4 Aug (08.40)	4 Aug (18.30)	N/A	9.8
	6 Aug (17.45)	7 Aug (08.30)	N/A	14.8
	6 Aug (19.20)	7 Aug (17.15)	N/A	21.9
	6 Aug (19.20)	7 Aug (17.00)	N/A	21.7
	12 Sept (14.15)	12 Sept (22.50)	N/A	8.6
	12 Sept (10.40)	12 Sept (20.00)	24.5	9.3
	12 Sept (14.15)	14 Sept (21.00)	N/A	6.8
	12 Sept (14.15)	14 Sept (17.32)	N/A	51.3
	12 Sept (14.15)	13 Sept (22.10)	N/A	31.9
	12 Sept (14.15)	14 Sept (18.10)	N/A	27.9
	12 Sept (14.15)	16 Sept (14.00)	N/A	95.8
	12 Sept (14.15)	14 Sept (15.10)	N/A	48.9
	13 Sept (09.00)	14 Sept (02.00)	N/A	17.0
	12 Sept (18.15)	13 Sept (15.00)	N/A	20.8
	17 Sept (17.25)	17 Sept (22.35)	N/A	5.2
	21 Sept (17.30)	22 Sept (10.50)	N/A	17.3
	21 Sept (17.30)	22 Sept (09.40)	19.6	16.2
	24 Sept (14.14)	24 Sept (21.30)	N/A	7.3
	30 Sept (12.45)	30 Sept (16.30)	N/A	3.8
	29 Sept (17.15)	30 Sept (12.18)	N/A	19.1
	29 Sept (17.15)	30 Sept (13.30)	N/A	20.3
	29 Sept (17.15)	30 Sept (12.55)	N/A	19.7
			Average	21.4

Appendix D. Staffing at the Local Disease Control Centre

Mix of Reigate and non local staff



Veterinary and non-veterinary staffing levels



Appendix E. Comparison with 1967 and 2001

The main comparisons between the 1967-68, 2001 and 2007 FMD outbreaks are shown in the following table:

	1967-68 outbreak
Date the first case was confirmed	25 October 1967, at Bryn Farm in Shropshire
Date the last case was diagnosed	4 June 1968
Total length of outbreak[1]	222 days
Speed of identification of the source case	Reported to the Department's vets within four days of the onset of clinical signs.
Extent of initial 'seeding'	There were up to 24 almost simultaneous primary outbreaks deriving from a consignment of infected frozen lamb carcasses from Argentina distributed in Cheshire and Shropshire. This led to an early explosion in cases, with 490 cases occurring during one week in mid-November 1967.
The extent to which the disease spread throughout the UK	The disease was mainly concentrated in the Cheshire Plain, affecting in particular dairying areas of Cheshire, Staffordshire, Montgomeryshire, Denbighshire, Shropshire and Flintshire. There were outbreaks in 16 counties.
Overall number of infected premises	2,364
Number of animals slaughtered for disease control purposes	442,000 (49% cattle, 26% pigs and 25% sheep)
Suspected source of infection	Infected frozen lamb imported from Argentina.
Cause of spread	Mainly airborne, with relative humidity and wind speed and direction assisting spread. Cattle were the main species affected by disease. From mid-February 1968 there were 18 cases of re-infection on farms which had restocked. In 12 of these, recrudescence arose from incomplete cleansing and disinfecting of farms.

[1] Taken as the time between the first and last confirmed cases.

	2001 outbreak	2007 outbreak
	20 February 2001, at an abattoir in Essex	3 August 2007, at Woolford Farm, Surrey
	30 September 2001	30 September 2007
	221 days	58 days
	Reported to the Department's vets around three weeks after the likely onset of clinical signs.	Reported to Animal Health vets within four days of the onset of clinical signs The farmer first noticed that one of his animals was 'off colour' on 29 July. On 2 August, on the advice of his vet, he called the Reigate Animal Health Divisional Office.
	There was one source case, but its identification, three weeks after infection, meant the disease had been spread around the country as a result of movements of, mainly, sheep through markets and dealers. At least 57 premises, in nine geographical groups, are now known to have been 'seeded' with infection by 20 February 2001.	The estimated period during which the first infected premises was infected with FMD is 19-26 July and epidemiological investigations have found that IP2 was infected by IP1. Nucleotide sequencing also shows that IP2 was the likely source for IP5, the index case of the second cluster.
	The disease was widespread and affected 44 British counties, unitary authorities and metropolitan districts from the Scottish Borders in the north, to Anglesey in the west, and to Cornwall in the far south west. There were concentrations of infection in Cumbria, Devon, Dumfries and Galloway, Northumberland and North Yorkshire.	The disease was contained in a small area in Surrey and Berkshire in the south east of England.
	2,026	8
	More than four million (85% sheep, 12% cattle, 3% pigs)	2,160 (982 cattle, 1128 pigs, 43 sheep and seven goats)
	Infected imported animal products.	From the Pirbright Site, where the Institute for Animal Health and Merial, a commercial company that manufactures vaccines for animals, are located. The most likely explanation for the source of the outbreak was accidental release from the drainage system, which was found to be in poor repair.
	Initially, by movements of infected animals, particularly sheep, in which the virus was present but clinical signs had not been detected. Later by local spread, including through persons, machinery and vehicles that had been in contact with infected animals and where compliance with biosecurity measures had not been effective.	Epidemiological investigations suggest that the movement of virus from the Pirbright site was most likely due to the movement of fomites transferred by vehicles that had driven over the area potentially contaminated by effluent from the drains.

Appendix E. Comparison with 1967 and 2001 (cont.)

	1967-68 outbreak
Cost to government	Around £370 million at 2001 prices, including £280 million paid out to farmers in compensation.
Introduction of national movement ban	After around a week, movement restrictions were extended to the counties adjacent to the Infected Areas to form a barrier zone and on 18 November 1967, 24 days into the epidemic, a Controlled Area (including national movement restrictions) was imposed across England and Wales. On 25 November, it was extended to Scotland.
State of UK livestock industry	Smaller and more compact farms. Fewer animal movements. Beef and sheep production more extensive, with the average number of livestock per holding less than half that in 2001. Movement of animals highly seasonal. Far fewer animals and much smaller land mass affected than in 2001.
Number of live auction markets in the UK	More than 800
Number of slaughterhouses in the UK	More than 3,000
Numbers of veterinary surgeons	An additional 645 vets were mobilised
Number of days before military deployed	12
Number of troops deployed	400

Source: National Audit Office and Defra

	2001 outbreak	2007 outbreak
	More than £3 billion, including £1.2 billion paid to farmers in compensation.	The total cost to Defra and Animal Health was around £47 million.
	A national movement ban was introduced just under three days after the first case had been officially confirmed.	A national movement ban was introduced on 3 August when the first case was confirmed and again on 12 September when IP3 was confirmed. (The movement bans were widely observed within hours.)
	Farm sizes and stock numbers increased significantly since 1967-68; production cycles shorter and seasonality lessened. The livestock industry was more intensive and there were many more animal movements, particularly of sheep. As a result, the land mass of Great Britain affected and numbers of animals involved were considerably greater than in 1967-68, even though the number of cases was similar. While the cattle population had decreased by a quarter over the past 30 years to 9.5 million in Great Britain and the pig population by a half, to six million, the sheep population had grown by a half to 40 million in 2000, including 21 million breeding ewes. The sheep flock was the largest in the European Union.	Following reforms of the Common Agricultural Policy, the introduction of the Single Farm Payment in 2005 means that producers no longer receive subsidies directly based on the number of animals that they keep. This has provided them with greater business freedom to meet the demands of the market, and environmentally friendly farming practices are now better acknowledged and rewarded. The industry is therefore expected to continue to go through a period of change as it adapts to these reforms. Long-term trends for increased farm sizes and stock numbers continue. In 2006 the cattle herd stood at 9.3 million. Around 27% are kept on farms that keep between 201 and 350 cattle, but nearly 50% of premises keep fewer than 50 cattle. The dairy herd has continued to decline steadily due to increasing milk yields coupled with the quota limit on milk production. The sheep breeding flock totalled 17 million in June 2006.
	170	186 in Great Britain[2]
	Fewer than 500	In the UK there is a total of 463 slaughterhouses (297 red meat slaughterhouses, 61 farm slaughter facilities that deal with farmed game and 105 poultry meat slaughterhouses).[3]
	More than 1,800 vets were deployed at the peak of the outbreak	288 vets used
	25, though the Department had been liaising with the military from day one	The military was not deployed
	More than 2,000 at the peak	0

[2] Data taken from the Association of Livestock Auctioneers Website – 42 in the north of England, 44 in the south of England, 39 in Wales, 31 in Scotland.

[3] Source: Meat Hygiene Service

Appendix F. Animal health data systems

The European Union requires member states to identify all cattle, sheep and pigs. Currently there are several incompatible data systems involved in animal health policy which are owned by different bodies within the Defra network and which use outdated technology. The three main categories of data system are:

1. systems used to process the European farm payments;

2. systems to track livestock movements; and

3. systems used for disease control purposes.

European Farm Payments Systems

The Rural Payments Agency (RPA) Information Technology Application (RITA)

The Rural Payments Agency's primary function is to process European farm payments. The RPA Information Technology Application (RITA) registers customer details including business addresses, contact information and payment information. This information is, in turn, provided to the other systems detailed below. RITA is also used to allocate County Parish Holding numbers: unique numbers used to identify holdings. County Parish Holding numbers are now largely out of date but other data systems, such as Vetnet and the Rural Land Register, will not function without them.

The Rural Land Register

The Rural Land Register contains geographic information which details approximately 2.2 million land parcels these are used to validate claims under the Single Payment Scheme and Rural Development Programme for England. Land parcels are identified using Ordnance Survey sheet numbers and some are also linked to County Parish Holding numbers.

Livestock Systems

Vetnet

Vetnet is an Animal Health database where livestock owners/keepers register their herds. The database records the owner/keeper name and address, the name and address of the land holding (an ambiguous definition which does not necessarily coincide with the location of stock) and species, flock and herd numbers. It also deals with endemic diseases such as TB, livestock tracings and welfare issues.

Cattle Tracing System (CTS)

The Cattle Tracing System is owned by the Rural Payments Agency having been established after the onset of BSE to trace cattle movements. For individual cattle, the database records births, deaths, movements, ear tag identifiers and the name and address of keepers. Location details are provided by Vetnet in the form of a County Parish Holding number and, in most cases, a map reference. Movements can be recorded on CTS online or by completing and posting one of the movement cards in the cattle passport to the British Cattle Movement Service (BCMS) within three days of the movement taking place. BCMS is part of the RPA.

Animal Movement Licensing System (AMLS)

RPA also owns the Animal Movements Licensing System, which records batch movements of pigs, sheep, goats and deer. Livestock owners must complete the appropriate sections of the Animal Movement Licence (AML) form. A copy of the completed form is sent by the receiving livestock owner to their local authority within three days of the move taking place. Local authorities will add details of the movement to AMLS. Any illegal movements can be identified and enforcement action taken by the local authorities. Cattle movement data is downloaded from CTS to AMLS daily.

Exotic Disease Control Systems

Disease Control System (DCS)

The Disease Control System was created by the Department (then MAFF) during the 2001 outbreak and has been enhanced over the past six years. DCS uses data from Vetnet, CTS and AMLS and records all restrictions and visits associated with a particular premises. It also records details of any infected premises, dangerous contacts and slaughter and disposal information. DCS is only operated in the event of an outbreak.

Appendix G. Glossary of acronyms and explanation of frequently used terms

Acronym	Term
ADPG	Animal Disease Policy Group
AH	Animal Health (Government executive agency)
AHDO	Animal Health Divisional Office
AMLS	Animal Movements Licensing System
BBSRC	Biotechnology and Biological Sciences Research Council
BCMS	British Cattle Movement Service
BCVA	British Cattle Veterinary Association
BRP	Business Reform Programme
BSE	Bovine Spongiform Encephalopathy
COBR	Cabinet Office Briefing Room (where the Civil Contingencies Committee meets)
CTS	Cattle Tracing System
CVO	Chief Veterinary Officer
DA	Devolved administration
DCS	Disease Control System
Defra	Department for the Environment, Food and Rural Affairs
DIUS	Department for Innovation, Universities and Skills
DOM	Divisional Operations Manager
EPEAD	Emergency Preparedness Exotic Animal Disease
ERMAS	Emergency Readiness Management Assurance Scheme
FAO	Food and Agriculture Organisation
FDF	Food and Drink Federation
FEC	Full Economic Cost
FMD	Foot and Mouth Disease
GIS	Geographic Information Systems

Acronym	Term
GNN	Government News Network
HSE	Health and Safety Executive
IAH	Institute for Animal Health
IP	Infected Premises
LACORS	Local Authorities Co-ordinators of Regulatory Services
LDCC	Local Disease Control Centre
LMU	Livestock Movement Unit
MAFF	Ministry of Agriculture, Fisheries and Food
NAO	National Audit Office
NDCC	National Disease Control Centre
NDPB	Non Departmental Public Body
NEEG	National Emergencies Epidemiology Group
NFU	National Farmers Union
NSP	Non-Specific Protein (test)
OIE	L'Office International des Epizooties (the World Organisation for Animal Health)
OS	Ordnance Survey
OSI	Office of Science and Innovation
PCR	Polymerase Chain Reaction (test)
PSRE	Public Sector Research Establishment
PSRP	Pirbright Site Redevelopment Programme
PZ	Protection Zone
RADAR	Rapid Analysis and Detection of Animal-related Risks
RIPSS	Research Council Institute and Public Sector Research Establishment Sustainability Study
RITA	RPA Information Technology Application
ROD	Regional Operations Director
RPA	Rural Payments Agency
RRM	(Animal Health) Readiness and Resilience Manager
SAC	Science Advisory Council
SAPO	Specified Animal Pathogens Order
SCoFCAH	Standing Committee on the Food Chain and Animal Health

Appendix G. Glossary of acronyms and explanation of frequently used terms (cont.)

Acronym	Term
SEERAD	Scottish Executive Environment and Rural Affairs Department
SZ	Surveillance Zone
VENDU	Veterinary Exotic Notifiable Diseases Unit
VIPER	Veterinary Instructions Procedures and Emergency Routines
VLA	Veterinary Laboratories Agency
VMD	Veterinary Medicines Directorate
WTO	World Trade Organisation

Term	Definition
2002 Report	The Foot and Mouth Disease 2001: Lessons to be Learned Inquiry, chaired by Dr Iain Anderson, published in 2002
Amber Alert	State of emergency classified in a colour coded approach: red, amber and green
Avian Influenza (AI)	A disease of birds spread by movement of infected birds or contact with respiratory secretions, and in particular faeces, either directly or through contaminated objects, clothes or vehicles
Biorisk	The probability or chance that a particular adverse event, possibly leading to harm, will occur
Biosafety	Laboratory biosafety describes the containment principles, technologies and practices that are implemented to prevent the unintentional exposure to pathogens and toxins, or their accidental release
Biosecurity	The policies and measures taken for protecting a nation's food supply and agricultural resources from both accidental contamination and deliberate attacks of bioterrorism
Birdtable meeting	A short meeting of key participants which takes place in the National Disease Control Centre or the Local Disease Control Centre. Provides a forum for immediate concerns or key points of information to be raised and corrective action identified
Bluetongue	A disease of animals affecting all ruminants, including sheep, cattle, deer, goats and camelids caused by a virus spread by certain types of biting midges
Callaghan Review	Sir Bill Callaghan was chair of the Review of the Regulatory Framework for Animal Pathogens. The review was published on 13 December 2007
Control Zone	Term referring to the area covered by the Protection and Surveillance Zones

Term	Definition
Core Group	Group of livestock industry specialists brought together to share policy making responsibility with officials
Dangerous contact	Premises where animals have been in direct contact with infected animals or have, in any way, been exposed to infection
Defra Delivery Network	Defra and its Executive Agencies: in this context, Animal Health, the Veterinary Laboratories Agency and the Rural Payments Agency
Defra Renew	Defra's change programme to transform the way the Department operates so that resources are used flexibly
Direct contact	An animal which has come into direct contact with an infected animal
Epidemic	Classification of a disease that appears as new cases in a given population, during a given period, at a rate that substantially exceeds what is 'expected,' based on recent experience
Epidemiology	The study of factors affecting the health and illness of populations
Exotic animal disease	Animal disease which is not endemic to the UK
Foot and Mouth Disease (FMD)	An infectious disease affecting cloven-hoofed animals, in particular cattle, sheep, pigs, goats and deer
Genus	Company contracted by Defra/Animal Health to vaccinate in an outbreak of FMD
HSE Report	Report on the potential breaches of biosecurity at the Pirbright site in 2007
Phase 1	First phase of the outbreak encompassing all events occurring between 3 August and 8 September inclusive
Phase 2	Second phase of the outbreak encompassing all events occurring between 12 September and 31 December inclusive
Pirbright	Site from which the FMD virus escaped. Includes the Institute of Animal Health, Merial Animal Health and Stabilitech laboratories
Protection Zone	The three kilometre zone put in place surrounding an infected premises upon confirmation of disease
Restricted Zone	The area encompassed by both the protection and surveillance zones
Scalability	The ability of an operation or activity to be scaled up in the event of further disease spread
Spratt Review	Professor Brian Spratt of Imperial College London University was commissioned by Defra to investigate the biosecurity of the Pirbright site and to reconsider the future safety of laboratories that work on FMD and other exotic animal pathogens
Surveillance Zone	The ten kilometre zone put in place surrounding an infected premises (measured from the point of infection)
Tracings	The system of tracking the movements of livestock

Appendix H. Bibliography

We drew on a range of documents during our work. These are listed below.

Title	Author	Date
Policy Commission on the Future of Farming and Food	Sir Don Curry	January 2002
The 2001 Outbreak of Foot and Mouth Disease	National Audit Office	June 2002
The Royal Society Inquiry into Infectious Diseases in Livestock	Professor Sir Brian Follett	July 2002
Foot and Mouth Disease 2001: Lessons to be Learned Inquiry	Dr Iain Anderson	July 2002
Economic Impact of the 2001 Foot and Mouth Disease Outbreak in Scotland	The Royal Society of Edinburgh	2002
Review of the Institute for Animal Health – Pirbright Laboratory A report for BBSRC Council	Professor Keith Gull	July 2002
Response to the Reports of the Foot and Mouth Disease Inquiries	HM Government with the Welsh Assembly Government	November 2002
Government Response to the Reports of the FMD Inquiries: Route Map for Implementation of Commitments	Defra	January 2003
EU FMD Directive	Official Journal of the European Union	September 2003
Research Council Institute and PSRE Sustainability Study (RIPSS) and the Defra Response	Office of Science and Innovation	2004
Research Council Institutes, Centres, Surveys and Units: A Review of Governance Issues	Gavin Costigan	2005
Defra FMD: Applying the lessons	National Audit Office	February 2005
Central Government Arrangements for Responding to an Emergency Concept of Operations	Civil Contingencies Secretariat	March 2005
Risk Solutions: Cost Benefit Analysis of Foot and Mouth Disease Controls, A report for Defra	Risk Solutions	May 2005
Departmental Report and Resource Accounts 2006	Defra	2006
FMD Order 2006		2006
Defra Risk Management Assessment Framework	Defra	July 2006
Report of an Independent Review of Governance of BBSRC Sponsored Institutes for the Biotechnology and Biological Sciences Research Council	Professor Sir Brian Follett	September 2006
Departmental Report and Resource Accounts 2007	Defra	2007

Title	Author	Date
Defra Review of the Rural Payments Agency	David Hunter	March 2007
Capability Review of Defra	Cabinet Office Capability Review team	March 2007
House of Commons Science and Technology Committee Report on Research Council Institutes and the Government Response	House of Commons Science and Technology Committee	March 2007
Defra Science Advisory Council (SAC), Risk Sub-group (SAC-R)	Defra Science Advisory Council	May 2007
Internal Audit Report, Audit of Risk Management within Defra	Defra Internal Audit Division	June 2007
Independent Review of the safety of UK facilities handling foot-and-mouth disease virus	Professor Brian Spratt	August 2007
FMD 2007 Epidemiology Report	Defra	September 2007
Final report on potential breaches of biosecurity at the Pirbright site 2007	Health and Safety Executive	September 2007
Foot and Mouth Disease Government Statement in response to investigations into the probable release of FMD virus from Pirbright	Defra	September 2007
Environment, Food and Rural Affairs Select Committee Hearing: Secretary of State – Hilary Benn	Hansard	October 2007
Environment, Food and Rural Affairs Select Committee Hearing: Permanent Secretary – Helen Ghosh	Hansard	November 2007
Department for Environment, Food and Rural Affairs and the Rural Payments Agency	National Audit Office	December 2007
House of Commons Debate on the performance of Defra	Hansard	December 2007
Consultation document: Responsibility and Cost Sharing for Animal Health and Welfare: Next Steps	Defra	December 2007
Exotic Animal Disease Framework Response Plan	Defra	December 2007
Review of the Regulatory Framework for Animal Pathogens	Sir Bill Callaghan	December 2007
Defra Risk Management Strategy April 2002 – 2007	Defra	
IAH Science Strategy 2005 – 2015	IAH	
IAH Delivering Scientific Excellence	IAH	

We are grateful to Defra and Cabinet Office for allowing us access to minutes of the following meetings:

- Animal Disease Policy Group
- Expert Group
- Core and Stakeholder groups
- Defra Emergency Management Board meetings, NDCC and LDCC 'Birdtable' meetings
- COBR

Appendix I. Accidental releases of FMD virus from laboratories (worldwide), including those laboratories producing FMD vaccines

Date	Country	Details	Reference
1960	UK	Type SAT2 FMDV escaped from IAH-Pirbright animal isolation unit to Worplesdon farm, 1.5 km distant. No filtration of exit air from building.	Sellers, Personal Communication, 2007
1968	Denmark	Type A5 FMDV. Two foci close to Lindholm	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1969	Czechoslovakia	Type A5 FMDV. Single focus in Bohemia. Escape from vaccine plant suspected.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1972	Hungary	Type C FMDV (production strain). Escape from Waldmann plant.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1974	Germany	Type C FMDV (production strain). Disease started near a vaccine plant.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1975	Czecholsovakia	Type A5 FMDV (production strain). Disease found near vaccine plant of Terezin.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1976	Germany	Type C FMDV (production strain). Disease started at Rostock and Greifswald i.e. near the vaccine plant.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1977	Germany	Type C FMDV (production strain)	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1977	Germany	Type O FMDV (production strain). Disease at Griefswald near vaccine production plant at Riems.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1979	Spain	Type C FMDV (production strain). Escape of virus from a vaccine plant near Gerona suspected.	Report of the 24th Session of the European Commission for the Control of FMD, Rome, 7-10 April, 1981, Appendix B6, Table 3
1987	Germany	Type O FMDV outbreaks 1 km from Lower Saxony vaccine plant	Valarcher et al., 2007
1988	Germany	Type O FMDV outbreaks 15km and three months after Lower Saxony outbreaks above	Valarcher et al., 2008

1993	Russia	Type A FMDV outbreaks close to Vladimir vaccine plant	Valarcher et al., 2008
2007	UK	Type O BFS outbreak in Normandy, 4.5 km from Pirbright site where same virus was handled at IAH and was being used for vaccine production at Merial.	

Source: Defra

Appendix J. Submissions to the review

We received submissions from the following[1]:

Animal Health
Animal Health Resources Limited
Arla Foods Limited
Biotechnology and Biological Sciences Research Council
British Cattle Veterinary Association
British Retail Consortium
British Veterinary Association
Central England Animal Health and Welfare Group
Chew Valley Hides
Country Land and Business Association
Department for Environment, Food and Rural Affairs (Defra)
European Livestock Association
Farm Crisis Network
Farmtalking
Food and Drink Federation
Foodaware
Guildford Borough Council
Institute for Animal Health
Licensed Animal Slaughterers and Salvage Association
Local Authorities Co-ordinators of Regulatory Services
Marks & Spencer
Meat and Livestock Commission
National Association of Agricultural Contractors
National Farmers Union
National Foot and Mouth Group
National Trust
Natural England
Northumberland Strategic Partnership
Pet Food Manufacturers' Association
Provision Trade Federation
Public and Commercial Services Union
Ramblers Association
Road Haulage Association
Road Haulage Association of Scotland and Northern Ireland
Royal Borough of Windsor and Maidenhead Trading Standards
Royal Society for the Prevention of Cruelty to Animals
Smallholders Forum
South East Sustainable Farming and Food Board
South East Sustainable Food and Farming Strategy Board

[1] The Review also received a small number of submissions from people who asked for the documents to remain confidential. They are not listed here.

Surrey County Council Trading Standards
Surrey Rural Partnership
Sussex Police
Trading Standards Institute
UK Leather Federation
Warmwell.com

Sally and Nigel Berryman – Farmers
Peter Black – Farmer
Rosemary Brown
Richard Brown – Vet
John Burns – Farmer
John Daykin – Vet
Dr Tony Garland
Dr Alex Donaldson – Scientist
Peter Hutley – Farmer
Mr and Mrs Irwin
Andrew King – Scientist
Ann Lambourn – Independent Researcher
Dr John Mann – Vet
Andy Marshall – Farmer
Keith Meldrum – Vet
Betty Moxon
Robert Persey – Farmer
Colin Rayner – Councillor: Royal Borough of Windsor and Maidenhead
Jane Ross – Farmer
Bob Sellers – Former Director of Institute for Animal Health, Pirbright
Cath Smith – Smallholder
Toby Tennant – Farmer
Dr Ruth Watkins – Scientist and Farmer

These submissions can be found on the Cabinet Office website at www.cabinetoffice.gov.uk/fmdreview

Appendix K. People interviewed by the Review

Name	Title	Organisation
Notes of interviews can be found on the Cabinet Office website: www.cabinetoffice.gov.uk/fmdreview		
Rt Hon Gordon Brown MP	Prime Minister	
Rt Hon Hilary Benn MP	Secretary of State for Environment, Food and Rural Affairs	Department for Environment, Food and Rural Affairs
Helen Ghosh	Permanent Secretary	Department for Environment, Food and Rural Affairs
Ann Nolan	Transformation Director	Animal Health
Rob Paul	Director of Veterinary and Technical Services	Animal Health
Kate Sharpe	Divisional Veterinary Manager, Leeds	Animal Health
Glenys Stacey	Chief Executive	Animal Health
Ann Waters	Director of Contingency Planning	Animal Health
Nigel Brown	Director of Science & Technology	Biotechnology and Biological Sciences Research Council
Paul Burrows	Head of Strategy Planning Unit	Biotechnology and Biological Sciences Research Council
Paul Gemmill	Executive Director	Biotechnology and Biological Sciences Research Council
Steve Visscher	Interim Chief Executive	Biotechnology and Biological Sciences Research Council
Bruce Mann	Head of the Civil Contingencies Secretariat	Cabinet Office
Sir Richard Mottram	Former Permanent Secretary, Intelligence, Security and Resilience	Cabinet Office
Andrew Burchell	Director General, Service Transformation Group	Department for Environment, Food and Rural Affairs
Chris Chant	Chief Information Officer	Department for Environment, Food and Rural Affairs
Nick Coulson	Deputy Director for International Animal Health	Department for Environment, Food and Rural Affairs
David Dawson	Director, Exotic Disease Policy and Delivery	Department for Environment, Food and Rural Affairs

Name	Title	Organisation
Richard Drummond	Deputy Director, Animal Health and Welfare Evidence Base and Veterinary Professional Services	Department for Environment, Food and Rural Affairs
Jane Gibbens	Head of National Emergency Epidemiology Group	Department for Environment, Food and Rural Affairs
Fred Landeg	Acting Chief Veterinary Officer	Department for Environment, Food and Rural Affairs
Andy Lebrecht	Former Director General, Food and Farming Group	Department for Environment, Food and Rural Affairs
Paul Manser	Former Deputy Veterinary Head, Animal Health and Welfare and Veterinary Professional Services	Department for Environment, Food and Rural Affairs
Steve Morris	Director of Communications	Department for Environment, Food and Rural Affairs
David Mouat	Head of the Veterinary Exotic Notifiable Diseases Unit	Department for Environment, Food and Rural Affairs
Francesca Okosi	Director of People and Performance	Department for Environment, Food and Rural Affairs
Debby Reynolds	Former Chief Veterinary Officer	Department for Environment, Food and Rural Affairs
Duff Burrell	National Beef Association	Department for Environment, Food and Rural Affairs Core Group of industry representatives
Ian Campbell	National Pig Association	Department for Environment, Food and Rural Affairs Core Group of industry representatives
David Catlow	Past President British Veterinary Association	Department for Environment, Food and Rural Affairs Core Group of industry representatives
Chris Dodds	Livestock Auctioneers	Department for Environment, Food and Rural Affairs Core Group of industry representatives
Stuart Roberts	British Meat Processors Association	Department for Environment, Food and Rural Affairs Core Group of industry representatives
Sir Keith O'Nions	Director General, Science and Innovation	Department for Innovation, Universities and Skills
Paul Williams	Head, Research Councils Unit, Science and Innovation Unit	Department for Innovation, Universities and Skills
Karen Clayton	Head of Biological Agents Unit	Health and Safety Executive
Paul Logan	Biotechnology Portfolio Holder and Principal Specialist Inspector	Health and Safety Executive

Appendix K. People interviewed by the Review (cont.)

Name	Title	Organisation
Dan Mitchell	HM Chief Inspector of Mines	Health and Safety Executive
Geoffrey Podger	Chief Executive	Health and Safety Executive
Professor Brian Spratt	Head of Department, Infectious Disease Epidemiology	Imperial College, London
Professor Keith Gull	Chair, Governing Body	Institute for Animal Health
Tim Key	Governor	Institute for Animal Health
Martin Haworth	Director of Policy	National Farmers Union
Terry Jones	Head of London Office	National Farmers Union
Peter Kendall	President	National Farmers Union
Tony Cooper	Interim Chief Executive	Rural Payments Agency

Appendix L. People met by the Review

Name	Title	Organisation
The Review also spoke to the following people:		
Adrian Hanratty	Divisional Operations Manager, Local Disease Control Centre	Animal Health
Andy Lashbrooke	Human Resources Business Partner	Animal Health
Brian Sullivan	Contingency Planning Directorate	Animal Health
David Thomas	Divisional Veterinary Manager	Animal Health Divisional Office, Carmarthen
Sam Hiles	Office Manager	Animal Health Divisional Office, Reigate
Alistair House	Senior Animal Health Officer	Animal Health Divisional Office, Reigate
Claire Ingham	Readiness and Resilience Manager	Animal Health Divisional Office, Reigate
Emma Paul	Veterinary Officer	Animal Health Divisional Office, Reigate
John Pollitt	Deputy Veterinary Manager	Animal Health Divisional Office, Reigate
David Brewer	Veterinary Officer	Animal Health Divisional Office, Taunton
Richard Horton	Animal Health Officer	Animal Health Divisional Office, Taunton
Derick McIntosh	Head of Operations	Animal Health, Scotland
Jim Walker	Trading Director and Vice Chairman	Argent Energy
Mark Carter	Presenter	BBC Southern Counties Radio
Clare Dutton	Journalist	BBC Southern Counties Radio
Professor Sir John Beringer	Chair	Review of funding, governance, and risk management at the Institute for Animal Health
Professor Julia Goodfellow	Former Chief Executive	Biotechnology and Biological Sciences Research Council
Carl Boyde	Private Vet	
Colonel Anthony Kimber	Military Liaison	British Army
Sir Gus O'Donnell	Cabinet Secretary	Cabinet Office
Sir Bill Callaghan	Chairman	Callaghan Review of the Regulatory Framework for Handling of Animal Pathogens in the United Kingdom

Appendix L. (cont.)

Name	Title	Organisation
Professor Ian McConnell	Department of Veterinary Science	Cambridge University
Stuart Burgess	Chairman	Commission for Rural Communities
Sir Howard Dalton	Former Chief Scientist	Department for Environment, Food and Rural Affairs
Miles Parker	Head of Science Directorate	Department for Environment, Food and Rural Affairs
Professor Jim Scudamore	Former Chief Veterinary Officer	Department for Environment, Food and Rural Affairs
Scott Sellars	Animal Health and Welfare Evidence Base Team	Department for Environment, Food and Rural Affairs
Jonathan Shaw MP	Parliamentary Under Secretary of State	Department for Environment, Food and Rural Affairs
Peter Stevenson	Animal Health and Welfare Evidence Base Team	Department for Environment, Food and Rural Affairs
Professor John Beddington	Government Chief Scientific Adviser	Department for Innovation, Universities and Skills
Sir David King	Former Government Chief Scientific Adviser	Department for Innovation, Universities and Skills
Alberto Ladommadda	Head of Unit for Animal Health and Chair of the Standing Committee on Food Chain and Animal Health	European Union
Bernard Van Goethem	Director for Animal Health and Welfare	European Union
Nick Fenwick	Director of Agricultural Policy	Farmers Union Wales
Sir Michael Pitt	Chair	Flooding Lessons Learned Review
David Cooke	Project Manager, FMD Vaccination Resource	Genus
Mary Burden	Deputy Head Regional Resilience Team	Government Office South East
Peter Craggs	Regional Resilience Director	Government Office South East
Dougal Driver	Head of Department for the Environment, Food and Rural Affairs Service	Government Office South East
Julie Price	Head of Rural Team	Government Office South East
Chris Butler	Head of Audit, Control and Risk Team	HM Treasury
Gwyn Howells	Chief Executive	Hybu Cig Cymru (Meat Promotion Wales)

Name	Title	Organisation
Clive Benson	Defra Delivery Centre Manager	IBM
Paul Burns	Service Manager	IBM
Professor Martin Shirley	Director	Institute for Animal Health
John Anderson	Head of Pirbright Laboratory and Senior Responsible Officer for the Pirbright Site Redevelopment Programme	Institute for Animal Health
Don King	Research Leader	Institute for Animal Health
Uwe Mueller-Doblies	Head of Biosecurity	Institute for Animal Health
David Paton	Genealogy Division	Institute for Animal Health
Professor Sir Richard Brook	Director	Leverhulme Trust
Alan Hurst	Field Epidemiology Team Manager	Local Disease Control Centre
Peter Long	Field Operations Team Manager	Local Disease Control Centre
Charlie Moir	Divisional Veterinary Manager	Local Disease Control Centre
David Wild	Divisional Veterinary Manager	Local Disease Control Centre
Michelle Wilson	Manager	Local Disease Control Centre
Brian Woolacott	Regional Operations Director	Local Disease Control Centre
James Mulleneux	National Farmers Union	Local Disease Control Centre: National Farmers Union Representative
Tim Doel	Site Director	Merial
Duncan Fawthrop	Head of Biosecurity	Merial
Roger Mugford	Small livestock owner	
John Cameron	President	National Beef Association and National Sheep Association
William White	Regional Director, South East	National Farmers Union
Dai Davies	President	National Farmers Union Cymru
Mary James	Deputy Director	National Farmers Union Cymru
Andy Robertson	Chief Executive	National Farmers Union Scotland
Helen Davies	Regional Secretary for Wales	National Sheep Association
Hamish Waugh	Treasurer	National Sheep Association
Mathew Larkin	Land Management Team	Natural England
Keith Spencer	Partner/Auctioneer	Newland, Rennie Wilkins
Jonathan Simmons	Senior Developer	Ordnance Survey

Appendix L. (cont.)

Name	Title	Organisation
Peter ter Haar	Director of Products	Ordnance Survey
Carl Wilson	Pre and Post Sales Support Manager	Ordnance Survey
Shaun Leavey	Chair	Regional Sustainable Farming and Food Board
Phil Flanders	Director Scotland and Northern Ireland	Road Haulage Association
Alastair Donaldson	Executive Manager	Scottish Association of Meat Wholesalers
Richard Lochead MSP	Cabinet Secretary for Rural Affairs and the Environment	Scottish Executive
John Elvidge	Permanent Secretary	Scottish Executive
Charles Milne	Chief Veterinary Officer	Scottish Executive
John Nicholls	Head of Civil Contingencies Unit	Scottish Executive
Peter Russell	Head of Rural Directorate	Scottish Executive
David Whiteford	Business Development Director	Scottish Food Quality Certification
Mike Russell	Journalist	Surrey Advertiser
Kevin Chesson	Head of Trading Standards, Animal Health Team	Surrey County Council
Peter Denard	County Trading Standards Officer	Surrey County Council
Ian Good	Head of Contingency Planning	Surrey County Council
Mark Rowley	Assistant Chief Constable (Specialist Operations)	Surrey Police
Sir Don Curry	Chair	Sustainable Farming and Food Implementation Group
Graeme Taylor	Second Secretary, Animal Health and Welfare	UK Permanent Representation to European Union
Simon Stannard	First Secretary, Animal Health and Welfare	UK Permanent Representation to European Union
Professor Sir Brian Follett	Professor of Zoology	University of Oxford
Brian Arbuckle	Vet	Volunteer to the Local Disease Control Centre
Huw Brodie	Director, Rural Affairs and Heritage	Welsh Assembly Government
Christianne Glossop	Chief Veterinary Officer	Welsh Assembly Government

Name	Title	Organisation
Elin Jones AM	Minister for Rural Affairs	Welsh Assembly Government
Tony Joss	Head of Exotic Animal Diseases and Contingency Planning	Welsh Assembly Government
Chris Payne	Managing Director	Wessex Incineration

Appendix M. About the Review

The terms of reference for the Foot and Mouth Review were:

To conduct a Review of the Government's handling of the outbreak of foot and mouth disease during 2007, in order to:

- *establish whether relevant points from the Lessons to be Learned Report on the 2001 outbreak were implemented;*
- *establish whether new lessons might be drawn from the handling of the 2007 outbreak;*

and to make recommendations by the end of 2007 to the Prime Minister and the Secretary of State for the Environment, Food and Rural Affairs on the future handling of foot and mouth disease outbreaks.

The Review was commissioned before the second phase of the disease broke out on 12 September. It was subsequently agreed that the report date should be extended to take this into account. The Review's work lasted from October 2007 to March 2008.

Dr Iain Anderson was the Chairman of the Review. The Review team comprised:

- Alun Evans (Secretary to the Review) – seconded from Department for Communities and Local Government
- Kristian Armstrong – seconded from Cabinet Office
- Ian Ball – seconded from Cabinet Office (October 2007 – December 2007)
- Rupert Cazalet – seconded from Airwave Solutions Ltd
- Jane Griffith – seconded from Department for Communities and Local Government
- Penelope Irving – seconded from Ministry of Defence
- Elin Jones – seconded from Department for Communities and Local Government
- Diana Venn – seconded from Department for Communities and Local Government (October 2007 – January 2008)

We would like to thank all those who took the time to come to meet us or send submissions to the Review.

In particular, we would like to thank Ordnance Survey, Wessex Incineration, European Union officials and ministers and officials of other government departments in Edinburgh, Cardiff and Brussels.

We would like to thank the following for their expert advice:

Professor Brian Spratt (Imperial College): nucleotide sequencing
Dr David Paton (Institute for Animal Health): FMD diagnostics and testing techniques

We would like to thank David Sims (Treasury Solicitor's Office) for legal advice to the Review.

We would like to thank Dr Liz Fry and Professor David Stuart from the Wellcome Trust Centre for Human Genetics (Division of Structural Biology) at the University of Oxford for permission to use the image on the front cover. Please see the full explanation and credit on the outside back cover.

Finally we would also like to thank the Review Liaison Team at Defra.

Review visits

The Review made the following formal visits:

6-9 and 27 November 2007 – Surrey
12-13 November 2007 – Scotland
29 November 2007 – Wales
11-12 December 2007 – European Union, Brussels

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The cover shows the structure of a Foot and Mouth Disease virus particle (strain O_1BFS 1860) determined by X-ray crystallography and magnified a little over 5 million times. The surface of the individual atoms that make up the virus is shown looking down one of the twelve 5-fold axes of symmetry. The colouring is graded depthwise (or "radially depth-cued"), the most superficial areas in red, the most recessed, blue. The Anderson Review acknowledges and thanks the contributors, Dr E Fry and Professor DI Stuart FRS from the Wellcome Trust Centre for Human Genetics (Division of Structural Biology) at the University of Oxford.

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