



Livestock Disease



The 2001 Foot and Mouth Disease outbreak cost the UK £6-9 billion¹. In 2010/11, the government spent £91 million compensating farmers for bovine TB². It is considering proposals for sharing costs and responsibilities for preventing and controlling disease with the livestock industry. This POSTnote examines disease threats to UK livestock, outlines prevention and control measures, and looks at factors likely to contribute to future disease.

Background

Expansion in the livestock sector is driven by population growth, rising affluence and urbanisation³. Global population is projected to rise from nearly seven billion in 2011 to over nine billion by 2050, presenting substantial challenges to food security. Over the same timeframe, per capita meat consumption is predicted to rise from 32 kg a year to 52 kg a year. This increased reliance on livestock has come at a time when the UK faces a heightened threat of livestock disease. Increases in globalisation, animal movements and trade coupled with climate change and economic recession all have the potential to reduce capacity to prevent and control disease. Three main classes of animal disease threaten the UK:

- those that are not usually present in the UK and which can affect animals and humans (e.g. Avian Influenza);
- those that may or may not cause clinical signs in animals but cause disease in people (e.g. Salmonella and E.coli);
- those that do not present a significant public health risk but affect animal welfare, productivity and profitability (e.g. Bovine Viral Diarrhoea).

Prioritisation of Livestock Disease

The importance placed on a particular disease will depend on several factors. Defra (Box 1) uses four criteria to prioritise allocation of Government resources to deal with animal health issues.

Overview

- Livestock disease affects the economy, animal welfare, the environment and public health.
- Current policy outlines measures for both prevention and control. It is widely agreed that prevention is preferable to controlling disease outbreaks.
- Increased meat consumption by a rising global population is likely to lead to growth in the livestock sector.
- Disease risk is predicted to increase, due to intensification, climate change and increasing globalisation and trade.
- New responsibility and cost sharing measures will promote sharing of responsibilities between farmers and government.

- **To protect public health.** Two thirds of known human diseases are zoonoses (transmissible between animals and humans)⁴. For example, Campylobacter and Salmonella transmitted from poultry or pigs to humans are major public health concerns.
- **To protect and promote the welfare of animals.** Animals are protected under UK animal welfare legislation because they are able to experience pain and distress. "Freedom from pain, injury and disease" is one of the Farm Animal Welfare Committee's (Box 1) 'Five Freedoms'. Some diseases such as sheep scab have the potential to impact severely upon animal welfare.
- **To protect the interests of the wider economy, environment and society.** Losses in farm production combined with disruption to markets and international trade pose risks to livelihoods. Loss of income from tourism during a disease outbreak can also affect a wide range of businesses.
- **To protect international trade.** During a notifiable disease outbreak (Box 1), EU controls are enforced to ban the export of live animals and animal products. This may have an impact on international trade for months or years and can reduce future trust in UK produce.

Prevention and Control

The EU Animal Health Strategy⁵, "Prevention is better than cure", outlines both prevention and control measures to be

Box 1. Stakeholders Involved in Ensuring Animal Health

- The Department for Environment, Food and Rural Affairs (Defra) takes the lead on animal health in England. In Scotland, animal health is led by the Scottish Government Rural Directorate for Animal Health and Welfare, in Wales by the Department for Environment, Planning and Countryside and in Northern Ireland by the Department for Rural Affairs Northern Ireland. The departments administer legislation which identifies notifiable diseases that must be reported to authorities.
- The Animal Health and Veterinary Laboratories Agency (AHVLA) is an executive agency working on behalf of Defra, the Scottish Government and the Welsh Assembly Government. It has frequent interaction with farmers, veterinarians and animal keepers.
- Advisory groups such as the Responsibility and Cost Sharing Advisory Group published proposals in 2010 to reduce the risk and cost of animal disease and to improve the welfare of kept animals. The Farm Animal Welfare Committee (FAWC) is an expert committee of the English, Scottish and Welsh Administrations.
- Other bodies involved include the British Veterinary Association (BVA) and the National Farmers Union (NFU).
- The EU is responsible for most animal health law. The European Commission has an Animal Health Strategy (2007-2012); proposals on responsibility and cost sharing are due in 2012.
- The World Organisation for Animal Health (OIE) is the inter-governmental organisation responsible for standards for animal health controls and surveillance worldwide.

implemented during a disease outbreak. Some of these measures, such as vaccines and antimicrobials, can be used for both prevention and control.

Disease Prevention*Surveillance*

Surveillance provides early warning and prompt detection of livestock disease threats, together with analysis of the way diseases spread. Surveillance within the UK depends on disease identification and reporting by livestock keepers and veterinarians and enables disease patterns to be monitored. Monitoring of international disease at Defra was intensified in the wake of the 2001 Foot and Mouth Disease (FMD) outbreak, to identify new threats to UK livestock. Defra uses official disease reports from the OIE (Box 1), EU, Foreign and Commonwealth Office, UK laboratories and research articles to monitor disease risk and trends in new and emerging diseases. It produces monthly reports outlining the main exotic disease threats (Box 2) and monthly and quarterly reports on the domestic disease situation.

Control at Source

Livestock disease is a global problem. Emerging diseases, changing patterns of disease and increasing globalisation mean that global disease threats also put the UK at risk. Control, and ultimately eradication, of diseases elsewhere in the world have the potential to protect animals in the UK. For instance Rinderpest, a disease of cattle, is on schedule to be eradicated worldwide by 2011 (see Box 3). However, the extent to which other diseases can be tackled in this way is uncertain.

Biosecurity

Good biosecurity means ensuring good hygiene practices are in place. It is a vital part of keeping disease away from livestock, preventing any spread between livestock and, for zoonoses, minimising the transfer to humans. Biosecurity measures address isolation of new and diseased animals; movement of people, animals and equipment; and

Box 2. Most Important Diseases for the UK

Defra monitors two main types of disease threats:

- Endemic diseases (usually found in the UK). Currently these include Bovine TB, Salmonella, Campylobacter, E. coli, Bovine Viral Diarrhoea, Mastitis and Sheep Scab.
- Exotic diseases (usually found outside the UK). Defra produces a monthly report listing current exotic disease concerns for the UK. These include African Swine Fever, Foot and Mouth Disease, Bluetongue, highly pathogenic Avian Influenza, Newcastle Disease, Rift Valley Fever, Aujeszky's Disease and Brucellosis.

procedures for cleaning and disinfecting facilities and vehicles. Biosecurity must be maintained in farms, markets, during transport and at slaughter.

Traceability

Being able to trace livestock movements enables disease spread to be monitored. Currently, individual identification can be achieved, for example in cattle, using a paper-based system of animal passports and holding registers combined with national identification databases. The EU is implementing a system across member states requiring all sheep 12 months or older to be electronically tagged. The introduction of affordable electronic identification could improve efficiency and lead to an integrated EU electronic system. However, other livestock such as poultry are not currently covered by such arrangements.

Import/Trade controls

Legal and illegal imports of live animals and animal products are potential sources of disease risk. Non-animal products can also be potential. For instance imported car tyres can harbour mosquito larvae.

Wildlife Control/Management

Seventy two percent of diseases transferred between livestock and humans are also present in wildlife. Vaccination and culling of wildlife can be used to prevent the spread from wildlife to livestock. For instance, various trials have shown that culling badgers reduces bovine TB incidence where the culling occurs, but can also increase bovine TB in the surrounding area. Defra is consulting on whether to licence badger culling in two different locations; culling has been opposed by some animal welfare and conservation groups.

Vaccination

Vaccines stimulate an immune response to protect animals against later infection with a specific disease. They are widely and routinely used to control endemic diseases such as Salmonella in poultry. Vaccines could potentially be used to prevent diseases such as bovine TB, although no effective cattle vaccine is currently available for this disease.

Husbandry/Production System

Animals that are cared for appropriately and in accordance with existing welfare standards are less likely to contract or spread disease and tend to be healthier⁷. Additionally, different production systems are associated with differing disease risks. For example, intensive, indoor systems can significantly reduce contact with certain diseases. However, stress associated with intensive production may increase susceptibility to disease and its subsequent spread.

Box 3. Success Story – Eradication of Rinderpest

Rinderpest, (or 'cattle plague'), is a very contagious viral disease with a high mortality rate. In 2004, the Global Rinderpest Eradication Programme (GREP) was launched by the Food and Agriculture Organisation of the United Nations. The aim of the programme was the global eradication of Rinderpest by 2011, a goal the UN announced had been achieved in June 2011. After establishing the distribution and spread of the disease, GREP sought to contain Rinderpest within the infected areas, and to eliminate all sources of infection, mainly through vaccination. Once evidence suggested that the virus had been eliminated, GREP's activities focused on surveillance systems to prove the absence of the disease.

Conversely, animals housed in extensive systems might be more likely to come into contact with disease, but the risk of contracting and spreading it may be lower (see Intensification and Food Security, page 4).

Genetic Modification and Cloning

Genetic modification (GM) could be used to introduce novel genes that confer resistance to infection. For instance in 2011, scientists at the Roslin Institute used GM to prevent chickens transmitting Avian Influenza.

Animal cloning is used to generate an individual that has the same DNA as another individual. Scientists have already cloned animals to extend their breeding and production potential, and may in future be able to clone animals with reduced susceptibility to disease.

Some consumer groups have expressed safety concerns about GM and cloned animals, whereas other groups oppose such procedures on animal welfare grounds. Food from cloned animals must be authorised under the EU Novel Foods Regulation before it can be sold. However, there have been no applications in the EU to date. In November 2010, the Advisory Committee on Novel Foods and Processes concluded that meat and milk from cloned cattle and their offspring were unlikely to present a food safety risk, but noted that consumers may wish to see effective labelling. EU negotiations on amendments to the novel foods regulations broke down in March 2011. The Commission is likely to propose new legislation specifically on cloning but the timing is unclear.

Disease Control

Following a disease outbreak, additional measures can be implemented to control its spread. For some notifiable diseases, the European Commission prohibits export of animals and animal products from the affected species until disease-free status has been achieved.

Antimicrobials

Antimicrobials (or antibiotics) destroy or inhibit the growth of bacteria. They may be used both to treat disease in infected animals and to prevent disease in those at risk or known to be susceptible. All livestock medicines are subject to strict regulation (Box 4). While the controlled use of antimicrobials by veterinarians is necessary to limit infections in animals, excessive or inappropriate use may contribute to the development of antimicrobial resistant organisms. There is concern that the irresponsible use of antimicrobials in animals might compromise the effectiveness of related medicines in humans.

Box 4. Regulation of Livestock Medicines

Animal medicines are authorised and regulated by the Veterinary Medicines Directorate, to ensure their quality, effectiveness and safety for animals, consumers and the environment. Once a medicine has been given to an animal, a withdrawal period is enforced during which the animal cannot be slaughtered for food, nor its products enter the human food chain. The Responsible Use of Medicines in Agriculture Alliance promotes best practice in the use of animal medicines. Consumer surveys indicate that the public have a favourable attitude towards the use of medicines to treat livestock diseases, but want to ensure that transparency is maintained.

Culling of Livestock

Another control measure is to slaughter and dispose of infected animals, and animals that have been in contact with them or in their vicinity. Accurate surveillance information about the geographical location of disease and its spread can be used to construct models to inform culling policy.

Emergency vaccination

Vaccination can be used to control an outbreak of disease once it has been detected. For example, it was successfully used to control a UK Bluetongue outbreak in 2007, and Defra is currently trialling a badger vaccine as a control measure for bovine TB. However, vaccination has its drawbacks. For instance, few vaccines give 100% protection and vaccines have not yet been developed for all diseases. For some diseases, use of vaccination during an outbreak can make it difficult to distinguish between animals that have been vaccinated and those that are infected. This makes it hard to ascertain when the disease has been eliminated and disease-free status has been achieved. The development of DIVA (Differentiating Infected and Vaccinated Animals) tests is ongoing and is likely to make vaccination a more attractive option.

Animal Movement Controls

During an outbreak of a contagious notifiable disease, preventing the movement of animals between farms, markets and slaughterhouses can limit disease spread.

Planning

A risk management approach can be used both to prevent disease and to manage outbreaks. Relevant considerations include environmental conditions, how the disease is spreading, how it is transmitted and any vectors that may be involved. While current government strategy emphasises disease prevention, it also incorporates lessons learned from previous outbreaks into plans for managing future outbreaks. For example, for any future FMD outbreak, more serious consideration would be given to using vaccines; the government has taken measures to ensure vaccines would be available, if needed. Defra recently published a new Contingency Plan for Exotic Notifiable Diseases of Animals⁶. It outlines the roles and responsibilities of a wide range of bodies including central government and its agencies, local government, non-governmental organisations, animal keepers, veterinarians and the police. Understanding the roles and responsibilities of all involved contributes to successful operations⁷. A recent exercise ('Silver Birch') examined UK capacity to deal with an outbreak of FMD. The lessons learned from this exercise have been incorporated into the new Defra contingency plan.

Responsibility and Cost Sharing

Currently, the government bears the cost of compensating farmers for animals/products compulsorily destroyed in a notifiable disease outbreak. The Animal Health and Welfare Strategy proposed that responsibilities and costs of livestock health and welfare should be balanced between industry and taxpayers. A Responsibility and Cost Sharing Advisory Group (RCSAG) reported in December 2010¹. The government's response, in 2011, recommended the creation of an Animal Health and Welfare Board for England, to reduce the risk and cost of animal disease, improve animal welfare, rebuild and maintain trust between government and industry, and improve the effectiveness and value for money of policy and delivery. A Chair for the new board was announced in August 2011; further appointments are being made and the board is expected to meet in November 2011. Future decisions on cost sharing will be informed by the board's advice.

Factors Influencing Future Disease Threats Strategic Responsibilities

RCSAG highlighted the collective 'ownership' of disease control policies and urged stakeholders to share responsibility for decisions on disease prevention and control. The consensus is that the government should retain responsibility for funding research and development, disease surveillance and maintaining a competent veterinary service for the prevention and control of exotic disease. Responsibility for livestock health lies with livestock keepers and the livestock industry. Identifying early signs of disease remains the responsibility of the livestock keeper, and subsequently the veterinarian. Compensation for endemic disease could be replaced with insurance taken out by livestock keepers against animal losses.

Academics and veterinary and animal welfare groups say that, despite the appropriate legislation being in place, deficiencies in biosecurity are a major contributor to disease threat and have called for research into farmer compliance. Compensation systems could be used as an incentive for good biosecurity and other prevention measures.

Veterinary Supply

Veterinarians are uniquely placed to promote livestock health and to advise owners on disease prevention. Their ability to recognise the early signs of endemic, exotic and emerging diseases will depend on the extent of their training within this field. Groups such as the BVA are concerned that the supply of veterinarians with experience of farm animal medicine may be threatened by the lack of profitability in the farm animal sector and/or increases in the cost of university education. However, the Defra-commissioned Lowe report⁸ concluded that there were no foreseeable problems with the supply of farm animal veterinarians.

Climate Change

Climate change may result in the emergence of new diseases in new locations. Higher temperatures and variable precipitation may lead to new transmission mechanisms, and an increase of vector-borne diseases and parasites¹. This puts the onus on surveillance and training of farmers and veterinarians to identify new diseases.

Box 5. "Sustainable Intensification"

The government Foresight project considered the decisions that policy makers need to make to ensure that a rising global population can be fed sustainably and equitably⁹. Producing more food from the same area of land while reducing environmental impacts has been referred to as "sustainable intensification". Intensification could lead to improvements in biosecurity, but disease susceptibility and spread might increase due to reduced welfare and a higher density of livestock. If animal health and welfare are considered within the scope of "sustainable intensification" then there may need to be changes in consumer behaviour. Some have identified a need for a decrease in the consumption of animal products and/or a willingness to pay for products that guarantee better livestock health and welfare⁹.

EU Expansion and Harmonisation

There are plans to replace the existing EU Animal Health Strategy with a simplified framework seeking convergence to international standards. UK health and welfare standards are currently among the highest in the EU. Animal welfare and farming groups have expressed concern that harmonisation might result in a lowering of these standards within Europe. Maintaining higher standards of health and welfare might put the UK at a commercial disadvantage, in an EU where free trade is highly valued.

Intensification and Food Security

An increasing global population combined with pressure caused by consumer expectations of cheap food means that livestock production systems are being further intensified. A recent government Foresight project⁹ has called for "sustainable intensification" (Box 5). Even systems that have maintained extensive farming are under pressure to intensify. However, in the case of dairy cows, increases in milk yield can be linked with decreased fertility and increased disease incidence, which reduces animal welfare and productivity^{10,11}. Pressures to intensify livestock systems could themselves threaten food security if they increase the likelihood of a serious disease outbreak.

Consumer Behaviour

Recent years have seen food prices increase after a steady long-term decline. Food prices fell by 32% in real terms between 1975 and 2007, but have risen by 26% in the four years since 2007¹². Veterinary and animal welfare groups are concerned that pressures to keep food prices low might adversely affect standards of animal health and welfare. However, the success of food assurance schemes¹³ that set standards for hygiene, animal welfare and environmental protection, suggests that higher welfare products are a priority for consumers.

Endnotes

- 1 Responsibility and cost sharing for animal health and welfare, final report 2010
- 2 Bovine TB eradication programme for England, Defra, July 2011
- 3 Livestock in the balance: Report by the Food and Agriculture Organization of the United Nations, 2009
- 4 Foresight: The detection and identification of infectious diseases, 2006, OSI
- 5 EU animal health strategy; prevention is better than cure, 2007
- 6 Contingency Plan for Exotic Notifiable Diseases of Animals, 2011, Defra
- 7 Animal health and welfare strategy for Great Britain 2004
- 8 Lowe P, Unlocking potential. A report on veterinary expertise in food animal production, 2009, Defra
- 9 Foresight: The future of food and farming, 2011, BIS
- 10 The EFSA Journal 1143, 1-38, 2009
- 11 Opinion on the welfare of the dairy cow, Farm Animal Welfare Council, 2009
- 12 Food Statistics Pocket Book, 2011, Defra/ONS
- 13 For example the Red Tractor Scheme, www.myredtractor.co.uk/splash/