

GB notifiable disease surveillance

This chapter includes an overview of the 2001 FMD outbreak. A full report has been submitted to the Office International Epizooties and a special edition of the State Veterinary Journal is in production. FMD was confirmed in pigs in an Essex abattoir on 20 February 2001; the first case in Great Britain since 1981. In total there were 2026 confirmed cases across Great Britain and 4,017,000 animals were slaughtered during the year in order to eradicate the disease. The virus responsible for the outbreak was confirmed as the highly virulent pan-Asiatic O type. Restrictions were placed on all FMD-susceptible livestock movements within Great Britain, although this ban was gradually lifted when areas were declared FMD-free; the last reported case was on 30 September 2001. There were four cases reported in Northern Ireland.

FMD

Background

Initial outbreak in Great Britain

The first case of the 2001 outbreak was confirmed in pigs in an abattoir in Essex on 20 February 2001. The source of infection was traced to a pig unit in Tyne & Wear, Northumberland where disease was thought to have been introduced at the beginning of February. Sheep on a neighbouring premises are believed to have become infected by airborne spread from the pig unit.

These sheep were subsequently moved through Hexham market in Northumberland and Longtown market in Cumbria between 13 and 20 February. During these movements other sheep became infected. Disease was

subsequently spread to other parts of Great Britain and Northern Ireland as a result of sheep and personnel movements through markets and by dealers. Subsequent local spread took place creating a series of minor epidemics.

Epidemiological enquiries have shown that over 50 premises from the Solway Firth to Devon were already infected by the initial movement before disease was confirmed on 20 February.

The disease

FMD is a highly infectious viral disease which affects cattle, sheep, pigs and goats and some wild animals such as hedgehogs, coypu, rats, deer, camelids and zoo animals including elephants. Symptoms include vesicles (blisters) in the mouth and/or on the feet and other signs which vary somewhat but may include:

- **cattle:** fever, dullness, off feed, shivering, reduced milk yield and sore teats in milking stock, slivering, tenderness of feet or lameness;
- **sheep and goats:** fever, lameness, stiff-legged walk, off colour, tendency to lie down, increased mortality;
- **pigs:** fever, lameness, dullness, off feed.

The FMD virus

There are seven main types of FMD virus and the incubation period varies depending on the strain but can be between two and 14 days. The virus responsible for this year's outbreak was the highly virulent pan-Asiatic O type. FMD, whilst being extremely infectious, is a relatively 'weak' virus, in that it can be killed easily by certain disinfectants, heat and low humidity (hence, the reason it tends to occur in winter months, when moisture levels are high).

FMD can be spread by:

- direct contact with an infected animal (which may excrete the virus a few days before signs of the disease develop);
- airborne spread from an infected animal, which happens readily, depending on weather conditions and local geography;
- indirectly by infected material carried on persons, clothing, vehicles, equipment, sheepdogs, scavenging animals and vermin.

The disease kills only a small percentage of infected animals, mainly the very old and young, and most animals recover in a matter of a few weeks. It is extremely rare for humans to catch the disease, although the last reported case in Great Britain was in the 1967/1968 outbreak; the symptoms are mild and flu-like.

The Food Standards Agency advised that there were no implications for the human food chain via this epidemic.

Disease reporting procedures

In line with many other countries, Great Britain has strict FMD reporting procedures. Any person who suspects this disease in an animal or carcase must notify the DEFRA Divisional Veterinary Manager or the police immediately.



Samples are normally sent to the laboratory for confirmation of diagnosis

Restrictions are imposed on a suspected/infected premises. A prompt investigation is then made by a veterinary inspector. If signs suggest that FMD is present, the veterinary inspector, after consulting with DEFRA Headquarters, signs a notice (Form C) which prohibits the movement of animals within a 8 km radius. Samples are normally sent to the laboratory for confirmation of diagnosis.

Laboratory diagnosis and serological surveillance

Laboratory diagnosis was usually based on virus isolation from samples of epithelium taken from affected animals. Serological surveillance testing is based on the detection of antibodies to the FMD virus, an immunological response to infection, rather than direct detection of the agent itself. Serology cannot show whether an animal has FMD in the earliest stages of infection, as most animals do not become positive for antibodies for about five to 10 days after the first appearance of clinical signs. Animals are most infectious two to four days before they show any such signs.

There were two main serological tests: an ELISA test for routine screening and a virus neutralisation test to confirm the ELISA positives or inconclusive results. A competitive solid phase ELISA for FMD was developed for use in the outbreak and was validated and adopted by the Office International Epizooties as a prescribed test.

In March, as the epidemic progressed, a significant requirement for serological testing to support FMD control and surveillance was anticipated. Available testing capacity at the beginning of the epidemic was 400 serological tests per week. Testing for FMD virus has to be conducted in secure laboratories with high levels of disease containment. A project team was established to plan the testing requirement and develop testing capacity. This was initially increased at the laboratory of the Institute for Animal Health, Pirbright; the World Reference Laboratory for FMD. The Centre of Applied Microbiological Research undertook some serological testing on behalf of DEFRA. Major refurbishment was undertaken to install serological testing facilities at the VLA's sites at

Penrith, Shrewsbury and Luddington, and the Animal Health Trust at Newmarket; the final laboratory to start testing. With all laboratories operating, a weekly throughput of 200,000 samples became possible. During the year over three million blood samples were tested from 32,000 farms with nearly 1.9 million tests for surveillance work. Overall, 0.08% of samples tested positive for antibody to the FMD virus.

Serosurveillance played a major part in monitoring dissemination of undisclosed FMD. It was of particular value for investigating sheep flocks and goat herds for evidence of exposure to infection, as clinical evidence of disease is not always apparent in these species. It was also the only way to determine when it was safe to lift Restricted Infected Area/ Infected Area status and will be crucial for helping Great Britain to regain its FMD-free status.

The most significant application of serological testing was surveillance around infected premises and testing of sheep prior to movements.

Strategy

DEFRA's contingency plans, which were drawn up in compliance with, and met EU requirements in December 1993, estimated the human resources needed to deal with an outbreak of FMD in Great Britain, based on EU recommendations at that time.

However, the scenario that DEFRA faced was that of widespread dissemination of the virus around the country before the initial diagnosis was made. This was far in excess of the assumptions made in the contingency plan. Indeed it is likely that at least 26 primary

outbreaks occurred in Cumbria alone as a result of animal movement. This does not include the additional primaries in the country as a result of transmission by vehicles or people associated with a very large sheep market.

Risk assessment

The spatial epidemiological model 'InterSpread' was developed during the early 1990s, and subsequently enhanced and refined, for use in the advent of an FMD outbreak; it was therefore used from the start of the outbreak. The initial use of the model was to evaluate potential control strategies and provide an estimate of the duration and magnitude of the epidemic for each strategy, in terms of the number of infected premises.

These analyses were conducted during March and involved examining vaccination strategies and pre-emptive culling, as well as the effects of the timespan between detection of infected premises and slaughter. For the control policy which was closest to the one implemented from late March, the model predicted an epidemic of approximately 1,800 to 1,900 affected farms with eradication between July and October 2001 with a low probability of continuing beyond October 2001; in the event this was a remarkably good estimate. The model was also used on a day to day basis, to compare the predicted occurrence with the observed incidence and to monitor for any unusual events, such as the occurrence of infected premises in previously unaffected locations.



Veterinary risk assessments were prepared and updated as and when required

The model was also run to examine the consequences of the virus being seeded to specific areas where the density of susceptible species was relatively high. This was done to identify potential hot spots. The consequences of seeding infection into a pig premises in the east of England was also examined during the latter stages of the epidemic. This was to examine the potential spread within the pig population and to cattle and sheep. The results showed that this would not present any great cause for concern provided that the ban on animal movements was maintained.

Throughout the outbreak, veterinary risk assessments were prepared and updated as and when required. These were made available via the DEFRA website.

Table C1.1: *List of veterinary risk assessments*

Moving livestock directly from farm a to farm b	Sheep shearing
Moving livestock (sheep, cattle, pigs) carcasses from their place of slaughter to a different place for disposal	Opening farm shops
Bulk Feed Delivery to Form D premises by lorry	Car boot sales on agricultural land
Opening footpaths to the public	Collection and transport of bull semen and artificial insemination of cows
Feral Deer on infected premises	Grouse shooting
Moving sheep to an alternative place of slaughter, and from there to a further place for disposal	Sheep dipping
Feral wild boar and domestic livestock	Vaccination of TSE experimental animals
Meat and waste products distribution	Pick Your Own operations on farms
Opening deer parks to the public	Shooting Pheasants and Partridge
Horse racing meetings	Wildfowling
Farm visits by DEFRA personnel	Falconry
Specified equestrian events	Hunting with dogs
Moving hay and straw onto a farm	The risk of causing new outbreaks of FMD if the wildlife unit resumes work on the randomised Badger Culling Trial
Official equestrian events on non-agricultural land	What is the risk of causing new outbreaks of FMD if livestock are sold in markets?

Personnel

In London, the Joint Co-ordination Centre was established both to co-ordinate the efforts of all the government departments involved in dealing with the epidemic and the field operation. The Joint Co-ordination Centre was organised and staffed primarily by DEFRA and the Army. It included representatives of the Department of the Environment and Transport for the Regions, Department for Education and Employment, Department of Health, the Environment Agency, the Regional

Co-ordination Unit for Government Offices in the Regions, the Devolved Administrations, the Association of Chief Police Officers and the National Farmers Union. In the field, Divisional Veterinary Managers set up Disease Control Centres in all the affected areas, drawing initially on locally available resources, such as local veterinary practices, agricultural colleges and auction marts for suitable personnel. Accommodation was arranged, communications (most notably with stakeholders) were established and training was provided. At the end of March, as the

situation developed and new policies increased workloads, the staffing at the local Disease Control Centres was further enhanced and Regional Operations Directors were appointed who were members of the Senior Civil Service. They supported the veterinary staff already in the field and provided the administrative input to operations, such as disposal, finance and personnel. These centres were also staffed by people drawn from other parts of DEFRA and many Government Offices, both centrally and in the regions. As an example, the Newcastle office grew from seven to 200 staff in two weeks and expanded to over 500 staff over a slightly longer timescale.

At the same time as the operation in the field was strengthened, the Army (101 Logistic Brigade) were brought in, under the name 'Operation Peninsular', to support the slaughter and disposal operation in the field and to provide logistic support, both to the Disease Control Centres and to Headquarters. They brought not only the manpower for the many tasks necessary in such a large operation in the field, but also the expertise and experience of managing a large logistics operation; the Army had around 2,000 personnel involved at the peak of the epidemic. Their emphasis on battle rhythm and the importance of communication and information flow by 'birdtables' (meetings for representatives of key groups in order to resolve particular concerns) held three times a day, was as important as their logistic skills. Each Disease Control Centre was supported by a different unit of the Army who provided, organised and replaced their staff as necessary, finally reducing and withdrawing them as the need lessened. However, they remained on 24-hour standby across the country. The whole exercise demonstrated how effective cross-departmental teams could be.

Qualified slaughtermen offered support and many casual clerical staff were hired to deal with the huge volume of administrative work. Press officers from other Government Departments and the Government Information Service were also drafted in to help both at Headquarters and at local level to deal with the many media enquiries. Additional Animal Health Officers and lay-bleeders, including a considerable number of veterinary students, also assisted. Veterinary staffing was supplemented by the following:

- over 2,500 temporary veterinary inspectors (TVIs) of whom nearly 700 were from 20 countries abroad;
- over 650 foreign government veterinary and technical staff, many of whom came under the terms of the International Veterinary Reserve agreement.

Communications

Instructions from headquarters to field staff were issued through the dedicated field information website (**VIPER**), making access to instructions quick and easy to retrieve. Hard copies were produced in local offices for transmission to staff working in the field.

Regular briefings took place for staff in Disease Control Centres around the country. This was a good example of joined up government as meetings were held with DEFRA staff, local authorities, other Government Departments, Army personnel and other interested parties.

At the height of the crisis, briefing was made available across the Department with the introduction of the Knowledge Network briefing system. This meant that personnel across the whole department had immediate

access to current briefing and messages. The DEFRA briefing system had an average of 3,480 hits per month on the Intranet site after its launch in April 2001. All DEFRA staff had access via the intranet to a single source of briefing, which began to cover other areas of departmental interest. The Communications Directorate worked with the Cabinet Office to bring forward the launch of a project, part of a wider cross-Government initiative, making briefing available to all Government Officials. DEFRA was one of the first central Government Departments to achieve this.

The News Co-ordination Centre and other Government Departments were able to use the DEFRA Knowledge Network as one of several key sources of information, in order to prepare, support and maintain their own outputs.

An FMD site was established on the DEFRA website to serve as the definitive news source on the outbreak.



There are several stages involved in building a pyre

Offers of assistance

A database was compiled centrally to log offers of assistance. This enabled local Disease Control Centres to search for additional services and products as required.

The huge variety of offers of equipment and supplies included combustible materials and fuel, disposal and incineration facilities, machinery, scientific/environmental assistance and transport etc.

For example, a total of 91,140 railway sleepers and 9,750 tonnes of coal were used, much of which was obtained through the offers of assistance from national and international sources. These were used in the building of pyres for the disposal of carcasses.

Vaccination

The British Government had vaccination under active consideration at all stages of the outbreak, and took into account the European and international legal framework within which the use of vaccination could be deployed. Great Britain had contingency plans in place to support a vaccination programme, including access to emergency supplies of vaccine.

Classic ring vaccination was not a practical option when the outbreak was detected. It was very soon clear that about 1.3 million sheep movements had taken place before the first case of FMD was identified and it was believed, and since confirmed, that the virus had been spread across a wide area. A preventative vaccination programme was proposed for cattle in two of the hardest hit areas of Great Britain. It was essential that farmers and others

who would be affected by the decision, supported the programme; not least because of the rules concerning movement restrictions, controls and treatments (especially for meat) with which they would have to comply. At the time it was debated, the necessary level of support was not there.

Over the summer, ring vaccination was looked at again as clusters of new cases developed. But the priority was to eradicate the disease, and scientific and veterinary advice remained that this goal would be achieved fastest and most effectively through culling and through the application of tight biosecurity measures.

Preventative vaccination of pigs was also looked at when the disease appeared to threaten the large pig rearing areas of the country, but again the risk and cost/benefit analysis did not support its use at that time. A key factor was the difficulty in complying with the requirements to achieve pH levels <6 in pork, taken with the overall improved disease situation and the expectation, which was realised, that restrictions on export trade in pork would resume before the autumn.

In December, Great Britain was a key contributor to, and a joint sponsor of, an international conference on the prevention and control of FMD. The conference usefully highlighted some of the key areas the EU needs to address and DEFRA will be working with our European partners in carrying the work forward. The conference identified the need to develop a broad range of disease control options, based on science and including emergency vaccination, to meet particular circumstances. It was agreed there was a need for flexibility in the choice of methods for controlling and eradicating the disease, improved communications and an

urgent need for tests to differentiate between infected and vaccinated animals. The conference also considered ways of preventing future outbreaks, including tightening up on import controls at the European border.

Action taken

Restrictions and testing

A premises was placed under 'Form A' restrictions if FMD was being investigated and remained in force if confirmed. A 'Form A' notice placed severe restrictions on movements to and from the premises and prohibited any animal, person or object entering or leaving the premises without permission. Samples, if required, would be taken from suspect animals by a veterinarian and tested at a laboratory. Confirmation of the disease was normally on the basis of clinical signs.

Movement controls

Following confirmation of FMD on 20 February and as soon as it became apparent that the disease was widespread across a sizeable part of the country on 23 February, the whole of Great Britain was designated a Controlled Area. The effect was to ban movements of all farmed livestock throughout Great Britain.

Closure of footpaths/ban on shooting and hunting

Local authorities were given the statutory powers to close footpaths and rights of way, wherever considered necessary. Shooting of game or any other wildlife, hunting with hounds or falcons and point to point meetings were all prohibited within Restricted Infected Areas/Infected Areas, to minimise the risk of the disease spreading on boots or clothing or by the disturbance of wildlife that might carry infection beyond the area concerned. However, these restrictions were relaxed and certain activities were permitted subject to special licences, which were issued depending on how close to an infected premises the activity would be taking place and the length of time that had elapsed since the last confirmed case of infection.

Export controls

The export of FMD susceptible live animals, meat, fresh milk and other animal products from Great Britain was prohibited immediately after the first confirmed case of FMD. In addition, urgent tracing began of all exports to EU Member States of FMD susceptible animals from suspect areas, since 1 February 2001 but before the export ban came into effect.

Protection zones/surveillance zones

Following confirmation of disease, a protection zone of 3 km was imposed around the infected premise. A surveillance zone was also imposed which was between 3 km and a

minimum of 10 km around the infected premises, although the size was sometimes increased if prevailing weather conditions were likely to spread the disease further. The protection zone and the surveillance zone together are known as an Infected Area.

Restricted Infected Area

At certain times it was deemed necessary to enforce stricter controls in order to prevent the spread of disease. This was done by employing a Restricted Infected Area, which imposed compulsory biosecurity conditions on livestock farms within it. These included compulsory cleansing and disinfection of all vehicles entering or leaving livestock premises, the requirement for a disinfectant foot bath at the entrance and strict controls on the movement of animals.

Division of country into three areas

Certain movements under official control were permitted for reasons of animal welfare or to allow animals to be slaughtered for human consumption as it would not have been possible to impose a permanent and total movement standstill across the whole of the country. For this purpose, the country was divided into three types of area:

- **provisionally free areas** where no outbreaks of FMD occurred;
- **at-risk areas** where FMD outbreaks were stamped out and Infected Area restrictions were lifted;

- **infected areas** where there had been or still were, FMD outbreaks and where Infected Area movement restrictions continued to be applied pending completion of serological surveillance in the protection zones.

County classification

Later, livestock movement arrangements were based on county, unitary authority and metropolitan district classification. Classification was based on the following:

FMD-free counties

- never had an outbreak of FMD **or**
- no outbreaks of FMD for three months, **and**
- serological surveillance in 3 km zone and 3 to 10 km zone around individual outbreaks complete and seropositive sheep/flocks destroyed, **and**
- all at-risk flocks (farms under Form D investigations and farms known to have received sheep between 1 and 23 February) resolved, i.e. dead or tested negative.

FMD at-risk counties

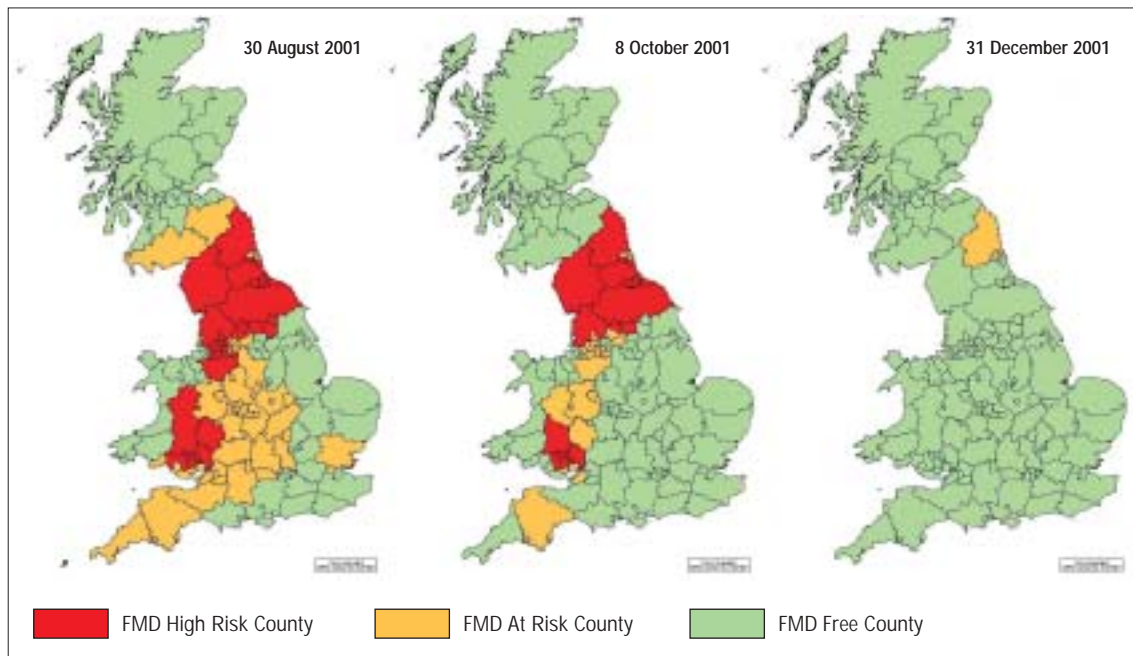
- no outbreaks in the county for the past 30 days and entirely outside an existing Infected Area/Restricted Infected Area, **and**
- serological surveillance in 3 km zone completed, **and**
- serological surveillance in 3 to 10 km zone around outbreaks not complete or at risk flocks (farms under Form D investigations and farms known to have received sheep between 1 and 23 February) still to be resolved, i.e. dead or tested negative.

FMD high risk counties

- outbreaks of FMD in the past 30 days, **or**
- surveillance in 3 km around outbreaks not completed, **and**
- surveillance in the 3 to 10 km zone not completed, **and**
- flocks at risk of FMD (farms under Form D investigations and farms known to have received sheep between 1 and 23 February) not resolved.

In allocating counties to these classifications, DEFRA also took into account the number of sheep in the county concerned and the previous weight of FMD infection as well as the amount of serological surveillance completed.

Figure C1.1: County classification showing decline of disease



Authorised movements

Movements under official control were permitted from areas of low to high FMD risk. Movements in the reverse direction were not permitted until later in the outbreak when limited movements of cattle and pigs were allowed on condition that the animals being moved were subject to prior official veterinary examination and that they were quarantined on the premises of destination for 21 days after they had moved.

In addition to the above, movements under the Livestock Welfare Disposal Scheme (a scheme set up to permit animals to be sent for disposal on welfare grounds) were allowed, subject to official veterinary inspection. Also certain other movements, under official control and subject to licence, were permitted; for example, so that animals could receive veterinary attention or so that they could be moved to common grazings.

Compulsory slaughter

All animals on infected premises were slaughtered and compensation paid. Slaughter on the grounds of suspicion of disease was also undertaken, particularly in the case of sheep where the diagnosis of FMD on the basis of clinical signs was difficult. Carcasses were either destroyed on pyres or were buried or rendered. The extent to which these methods were used varied during the outbreak and depended in part on the species of animal involved. Cattle over five years of age cannot be buried but must be destroyed by incineration or rendering because of BSE concerns. A target time of 24 hours was set for the slaughter of animals on confirmed/suspect premises starting from the time suspicion of FMD was reported to the local Disease Control Centre.

FMD-susceptible species on premises identified as being at risk of disease (**dangerous contacts**) due to contacts/links with an FMD

infected premises and identified as a result of the epidemiological enquiry, were also slaughtered. FMD-susceptible species on premises neighbouring (**contiguous**) to an infected premises were also slaughtered. However, in the latter cases, cattle and certain other animals did not need to be killed if the official veterinarian responsible for the infected premise concluded, on the basis of a risk assessment that the conditions of biosecurity under which the cattle had been held did not result in their exposure to FMD.

A target time of 48 hours was set for the animals on contiguous premises to be destroyed, starting from the time suspect FMD was reported to the local Disease Control Centre.



All animals on infected premises were slaughtered

In some parts of the country, notably parts of Cumbria, Dumfries & Galloway, the compulsory slaughter of all sheep within a 3 km radius of an infected premise was undertaken due to concerns that extensive undisclosed disease in sheep might pose a threat to cattle in the area.

Compensation

Farmers received compensation for the full market value of slaughtered animals whether they were dangerous contacts or infected animals. In addition, compensation was paid for any feeding-stuffs or any other materials destroyed or seized as being contaminated, which could not be satisfactorily disinfected. There was no compensation paid for consequential losses however they arose.

Cleansing and disinfection

Cleansing and disinfection of premises that were slaughtered out took place after carcasses had been removed. All farm buildings, machinery, farm vehicles, storage bins, silos that could have been contaminated with FMD virus etc. were thoroughly cleansed and disinfected with approved disinfectants. Cleansing and disinfection of slaughterhouses and markets etc. was also carried out if there had been any possible contact with FMD infected animals.

Lifting of restrictions

Lifting restrictions in Infected Areas is governed by EU rules and the process takes at least 30 days to allow for disinfection and cleaning and time to ensure that blood tests carried out on animals in the protection zone have proved negative for FMD. This was a rigorous process and involved veterinary inspections and laboratory testing, including blood testing, on farms around the infected premises to make sure the disease had not been overlooked.

Once farms were released from Infected Area restrictions, animals could be moved, if necessary, to any slaughterhouse willing to accept them as long as it could be reached on an uninterrupted journey, which took less than four and a half hours; a veterinarian no longer had to inspect them before movement.

Farmers could apply for licences to move their livestock to other areas under the livestock movement schemes and they were no longer restricted to licensed movements in their own Infected Area.

Biosecurity

Livestock farmers were advised that in order to stop the continued spread of the disease, the following biosecurity measures needed to be adhered to:

- prevention of contact between different groups of livestock;
- minimising the number of journeys made to visit stock;
- carrying out, at all times, the most rigorous cleansing and disinfection of personnel, equipment and vehicles.



Strict biosecurity was essential

Advice also stated that contact did not have to be direct such as examining or lambing an infected animal, but could be indirect, including driving a vehicle over a track where infected sheep have walked or putting equipment down on straw where sheep have been bedded or lambed. A small particle of infected dung trapped in the tread of tyres or boots is a typical example of how the virus may be inadvertently spread between farms.

Rural recovery

In October, Great Britain's rural recovery coordinator, Lord Haskin, published his findings into the state of the Cumbrian rural economy; the area hit hardest by the disease. Lord Haskins recommended helping the short-term survival of business.

The report highlighted measures needed to promote the recovery of the tourism and small business economy in Cumbria.

Regional seminars on recovering from FMD

A series of regional seminars, backed up by a programme of business advice for farmers whose animals had been culled, was rolled out by DEFRA. Comprehensive advice on restocking was also made available.

Farmers from over 7,500 premises who had their animals culled, received invitations to a series of seminars. These were organised through the Rural Development Service of the DEFRA.

When cleaning and disinfection had been completed, farmers whose stock had been compulsorily slaughtered were eligible for up to five days of free business advice. It was suggested to farmers that they might wish to consider remodelling their business, which could be assisted by the Department's environmental and rural development schemes. In areas where a large number of premises have been slaughtered out there may be opportunities for group activity such as marketing, environmental management or resource sharing.

The advisor, with the help of the farmer, also reviewed the farm business and arranged for an environmental evaluation to be conducted by an appropriate specialist. This helped farmers take strategic decisions about the future of the business and prepare a recovery plan.

Last case and last infected area

The last case of FMD in Great Britain was on 30 September. However, the last remaining Infected Area was not lifted until midnight on 28 November; this released 1,474 farms from Infected Area restrictions. The lift followed a programme of blood testing of sheep and goats within the 3 km protection zone around infected premises. Blood testing continued on sheep and goats within the 10km surveillance zones as part of the process towards the reclassification of counties to 'at-risk' and 'FMD-free'.

The future

Restocking

Restocking can only take place under the following conditions:

- Full and final cleansing and disinfection of the farm must take place and a period of 21 days allowed to elapse;
- Movements of stock onto the farm must be licensed by DEFRA or the Scottish Executive Environment Rural Affairs Department;
- The numbers of livestock permitted for initial restocking must be set out in the premises restocking plan, which has to be approved by the Divisional Veterinary Manager;
- Depending on the origin of sheep, testing of the flock of origin and all the sheep to be moved may be required;
- Animals must be inspected regularly for four weeks following restocking. Sheep and goats will be blood tested after 28 days. If all is clear, restrictions are lifted, following a final veterinary inspection.



Full and final cleansing and disinfection on the farm must take place

If the farmers do not wish to restock at once, restrictions are lifted four months after the full and final cleansing and disinfection, subject to a final inspection. If it was not possible to complete a full cleansing and disinfection to DEFRA's satisfaction, 12 months **must** elapse after the preliminary cleansing and disinfection before restocking can take place.

The issues around restocking went much wider than the rules designed to prevent a re-occurrence of FMD on a premises. Other issues included how to ensure that the stock brought in was free from other diseases, and making farm business and environmental advice available so that farmers could consider the business options open to them.

Resumption of imports

The ban on the importation of FMD-susceptible animals from Member States was subsequently lifted on 12 November 2001.

Independent inquiries

Two independent inquiries and a Policy Commission were set up reporting to the Prime Minister and the Secretary of State for Environment, Food and Rural Affairs into the lessons to be learned from the 2001 outbreak and the future of farming and the countryside. These are:

- **Inquiry into the lessons to be learned** from the FMD outbreak of 2001 and the way the Government should handle any future animal disease outbreak, to be chaired by Dr Iain Anderson, to 'make recommendations for the way in which the Government should handle any future major animal disease outbreak, in the light

of the lessons identified from the handling of the 2001 FMD outbreak in Great Britain';

- **Scientific review by the Royal Society** of questions relating to the transmission, prevention and control of epidemic outbreaks of infectious disease in livestock. The committee is to be chaired by Sir Brian Follet FRS and is to 'review scientific questions relating to the transmission, prevention and control of epidemic outbreaks of infectious disease* in livestock in Great Britain, and to make recommendations by summer 2002'. (*i.e. transmissible disease that have the potential for very serious and rapid spread, irrespective of national borders, that is of serious socio-economic or public health consequence and that is of major importance in the international trade of animals or animal products);
- **Policy Commission on the Future of Farming and Food**, as pledged by the Government, to be chaired by Sir Don Curry is to "advise the Government on how a sustainable, competitive and diverse farming and food sector can be created which contributes to a thriving and sustainable rural economy, advances environmental, economic, health and animal welfare goals, and is consistent with the Government's aims for the Common Agricultural Policy reform, enlargement of the EU and increased liberalisation".

These inquiries should be completed within six months. If any important emerging recommendations are made, DEFRA will publish interim findings.

Great Britain's FMD-free status (without vaccination) for the purposes of international trade was restored by the Office International Epizooties on 22 January 2002

Other diseases

Brucellosis

The national brucellosis surveillance programme continued during 2001. Bulk milk samples from all dairy herds were tested every month; beef breeding herds are blood-tested every two years. During the year, the planned level of bulk milk sampling was maintained, although blood sampling of beef herds was temporarily reduced due to FMD control measures. Cattle keepers are required to report all abortions or premature calvings to the Divisional Veterinary Manager so that the possibility of brucellosis can be eliminated. Treatment for brucellosis of cattle and contacts which have been exposed to infection must be slaughtered.

VLA research: *Brucella*-related work

A new assay, the fluorescence polarisation assay was evaluated for detection of antibody to *Brucella* in cattle, swine, sheep and goats. This assay is to be validated prior to introduction as an alternative test.

During the year, research focussed on identification of novel vaccine candidates and production of DNA vaccine constructs. Progress was made with a mouse model for evaluating the efficacy of *Brucella melitensis* candidate genes cloned into suitable expression vectors. The target date for completion of this is April 2002.

An ELISA was developed to detect production of pig gamma interferon from specifically

stimulated porcine whole blood preparations. Evaluation of porcine interferon responses for the specific diagnosis of brucellosis infection in pigs, using field samples from France, is hoped to begin in early 2002.

Enzootic bovine leukosis

Surveillance for enzootic bovine leukosis (EBL) continued by annual testing of bulk milk samples from 20% of dairy herds and blood testing of 25% of beef breeding herds. The planned level of bulk milk sampling was maintained during the year, although blood sampling of beef herds was temporarily reduced due to FMD control measures.

VLA research: enzootic bovine leukosis

The achievement of EBL disease-free status in Great Britain in July 1999 enabled some changes to be made to the EBL surveillance programme. A reduction in the volume of testing of milk from dairy cattle and serum from beef cattle, in line with EU requirements, was discussed and initiated with DEFRA. A tendering exercise was completed to appoint approved laboratories to conduct surveillance testing for both EBL and *Brucella*.

Measures were put in place within VLA Weybridge and VLA Winchester during 2001 to permit continued surveillance and diagnosis of EBL during the FMD epidemic. However, very few samples were received. The shortage of samples does not affect the national disease-free status as herds only have to be screened every four years.

VLA research: classical swine fever

The Mammalian Virology Detection Unit continued to receive submissions from suspect cases of classical swine fever (CSF), due to the increased awareness within the Animal Health Service. Large numbers of suspect cases were also anticipated due to the increasing incidence of porcine dermatitis and nephropathy syndrome.

Significant numbers of serological tests for CSF were performed in 2001 and VLA investigated 20 cases of deaths among sentinel pigs on restocked farms, all with negative results. In

addition, reverse transcription PCR tests (RT-PCR) were carried out on samples archived during the outbreak, to provide DEFRA with additional epidemiological information. In 2001, submissions of suspect cases of CSF ran at five per week, but declined markedly following the outbreak of FMD.

A collaborative project which is underway with the Institute of Animal Health, Pirbright, will investigate the immunopathogenesis of CSF. Initial work is focussed on the effects of CSF infection apoptosis and the production of cytokines.

Table C1.2: Last recorded outbreaks of notifiable disease in Great Britain

DISEASE	ANIMALS AFFECTED	LAST OCCURRED IN GREAT BRITAIN
African horse sickness	Horses	Never
African swine fever	Pigs	Never
Anthrax	Cattle and other mammals	1997
Aujeszky's disease	Pigs and other mammals	1989
Avian influenza (<i>fowl plague</i>)	Birds	1992
BSE	Cattle	2001
Blue tongue	Sheep and goats	Never
Brucellosis (<i>Brucella abortus</i>)	Cattle	1993
Brucellosis (<i>Brucella melitensis</i>)	Sheep and goats	1956
Classical swine fever	Pigs	2000
Contagious agalactia	Sheep and goats	Never
Contagious bovine pleuropneumonia	Cattle	1898
Contagious epididymitis (<i>Brucella ovis</i>)	Sheep and goats	Never

Continued over

Table C1.2: Last recorded outbreaks of notifiable disease in Great Britain (continued)

DISEASE	ANIMALS AFFECTED	LAST OCCURRED IN GREAT BRITAIN
Contagious equine metritis	Horses	1997
Dourine	Horses	Never
Enzootic bovine leukosis	Cattle	1996
Epizootic haemorrhagic Virus diseases	Deer	Never
Epizootic lymphangitis	Horses	1906
Equine viral arteritis	Horses	1998
Equine viral encephalomyelitis	Horses	Never
Equine infectious anaemia	Horses	1976
FMD	Cattle, sheep, pigs and other cloven hooved animals	2001
Glanders and farcy	Horses	1928
Goat Pox	Goats	Never
Lumpy skin disease	Cattle	Never
Newcastle disease	Birds	1997
Paramyxovirus of pigeons	Birds	2001
Pest des petits ruminants	Sheep and goats	Never
Rabies	Dogs and other mammals	1970
Rift Valley fever	Cattle, sheep and goats	Never
Rinderpest (<i>cattle plague</i>)	Cattle	1877
Scrapie	Sheep and goats	2001
Sheep pox	Sheep	1866
Swine vesicular disease	Pigs	1982
Teschen disease	Pigs	Never
Tuberculosis (<i>bovine TB</i>)	Cattle and goats	2001
Vesicular stomatitis	Cattle, pigs and horses	Never
Warble fly	Cattle, deer and horses	1990

Table C1.3: *Summary of statistics of the principal animal and poultry diseases in Great Britain from 1997 to 2001*

Years	1997	1998	1999	2000	2001
Anthrax					
Counties involved	1	–	–	–	–
Confirmed cases	1	–	–	–	–
Cattle deaths	1	0	0	0	0
Aujeszky's disease					
Counties involved	–	–	–	–	–
Outbreaks	0	0	0	0	0
Avian influenza					
Counties involved	–	–	–	–	–
Outbreaks	–	–	–	–	–
Birds slaughtered	0	0	0	0	0
BSE					
Counties involved	64	62	60	62	62
Animal deaths – cattle	5,313	4,046	2,857	1,798	1,153
Confirmed cases (by histopathology)	4,847	3,445	2,677	1,541	1,095
Contagious equine metritis					
Counties involved	2	–	–	–	–
Confirmed cases	2	0	0	0	0
Enzootic bovine leukosis					
Counties involved	–	–	–	–	–
Outbreaks	–	–	–	–	–
Number of reactors	0	0	0	0	0
Equine viral arteritis					
Counties involved	3	1	–	–	–
Outbreaks	3	2	0	0	0
FMD					
Counties involved	–	–	–	–	32
Outbreaks	–	–	–	–	2,030
Animals slaughtered	0	0	0	0	4,068,000
Newcastle disease					
Counties involved	6	–	–	–	–
Outbreaks	11	–	–	–	–
Birds slaughtered	648,000	0	0	0	0
Paramyxovirus of pigeons					
Counties involved	12	10	22	12	16
Outbreaks	17	18	36	27	20

Table C1.3: *Summary of statistics of the principal animal and poultry diseases in Great Britain from 1997 to 2001 (continued)*

Years	1997	1998	1999	2000	2001
Scrapie					
Counties involved	46	48	43	44	36
Confirmed cases	508	500	593	606	302
Classical swine fever					
Counties involved	–	–	–	3	–
Outbreaks	–	–	–	16	–
Animals slaughtered	0	0	0	74,793	0
Swine vesicular disease					
Counties involved	–	–	–	–	–
Outbreaks	–	–	–	–	–
Animals slaughtered	0	0	0	0	0
Warble fly					
Counties involved	–	–	–	–	–
Confirmed cases	–	–	–	–	–

International trade

DEFRA has an important role in ensuring that businesses and individuals are able to export animals and products by providing health guarantees to importing countries. Various measures are adhered to in order to maintain Great Britain's high animal health status. These were designed to ensure that imported animals and products of animal origin do not present unacceptable risks to the health of other animals or to people.

During the year, EU protection measures against FMD prohibited the export and import of livestock and bi-ungulate animals and placed restrictions on exports of products made from them (including milk). The ban on the importation of FMD-susceptible animals from Member States was subsequently lifted on 12 November 2001.

Exports and export controls

DEFRA has a responsibility to ensure that exports of live animal and animal products from Great Britain to Member States are in accordance with EU requirements. For Third Countries, exports are facilitated by arrangements to meet the requirements of the governing authorities in the country of destination. This is usually by export health certification, signed by an official veterinarian of the Department providing assurances regarding the current disease status in Great Britain and the health of the animal(s) or appropriate hygiene measures or processing for products. For this reason it is usually necessary for the consignment to be subject to veterinary examination prior to exportation.

Animal products

Export restrictions on animal products of bi-ungulate origin

Following confirmation of FMD in Great Britain, a Commission Decision was introduced banning all exports, including milk, of bi-ungulate origin as from 21 February 2001. A subsequent Commission Decision on 1 March replaced this and introduced certain relaxations to the Decision which were amended and updated several times during the course of the epidemic to enable a step by step approach to exports (accompanied by official certification in most cases) of the following:

- goods treated in such a way as to destroy the FMD virus;
- untreated non-Great Britain goods processed/stored/transported in such a way to prevent contamination with the FMD virus;

- untreated goods (fresh meat/preparations) derived from animals reared and slaughtered in disease-free areas in Great Britain.

Initially, processing establishments had to be wholly dedicated to processing 'export-eligible' material, but after a period during which no further outbreaks of FMD were reported, it was permissible to dedicate a time period for the processing of the material intended for export.

Only meat and products from pigs from areas which had never had a case in the current outbreak were eligible for export at first. However, this was subsequently extended to include those which had been free for three months and in which serosurveillance had been completed with satisfactory results. Also, the species of origin was extended to include cattle, sheep/goats, farmed game and wild game.

Restrictions on the export of bovine goods from Great Britain as a result of BSE continued. However, the two establishments previously approved to export beef derived from cattle born, reared and slaughtered under the Date Based Export Scheme withdrew their approval following the FMD outbreak and at the time of writing this report had not sought re-approval.

Portal surveillance to ensure compliance of the export restrictions due to BSE was extended to include FMD related restrictions.

Notifications to Member States and Third Countries

DEFRA notified the EU Member States and Third Countries of which FMD-susceptible animals had been exported prior to the FMD outbreak, and some exported animals originated from premises which were subsequently found to be infected. This resulted directly in outbreaks of disease in France and Ireland.

Semen exports

In the wake of the Classical Swine Fever outbreak in August 2000, there was steady progress made in regaining lost ground for the export of pigs and porcine semen. However, this was halted when FMD broke out and, at the beginning of the FMD outbreak, only bovine semen collected in Great Britain before 1 February 2001 was permitted to be exported to Member States. DEFRA was successful in getting agreement under EU Rules to allow the export of other categories of semen as follows:

- frozen bovine and porcine semen collected before 1 February 2001;
- frozen bovine and porcine semen imported into Great Britain in accordance with conditions laid down in relevant Commission Decisions;
- frozen bovine and porcine semen collected after 30 September 2001 in accordance with conditions laid down in relevant Commission Decision.

Ban on export of bovine embryos

Export of bovine embryos from Great Britain was already banned due to the BSE situation. This ban relates to all bovine embryos whether produced in Great Britain or imported, and whether intended for export to EU Member States or Third Countries.

Live poultry exports

Exports of live hatching eggs and day-old poultry was only marginally affected by the FMD outbreak. A number of countries initially placed a ban on all live animal imports from Great Britain but following negotiations between DEFRA and these countries, based on the fact that poultry are not capable of contracting FMD, a relaxation of the ban for nearly all importing countries was achieved. However, a small number of countries maintained their restrictions on live poultry imports from Great Britain until almost the end of the year.

Horse exports

Additional export requirements for horses from Great Britain were imposed under EU FMD protection measures, because of fears of mechanical transmission of the virus. Some Third Countries temporarily suspended the importation of horses from Great Britain or required additional safeguards.

Imports and import controls

In order to ensure that animal diseases are not imported into Great Britain DEFRA enforces a system of controls which rely primarily on imported animals and animal products being accompanied by health certification and being subject to post-import veterinary inspection. The controls fall into two main categories: those for imports from EU Member States and those for imports from Third Countries.

However, responsibility for safeguarding Great Britain's animal health status does not rest solely with DEFRA. In accepting the greater freedom under the Single Market, importers must assume responsibility for knowing what they are importing and under what conditions it should be imported.

Controls on legal imports

Most live animals consigned to Great Britain from other Member States must be accompanied by an official health certificate. The certificate contains information on the origin of the animals and also includes assurances relating to their health status. EU controls require certification and notification of arrival of imports into Great Britain from other EU Member States. DEFRA has powers to carry out spot checks at the premises of destination.

Animals and animal products being imported into Great Britain from Third Countries must be checked at a Border Inspection Post either in the first Member State they transit when they reach the EU or in Great Britain if on a direct route.

Imports from both EU Member States and Third Countries which do not comply with import conditions are re-exported or destroyed and personal imports of animal products are strictly limited.

Following interruption by FMD, work on disease control measures resumed on a new Statutory Instrument to replace the Products of Animal Origin (Import & Export) Regulations 1996.

Controls on illegal imports

No matter how strict import controls are it is not possible to guarantee that disease will never enter the country. In Great Britain, co-ordinated cross-Government action is underway to reduce the risk from imported meat and other products, including:

- better information for people travelling;
- more effective sharing of information among the enforcement agencies;
- better targeting of resources at ports;
- actively considering further options.

During the year, DEFRA was in the process of updating and strengthening enforcement legislation on imports and this is scheduled to be in place by early 2002.

Captive birds

The new Commission Decision on captive birds took effect on 1 November. This laid down harmonised conditions for export health certification, post-import quarantine and disease testing for captive birds imported to EU Member States from Third Countries. This involved very little change to quarantine measures in Great Britain but there were considerable changes in other procedures, such as the abolition of import licences and greater involvement Local Veterinary Inspectors in quarantine inspection duties.

As a result of the introduction of harmonised conditions for the import of captive birds to all Member States, it was possible to reduce the formalities associated with the movement of captive birds within the European Community. Licensing and quarantine have been abolished for the import of captive birds and pet birds to Great Britain from other Member States.

Poultry imports

British poultry imports are mainly commercial generation layers or broilers. There was some increase in the volume of imports, as a reduction in sales of red meat, as a result of FMD, resulted in greater sales of poultry.

VLA research: international trade programme

In Autumn 2001, serum samples taken from turkey poults imported from the United States of America whilst in quarantine were found to be sero-positive for *S. arizona*. Repeat testing was also sero-positive for many birds but no *Salmonella* was isolated from the birds at post-mortem or from two rounds of intensive faecal culture from the flocks. On subsequent inquiry, it was discovered that for the past several years the United States' turkey company had routinely used a multi-organism polyvalent 'autogenous' flock vaccine in parent flocks. Included in this vaccine were *S. agona*, *S. anatum* and *S. reading* as well *P. multocida*. It is possible that the use of this vaccine may have provoked some non-specific maternal immunity but there are no antigens shared with the turkey Arizona strain and the vaccine

has been in use for several years without producing the persistent reactors which occurred with this consignment. It is possible that a temporary change in growth conditions for vaccine production may have led to increased immunogenicity or that the parent flock may have been exposed to a transient *Salmonella* infection which may have led to higher than normal maternal antibody levels.

VLA research: equine viral arteritis

A TaqMan RT-PCR test for screening semen was developed, which is superior to virus isolation as a means of detecting equine viral arteritis. Once full validation is achieved, the test will be offered for consideration as an alternative to pre-export isolation for import certification.

Livestock protection

Artificial breeding activities were severely curtailed by the FMD epidemic during 2001. Emergency artificial insemination (AI) regulations were implemented to allow certain activities to resume. Significant restructuring of the bovine AI industry took place during the FMD epidemic, with one company ceasing to offer inseminator services and the closure of another semen processing centre.

Artificial insemination

AI in cattle and pigs is carried out under statutory controls. Most activities may take place only under authority of licences granted by the appropriate Minister.

Due to the FMD epidemic a veterinary risk assessment was carried out and appropriate licence conditions developed to allow certain activities to resume. In order to implement these, it was necessary to amend the FMD order and bring in emergency AI regulations.

Bovine AI

Bovine semen may only be collected from bulls which have undergone clinical examination and testing by a DEFRA Veterinary Officer or, exceptionally, an AI centre veterinarian. However, on-farm semen collection was suspended during the FMD epidemic.

Significant restructuring of the bovine AI industry took place during the FMD epidemic, with one company ceasing to offer inseminator services and the closure of another semen processing centre. These premises were subsequently purchased by a consortium, which plans to reopen them in due course.

Training in AI

The epidemic highlighted legal and practical difficulties over inseminator training. Steps were taken to begin to regularise the position by preparing a draft order under the Veterinary Surgeons Act and a draft amendment to the 1985 AI Regulations.

Ovine AI and embryo transfer

Great Britain does not normally regulate ovine germplasm movements but these were not permitted into, within or out of infected areas except under licence during the FMD epidemic. Licences to permit some AI and embryo transfer in sheep within FMD infected areas were issued. Inconsistencies, however, developed between controls over the movement of live animals and controls over the movement of germplasm.

Porcine AI

No movements of semen were permitted from pig AI centres within infected areas.