Control of foot and mouth disease: lessons from the experience of Ireland

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Summary
The authors outline the measures applied in Ireland to prevent the introduction of foot and mouth disease (FMD) from the United Kingdom, France and the Netherlands, to stamp out the disease in Ireland following confirmation of an outbreak on 22 March 2001 and to conduct serological surveillance in order to prove freedom from the disease. Successful control was the result of prompt action and extensive culling in the area around the infected premises. This was achieved by the State Veterinary Service operating with the assistance of the personnel and equipment resources of many Government departments, private industry and private veterinary practitioners, with the co-operation of the farming community and general public. In order to ensure effective use of these resources, good systems of communication and information technology are vital, as are the existence of detailed contingency plans and trained staff.

Keywords

Introduction

Sixty years have elapsed since the last epizootic of foot and mouth disease (FMD) occurred in Ireland. Ireland has never vaccinated to control FMD. However, as a major exporting country of livestock and livestock products, the occurrence of FMD in neighbouring countries always caused heightened awareness. This was true also in the recent outbreak. Although action was prompt and prudent, Ireland was very fortunate to contain the outbreak to a single episode. The presence of FMD in a neighbouring country had increased awareness, ensured prompt action and simplified diagnosis and surveillance.

Risk of infection from European member states infected with foot and mouth disease

During 2001, FMD was confirmed in the United Kingdom (UK), France and the Netherlands (on 20 February, 14 March and 21 March, respectively). An immediate ban was imposed on the import of live susceptible species and of products of susceptible species from these countries (unless appropriately treated).

All imports of live susceptible species from these countries, from the estimated earliest possible date of infection, were traced (from the UK from 1 February, France from 16 February and the Netherlands from 20 February).

A total of 78 consignments (13,115 pigs) had been received from Northern Ireland, UK. These had been consigned to four slaughter plants. Records of slaughter of these consignments were verified. Four consignments (1,501 sheep) had been received from Great Britain (GB). All susceptible species on the farms of destination were clinically examined and serological samples taken from the sheep. All imported and in-contact animals were then slaughtered, as a precautionary measure. All animals tested gave negative results.

Two consignments (6 cattle) had been received from France and two consignments (68 cattle) had been received from the Netherlands. All susceptible species on the premises of destination of the cattle were clinically examined and kept...
under observation until at least 21 days after import. No clinical signs of FMD were found.

**Control measures at ports and airports**

Following the outbreak of FMD in the UK, considerable resources were deployed along the 400-km land border with Northern Ireland (141 checkpoints) and at the 12 major ports and 8 airports of the State with international connections. The measures taken included the dissemination of information, automatic and manual disinfection of vehicles, placing of sanitised mats for disinfection of passenger footwear, confiscation of prohibited meat/milk products, certification checks, second-hand farm machinery checks and disinfection and increased supervision of the disposal of food waste from ships/aircraft.

During the operation of the controls at the ports and airports, the full extent of food of animal origin being moved in international travel as personal luggage became evident. Meat and milk products seized from passengers arriving at Dublin Airport included items coming from 18 countries in which FMD is endemic.

Outbreak of foot and mouth disease in Northern Ireland

Following the confirmation of FMD in sheep on premises in Meigh, County Armagh, Northern Ireland, on 1 March (at a distance of approximately 2 km from the border with Ireland), the following measures were applied in that area of the border adjoining Northern Ireland:

- establishment of a 3-km protection zone (which was later extended) and a 10-km surveillance zone in County Louth, on the frontier with Northern Ireland (Fig. 1)
- checks (for animals and animal products) and disinfection of vehicles leaving the control zones (Fig. 2)
- census of all susceptible species within the Irish parts of the zones arising from the outbreak in Northern Ireland (3,300 cattle, 18,500 sheep, 13 goats, 14 pigs, 250 deer in the protection zone and 5,300 cattle, 20,700 sheep and 13 goats in the surveillance zone)

![Fig. 1 Map showing the location of the control zones around foot and mouth disease outbreak number 2001/1 in Northern Ireland](image)

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regular clinical examination of all animals within the protection zone and a proportion of those in the surveillance zone

– cull of all sheep and goats within the zones

– serological tests of cattle herds within the zones.

Tracings from the Northern Ireland outbreak
Information received from the Northern Ireland authorities on the movements of sheep from the infected premises in Northern Ireland led to extensive investigations by the Special Investigation Unit (SIU) of the Department of Agriculture, Food and Rural Development (DAFRD) and the National Bureau of Criminal Investigation (NBCI) of the police. A total of seven premises in Ireland (including two abattoirs) were found to have received sheep from the single consignment of sheep imported illegally from Great Britain into Northern Ireland on 19 February. All of these premises were identified, all susceptible species on them were clinically examined, a representative number of sheep and cattle were serologically sampled, and all susceptible species were then slaughtered as a precautionary measure. The results of all clinical and serological tests conducted were negative for FMD. The investigation into this one consignment led to a total of over 400 traces of people, livestock, vehicles, animal contacts and of products from the abattoirs.

Outbreak of foot and mouth disease in Ireland

Suspicion of disease
Foot and mouth disease was first suspected in one ewe on a holding containing 113 cattle and 447 sheep at Broughattin, County Louth on 20 March. The holding was located 8 km south of the infected premises in Northern Ireland and within the extended protection zone established around the Northern Ireland outbreak. The area consisted of a peninsula (Cooley Peninsula), bound to the east and part of the south by the sea and bordering Northern Ireland to the north. Half of the restricted area consisted of mountains, which provided common grazing for sheep. The holding had been subject to the nation-wide ban on the movement of susceptible species effective since 28 February and to the movement control measures and clinical surveillance imposed in the protection zone from 1 March.

The holding consisted of seven land fragments containing livestock – five containing sheep only and two containing both cattle and sheep. Two fragments were in the protection zone and five were within the surveillance zone – towards the eastern part of the Cooley Peninsula (Fig. 3). The suspect animal was located in a field containing 97 ewes that had lamed over the previous three days. On close examination, nine of the first ten ewes examined presented clinical signs of FMD, i.e. erosions on the dental pad, gums and lips which were four to five days old. One had intact vesicles and some had ruptured vesicles on the coronary bands and inter-digital spaces of the feet, some had elevated temperatures but no other clinical signs and others had normal temperatures but were depressed (16). Three one- to two-day-old lambs had died in the previous 20 h and 12 more died during the course of the examination.

Confirmation of disease
Tissue and blood samples were taken on 20 March and the affected animals were slaughtered that day as a precaution. The samples were sent to the Institute for Animal Health, Pirbright Laboratory, UK, for confirmation. Confirmation was received on 22 March that two of the five samples were positive to the antigen capture enzyme-linked immunosorbent assay (ELISA) for foot and mouth disease virus (FMDV) serotype O.

Examination of animals on infected holdings
Clinical and serological examination of the animals on each of the seven land fragments, which constituted the infected premises, showed that two fragments contained infected animals. These were approximately 250 metres apart. On the first holding, 17 out of 28 animals tested were sero-positive. The second holding, sampled at the time of culling, showed 15 out of the 16 animals tested to be sero-positive and is thought to be the index case. Some of these animals had clinical lesions of the disease. A third fragment was found to have one sero-positive sheep out of ten animals sampled. Clinical evidence of infection with FMDV was neither detected in the third group, nor in the cattle on the holding.

Measures applied following the outbreak in Ireland
The following measures were immediately applied following the outbreak, in accordance with the requirements of European Union (EU) Council Directive 85/511/EEC (6):

– extension of the existing protection and surveillance zones (Fig. 4)
Fig. 3  
Map showing the location of the various land fragments of the infected holding, sero-positive holdings and commonage where sero-positive wild goats were found

Courtesy of G. McGrath

- census of all susceptible species within the extended zones (5,724 cattle, 23,640 sheep, 14 pigs, 17 goats and 265 deer in the protection zone and 15,148 cattle, 26,192 sheep and 13 goats in the surveillance zone)
- slaughter and burial on-site of all susceptible species on the remainder of the infected land fragments within 24 h (clinically affected animals were slaughtered on suspicion)
- epidemiological investigation into the source of infection and possible spread from the infected premises
- preliminary and final cleaning and disinfection of the infected premises
- cull of all susceptible species within 1 km of the infected premises within 36 h (32 holdings – 486 cattle and 3,395 sheep)
- extension of the cull to include all wild goats and deer (on the entire Cooley Peninsula) from 26 March (273 goats and 5 deer)
- extension of the cull to include all sheep within an area of 160 km² from 4 April (the entire Cooley Peninsula) (400 holdings – 48,744 sheep, 1,123 cattle, 2,908 pigs, 280 deer and 166 goats)
- clinical examination and random serology of culled animals (see ‘Epidemiological investigation and serological surveillance’ below)
- clinical examination and serology of all susceptible species remaining on holdings within the protection zone (795 samples from cattle)
- clinical examination and serology of all remaining sheep and goat holdings and random clinical examination and serology of cattle holdings in the surveillance zone, in accordance with Commission Decision 2001/293/EC (5) (7,062 samples – 5,783 cattle, 1,273 sheep and 6 goats)
- prohibition on the movement of FMD-susceptible species into, within and out of the zones
- ban on gatherings of susceptible species (including markets, fairs and shows)
- prohibition on artificial insemination
- treatment of milk from holdings within the zone.

In addition, measures were introduced to control the movement of livestock and animal products from the County of Louth, in accordance with Commission Decision 2001/234/EC as amended by Commission Decision 2001/267/EC (3, 4).

Establishment of a local disease control centre

Following the outbreak in Northern Ireland, a hotel was requisitioned as a Local Disease Control Centre (LDCC). This was established by DAFRD within the surveillance zone in
Ireland, for the management of surveillance visits and border controls. A separate building (a local sports club) was taken over for the operation of a cleaning and disinfection centre for staff and vehicles. This was within the surveillance zone, approximately 14 km from the hotel.

Cull of animals at risk

During the outbreak in Ireland, a total of 53,000 animals were clinically examined and slaughtered during the precautionary cull in County Louth. Ireland was fortunate to have a disused abattoir 1 km from the infected premises, which was used for this purpose. Adult sheep and pigs were killed using an electrical stunner, followed by bleeding. Lethal injection of pentobarbital sodium was used for lambs. Cattle were killed using a captive bolt, followed by pithing.

Wildlife cull

The Cooley Mountains provided common grazing for approximately 25,000 sheep, several groups of wild goats and a small number of deer. The wildlife cull involved the cooperation of personnel from a number of different Government departments and other sources. The Office of Public Works wildlife rangers identified the local wildlife population. Defence forces were used to identify the wild animals from the air, to shoot the animals and to remove the carcasses by helicopter. Private veterinary practitioners located the carcasses, examined them for lesions, blood sampled them and bagged them prior to removal for destruction. Local hunters were deployed to kill any deer remaining after the main cull. The discovery of two sero-positive goats in a group slaughtered on the commonage during the 1 km cull of susceptible species led to the decision to extend the cull to all sheep on the Cooley Peninsula on 4 April (see ‘Epidemiological investigation and serological surveillance’ below).

Destruction of carcasses

A decision was made that funeral pyres would not be used for the destruction of carcasses for reasons of public relations, cost, speed and environmental concerns. Animals on the infected premises were buried in situ. The carcasses and blood of animals slaughtered during the cull were transported in sealed containers for rendering, under official supervision. Cattle were eviscerated and the carcasses quartered to facilitate transport. The rendered material was stored under official supervision and later incinerated.
Epidemiological investigation and serological surveillance

During the cull, a total of 4,400 blood samples were taken from 48,744 sheep, 114 from 273 wild goats and 3 from 5 wild deer (in contiguous or epidemiologically connected holdings). These samples revealed positive serology in single animals on two contiguous holdings and in two wild goats of a group of 25 animals found in close proximity to the infected premises. No clinical signs suggesting infection were seen in any of these animals. Whilst infection was not confirmed, the serological results indicated the possibility of early infection.

Samples taken from sheep in the land fragment with the first detected case and in the second infected land fragment yielded information suggesting that the latter may have been the index case in the Republic of Ireland. The proportion of animals sampled with antibody titres, the proportion with high titres, the absence of detectable viraemia in sheep on the second land fragment and the history of animals having been moved from the second land fragment to the first, all tend to confirm this belief. Estimates, based on the average incubation periods and stages of infection, indicate the occurrence of two cycles of transmission and suggest that infection first occurred between 25 February and 1 March.

Nucleotide sequencing of one of the viruses isolated demonstrated close similarity between the isolate sequenced and those of viruses belonging to the pan-Asian O topotype. The virus was indistinguishable from viruses isolated from County Armagh, Northern Ireland, as well as isolates from the UK outbreak (14; N.J. Knowles et al., personal communication).

The source of the infection was not identified, but there is strong circumstantial evidence of an indirect contact between the infected premises in County Armagh, Northern Ireland, and a neighbouring farm to the first infected premises in County Louth. Police investigations are continuing.

Following the cull, extensive clinical and serological surveillance was conducted in the protection and surveillance zones. No further cases of FMD were detected. Over 23,890 samples were tested in a targeted survey in the affected county and in other areas of the country where both legally and illegally imported stock were located. Of these, 463 samples were sent to Pirbright for confirmation. All yielded negative results, except for the 39 samples from the infected farm.

Treatment of milk produced in County Louth

Following the outbreak in Northern Ireland, a total of 32 milk producers were affected by the controls in the zones. Initially, on-farm acidification using citric acid was used to treat the milk, prior to destruction. Subsequently, a dedicated vehicle fitted with virus filters was used to transport the milk to a designated plant for double high temperature short time (HTST) treatment. Following the outbreak in Ireland, a total of 300 suppliers in County Louth and four milk-processing companies were affected. The milk from these farms was processed into whole milk powder.

Lifting of the control zones

The checkpoints around County Louth were removed on 19 April, leaving the protection and surveillance zones intact.

The protection and surveillance zones were lifted on 30 April, following the completion of all clinical examinations and serological testing.

The status of Ireland as ‘FMD-free without vaccination’ under the Office International des Epizooties (OIE: World organisation for animal health) rules was regained on 22 June 2001. This status was confirmed by the OIE on 19 September 2001.

Additional control measures in the remainder of the country

The following measures were introduced throughout the territory of the Republic of Ireland:

– ban on markets and other gatherings of susceptible species from 26 February
– ban on movements of susceptible species from 28 February (except under permit, direct to slaughter from 6 March, or for welfare reasons from 8 March)
– reinforced rules on cleaning and disinfection of livestock vehicles following transport of susceptible species
– increased veterinary personnel assigned to slaughter plants for the purpose of more detailed ante-mortem examination of sheep
– ban on the feeding of swill to susceptible species from 28 March
– ban on artificial insemination of susceptible species
– ban on sheep shearing
– intensive public information programme directed at farmers, veterinarians and the general public.

Disease surveillance in the remainder of the country

Laboratory testing

Laboratory contingency plans for the investigation and sampling of animals suspected to be infected by FMD were in place. Sampling kits were deployed regionally and a standard
operating procedure (SOP) was available for on-farm investigation and sampling. Procedures were implemented for tissue sampling, transport media (13), compliant transport containers, training and forms, in compliance with laws concerning transportation of samples to Pirbright (1) and for the co-ordination of such submissions.

The World Reference Laboratory for FMD in Pirbright (Institute for Animal Health) is also the EU national reference laboratory for Ireland where all the testing in connection with trade, quarantine and suspect investigations are performed. Prior to the outbreak, the introduction of laboratory reagents from a biosafety category 4 laboratory working with foot and mouth disease virus was considered to be an unacceptable risk. However, when the disease occurred in the UK, the policy was changed to allow the importation of inactivated reagents for ELISA screening using the liquid phase blocking ELISA (LPBE) (11) and the antigen capture ELISA (9, 22). Samples screened using the LPBE, which gave suspicious results were referred to Pirbright for a titre ELISA and for the virus neutralisation test (VNT).

**Passive surveillance**

A total of 159 reports of suspicion of FMD was received between 21 February and 21 June, from most regions of the country. Veterinary inspectors investigated these suspect cases. In 44 of the cases, FMD could not be ruled out clinically and veterinary research officers from the regional veterinary laboratories network took samples for virus isolation and serological testing at Pirbright Laboratory. One case was confirmed as FMD-positive (Outbreak Number FMD2001/1) and 43 were found to be negative. Primary submission for the diagnosis of other diseases (as a differential diagnosis) was rare because of practical difficulties.

**Active surveillance – national serological survey in sheep**

The need to conduct serological surveillance to prove freedom from the disease and the difficulties in the clinical detection of sheep infected with the pan-Asian O topotype prompted a national serological survey of the sheep population (consisting of 7 million animals in 38,325 flocks). The survey design was based on, and exceeded, the recommendations for serological surveillance in the ‘Guide to the establishment and maintenance of FMD-free zone or country’ which was circulated at the OIE/FAO International Scientific Conference on FMD on 17/18 April 2001.

A computer-generated, random survey was conducted in two phases. Phase 1 concentrated on flocks in 18 counties which were at the greatest risk of having sheep introduced from Northern Ireland or Great Britain. A total of 3,639 of 18,388 flocks was sampled. Proportional weighting was given such that flocks with more than 100 sheep were five times more likely to be selected than those with 20 sheep. Each epidemiological unit within each selected flock was sampled using a formal random technique that would give 95% confidence of detecting at least one sero-positive animal if a prevalence of 5% or greater was obtained.

Phase 2 concentrated on the lower risk flocks in the remaining counties. A total of 308 of 19,937 flocks was sampled, giving 95% confidence of detecting sero-positive flocks if they were present at a prevalence of 1% or greater. The within-flock sampling was conducted as described above.

All sampled sheep were individually identified. The survey was conducted between 8 May and 25 July using the LPBE at the Central Veterinary Research Laboratory, Dublin. A total of 159,868 samples from 3,957 flocks from all 26 counties was tested. Of these, 1,232 samples were sent to Pirbright for confirmatory testing. This yielded 11 singleton inconclusive samples. All samples were found to be negative on retest, with the exception of one which was also inconclusive on retest. This animal was slaughtered. A total, including clinical suspect investigations, of 184,324 samples was tested. This scale of testing made the transportation of samples to Pirbright impracticable even if the laboratory was capable of handling all the samples in addition to their own extensive requirements. Ireland again was fortunate, considering the problems in Great Britain and Northern Ireland, that sufficient reagents were available for the requirements of both Ireland and France to be accommodated by the Pirbright Laboratory (12).

**Resources**

The DAFRD is the Irish Government department with responsibility for the control and eradication of the List A diseases of animals. However, many Government departments and agencies were actively involved in the measures required to eradicate FMD and to prevent further incursions of the disease from the UK.

In the days immediately after the outbreak in the United Kingdom, the Government established an FMD ‘Task Force’ to co-ordinate the response of the different Government departments and agencies in the fight against FMD. This Task Force was chaired by a Taoiseach (the Prime Minister) or in his absence, by the Minister for Agriculture, Food and Rural Development and met on a daily basis from 27 February. The Task Force included ministers and/or senior representatives from DAFRD, the Department of the Marine and Natural Resources, the Department of Finance, the Department of Public Enterprise, the Department of the Environment and Local Government, the Gardaí (police force), the Defence Forces and the Revenue Commissioners (customs). The Task Force played a vital role in co-ordinating the full State response to the FMD threat.
The Gardaí were involved in the controls at borders and control zones, in the enforcement of movement controls and also in assisting in the investigation of illegal imports of animals. At the peak of the crisis, 20% of the police force was involved in FMD control measures.

The following Government departments and agencies were involved in assisting in the FMD eradication and control strategy:
- Defence Forces (checkpoints and wild animal culls)
- Farm advisory service (issuing permits for animal movement and advising and counselling farmers)
- Customs authorities (controls at ports/airports)
- Department of the Marine and Natural Resources (controls at sea ports)
- Department of the Environment and Local Government (disposal of swill)
- Department of Public Enterprise (controls at small ports)
- Meteorological Office (modelling the assessment of airborne spread)
- Environmental Protection Agency (advising on carcass disposal)
- Local authorities (on-farm disposal of carcasses)
- Office of Public Works (contingencies for on-farm burning of carcasses)
- Farm Relief services (cleaning and disinfection at ports and borders)
- Waterways Ireland (disposal of swill from craft on inland waterways).

To respond to the outbreak in the UK, DAFRD closed down many of the schemes not involved in List A disease control and released the staff to deal exclusively with FMD.

Training

As part of contingency planning, training of departmental staff had taken place over several years. This had been focused on the decision-making process for the efficient control of disease outbreaks (for example the diagnosis of FMD, epidemiology, the control of suspect premises and of confirmed premises, the controls in protection and surveillance zones, etc.). Staff were trained at the Institute for Animal Health, Pirbright, UK. Staff also assisted when outbreaks of OIE List A diseases occurred in other countries. This was a particularly valuable way of gaining practical experience.

Communications

Communication with the public is an integral part of dealing with an FMD crisis. In the experience of Ireland, there was an insatiable demand from the media for information on FMD and the measures being taken to prevent or control the disease. Initially, this demand put enormous pressure on staff who were trying to deal with the measures necessary to fight the disease. The fact that the press office kept in close and regular contact with the media to disseminate information, to keep the public informed and to explain the reasons behind the measures taken was found to be essential. Mobilising public awareness/opinion was an integral part of the FMD campaign.

After the first week following the outbreak in the UK, DAFRD established daily press conferences chaired by the Minister of Agriculture, Food and Rural Development and attended by the Chief Veterinary Officer and Secretary General. This mechanism was invaluable in that it allowed DAFRD to organise the dissemination of information in its own time and to focus press attention to a particular time each day. This allowed the Minister and officials to continue with the essential tasks of dealing with the disease during the rest of the day. These press conferences continued until 10 May 2001.

Two other methods used in the campaign played a major role in informing and updating the public. Information was posted on the DAFRD website (which recorded 3 million hits up to 22 June and 600,000 hits in one week at the height of the crisis). A telephone help-line was also established to provide advice and information from 2 March onwards. The service operated 7 days a week, and was staffed by 48 people operating on 4 shifts per day. Up to 22 June, in excess of 30,000 calls had been received, with 2,500 calls per day at the peak of the crisis.

Daily information meetings were held with farmers in the affected area. Such meetings were regarded as essential to maintain their co-operation. The response of the general public, farmers and industry was massive.

Other methods used included providing information for television and radio news items and newspaper articles, advertisements in local and national newspapers by DAFRD and other Government departments, radio and television advertisements, press releases, and posters at ports, airports, DAFRD offices, public buildings and private premises.

Scientific Committee on foot and mouth disease

To assist and advise Government departments and other bodies responsible for introducing measures in relation to FMD control and prevention, the Minister for Agriculture, Food and Rural Development established an Expert Group chaired by the Dean of the Veterinary Faculty and composed of experts from a variety of fields and disciplines relevant to FMD control and prevention. The purpose of the group was to advise on the extensive range of controls in place and the appropriateness of adapting them to developments as they occurred. The main task was to ensure that the measures introduced were
consistently and were proportionate to the objectives to be achieved.

In formulating their advice and to ensure broad acceptance of the advice given, the Group met with and considered submissions from many different stakeholders.

Information technology

An information technology (IT) system capable of dealing with all the relevant information required at LDCC and National Disease Control Centre (NDCC) level is essential. This must include databases on holdings containing all susceptible species and be capable of providing lists of herds within zones, scheduling tasks (suspects, tracings, census, samples, slaughter, valuation), allocating tasks to individuals, tracking of laboratory samples and generating daily reports of key information.

In the Irish experience, parts of this system were not available at the start, but evolved during the course of the outbreak. Following a review carried out in November 2001, further refinements are proposed in the context of the overall DAFRD strategy.

Lessons learned from the experience of Ireland

Prevention

It is vital to have in place systems to identify and control food of animal origin being moved as personal luggage in international travel and illegal imports of food and food products, in particular from countries in which FMD is endemic.

Close co-operation between the Gardaí and the competent authorities, and between the equivalent services in neighbouring/trading countries was shown to be important in identifying and investigating illegal activity.

Control

The contingency plan of Ireland was drawn up to meet EU guidelines and was approved by EU Commission Decision 93/455/EEC (2). Future contingency plans should address additional issues, in particular those relating to the scale of response needed, the resources required by the State Veterinary Service and the role of the different Government departments and agencies (including the deployment of staff from these).

Whereas to date, training has focused on the professional aspects of control, this should be extended to additional issues and should include staff likely to be deployed from other areas of DAFRD and from other departments and agencies in the event of an outbreak.

The importance of having contingency plans which include biosecurity protocols for milk collection, ready availability of virus filters for milk tankers and treatment options for milk collected in infected areas was also evident in this outbreak.

The early introduction of a properly focused communications campaign (including a website, telephone help-line and a daily press briefing) plays a vital part in maintaining public support following an FMD outbreak. This also allows staff to concentrate on the core activities of prevention and control of the disease.

An efficient IT system, capable of linking data from the LDCC, NDCC and laboratories, is also a key element in the effective management of an outbreak. Ideally, such a system should be based on existing animal disease control IT systems, with which staff are familiar, in order to ensure maximum efficiency and effectiveness. A computer-based mapping system which identifies each fragment of land in the same ownership is also an invaluable aid in implementing effective control measures.

The establishment of the Government Task Force, led from the centre of Government, to co-ordinate the actions of the various Government departments and agencies was essential in maintaining both a coherent approach to FMD control and in ensuring that the matter was treated as a priority by each department and agency.

The establishment of the group of experts, chaired by the Dean of the Veterinary Faculty, to advise on the range of controls in place ensured that the measures adopted were consistent between the different organs of Government and were proportionate to the objectives to be achieved. Importantly, the group also ensured that all stakeholders accepted the control measures as necessary.

The early introduction of a nationwide prohibition on the movement of susceptible livestock when a real risk of FMD exists is essential to prevent the introduction and spread of the disease. A standstill period following movements of animals onto farms, should apply at all times.

In relation to preventive slaughter, the serological evidence obtained in the survey carried out in the Cooley Peninsula supported the decision to cull susceptible species within 1 km of the infected premises and all susceptible species with access to the common grazing on the Cooley Mountains.

Laboratory diagnosis

In light of the events which occurred in 2001, Ireland must now prepare for a future epizootic by re-evaluating the testing options of the country. A contingency for sampling and testing tissues from hundreds of suspect cases must be prepared and the test options required for surveillance and verification of disease freedom must be considered.
Ready availability of reagents and control standards are necessary for the support of diagnostic facilities and surveillance testing. Ideally, these would be located in a reagent bank, in the same way as FMD vaccine and antigen are available.

The solid phase competition ELISA would be the test of choice in screening for antibody for the purposes of epidemiology, surveillance and trade (15), and the early validation and international recognition of this assay for trade is essential (17, 18).

Other options would include the use of the non-structural protein (NSP) ELISAs, e.g. the 3ABC ELISA, as an additional epidemiological tool (7, 23). Validation for species other than cattle is necessary. In the event that vaccination was used, this method would enable differentiation between vaccinated and infected animals.

Virus isolation and propagation of virus for the performance of virus neutralisation tests will take place in the new category 3 laboratory (18) currently under development in Ireland. This will decrease turn-around times and help to minimise costs caused by investigations into suspect cases, especially at abattoirs.

A reverse transcriptase polymerase chain reaction (RT-PCR) has been described which can differentiate clinical tissue infected with one of the five strains of FMD virus from those infected with swine vesicular disease virus, encephalomyocarditis virus or bovine viral diarrhoea virus (24). Other studies using primers from the 1D and 2AB regions, which discriminate between strains, are insufficiently sensitive with all strains to replace rather than to augment existing technology (20). Recent work using universal primers on clinical material likewise resulted in a PCR which augmented existing technology (19). More recent reports (21) suggest that a real-time fluorogenic assay can give results on field samples comparable with those obtained with combined antigen capture ELISA and virus isolation. Should this prove to be the case, the assay represents a technology which could be usefully applied in an Irish context.

A rapid ‘penside cow test’ (10) using ‘clear view’ technology may have applications where a number of outbreaks have occurred and rapid results are required. Another rapid cow-side test, based on PCR technology, has been evaluated but with disappointing results (8), although these are likely to be improved with enhanced reagents.

Where tests involve the use of live virus, adequate arrangements for the regular training of laboratory staff in appropriate biosecure laboratories are necessary to ensure that core staff are available to facilitate the rapid introduction and expansion of a testing capability in the event of a crisis.

The use of photography to record clinical lesions (without compromising biosecurity) is warranted in any future outbreak. This is necessary to describe the clinical entities which present problems in differential diagnosis of FMD.

It is envisaged that in a situation of multiple outbreaks, veterinary inspectors will carry out whatever sampling is necessary (as opposed to veterinary research officers from regional laboratories). In a worst-case scenario, confirmation on clinical grounds only may apply, with sampling being carried out for epidemiological purposes where practical.

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Prophylaxie de la fièvre aphteuse : les enseignements de l’expérience irlandaise

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Résumé

Les auteurs exposent les grandes lignes des mesures adoptées par l’Irlande pour empêcher l’introduction de la fièvre aphteuse à partir du Royaume-Uni, de la France et des Pays-Bas, pour éradiquer la maladie (après confirmation de l’existence d’un foyer, le 22 mars 2001) et pour assurer la surveillance sérologique permettant d’attester du statut indemne de maladie. La rapidité de l’intervention et l’ampleur du programme d’abattage dans les zones entourant les exploitations contaminées expliquent le succès des mesures prophylactiques. Ce résultat a été obtenu grâce aux efforts des Services vétérinaires de l’État, avec le soutien en ressources humaines et en matériel de nombreux autres services publics, du secteur privé et de vétérinaires privés, et grâce à la coopération des collectivités rurales et du public. Il est capital, pour mobiliser efficacement ces ressources, de disposer de systèmes d’information et de communication performants, de plans d’urgence détaillés et d’un personnel entraîné.

Mots-clés


Enseñanzas de la experiencia irlandesa en cuanto al control de la fiebre aftosa

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Resumen

Los autores describen brevemente las medidas preventivas aplicadas en Irlanda a fin de impedir que la fiebre aftosa penetrara en el país desde el Reino Unido, Francia y los Países Bajos, eliminarla completamente en cuanto se tuvo confirmación de un brote (el 22 de marzo de 2001) e implantar medidas de vigilancia serológica para demostrar la ausencia de la enfermedad. El éxito de esa campaña de lucha estriba en la rapidez con que se intervino y la amplitud de los sacrificios sanitarios que se practicaron en los alrededores de las explotaciones infectadas. Para ello, los servicios veterinarios oficiales contaron con la ayuda en forma de personal y material de otros muchos ministerios y del sector privado (industria y veterinarios clínicos), y también con la colaboración de todos los círculos de profesionales de la ganadería y del gran público. Para garantizar que esos recursos se utilicen con eficacia es fundamental disponer de buenos sistemas tecnológicos de comunicación e información, de planes detallados de respuesta a los imprevistos y de personal bien formado.

Palabras clave

References


