

The position of the Dutch Farmers' Union on lessons learned and future prevention and control of foot and mouth disease

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Summary

Foot and mouth disease (FMD) has devastated animal husbandry in the Netherlands frequently in the past and still constitutes a threat. The use of vaccination reduced the number of outbreaks in the Netherlands in the 20th Century. However, the desire of some member states of the European Community not to use vaccination led to a new strategy based on stamping-out of infected and contagious farms and to strict transportation regulations. In 2001, this proved very disruptive to the wider rural economy, such as the recreational and tourism sectors. The policy also caused severe animal welfare problems and psychological problems among farmers and their families. This raised questions about the wider, and not only veterinary or agricultural, implications of control strategies of foot and mouth disease virus (FMDV). The technology seems to be in place for a return to the use of protective vaccination against FMDV during an outbreak, provided the Office International des Epizooties (OIE: World organisation for animal health) and European Commission (EC) receive data that substantiate the reliability of differentiating tests such as the 3ABC enzyme-linked immunosorbent assay (ELISA) for use in individual animals. Research is in progress but may not be able to produce these data until 2003 or 2004. High potency vaccines should be used to elicit sufficient immunity within three to four days. During an FMD crisis, farmers should be assisted to find markets for products from areas affected by FMDV. The human dimension of any FMD outbreak must be dealt with sufficiently in any contingency plan.

Keywords

Farmers' Unions – Farming perspective – Foot and mouth disease – Prevention – The Netherlands – Vaccination.

Introduction

Foot and mouth disease (FMD) is a highly infectious viral disease of cloven-hoofed animals (13). The disease was probably first described as an epidemic in 1514 and the agent responsible was first identified in 1897, as the result of research conducted by Löffler and Frosch at the request of the German Government (15, 16). Foot and mouth disease is still prevalent in many parts of the world, as emphasised by the epidemics which occurred in 2001 in the European Union (EU), southern Africa, Asia and South America. Due to the loss of productivity

and the infectious nature of the disease, an outbreak of FMD can have very serious economic consequences, including damage to international meat and livestock trade.

The Land- en Tuinbouw Organisatie Nederland (LTO-Nederland or LTO) is the Dutch farmers' union. The union comprises around 60,000 members, representing about 70% of the farmers in the Netherlands and approximately 80% of the production volume at the farm gate. The agricultural industry in the Netherlands relies heavily on international trade, with the export value for live animals and animal products totalling approximately €3 billion and the dairy export value totalling

around €5.6 billion. Over 95% of meat exports from the Netherlands remain within the EU.

Recent history of foot and mouth disease in the Netherlands and surrounding countries

Foot and mouth disease frequently affected the Netherlands during the last decade of the 19th Century and the first half of the 20th Century, as shown in Table I (3). During 1937 and 1938, the disease spread across large parts of the European continent. This resulted in 379,000 and 704,000 cases in France and Germany, respectively (21).

The use of vaccination as a tool to prevent the spread of FMD became more common in the 1940s. In the Netherlands, on-farm vaccination was first carried out in the Province of Friesland in 1942. This proved successful, and the use of a bivalent vaccine against FMD types A and O gradually increased, until in 1951, half the cattle population was vaccinated against FMD annually. However, the veterinary authorities in the Netherlands switched to the production of trivalent vaccine using the so-called Frenkel method due to outbreaks of FMD type C from 1951 to 1953 in western Europe. From this period until 1992, all cattle over the age of four to six months were vaccinated annually against the FMD types A, O and C (3, 4). This resulted in a dramatic change in the pattern of the disease (Table I).

The number of outbreaks of FMD declined across the European Community and there were even periods without a single outbreak. Such was the case during the period between 1996 and 2000, when an outbreak of FMD type Asia 1 was detected in Greece. Even in EU member states such as the United Kingdom (UK) where vaccination was not practised, the number of outbreaks decreased dramatically (Table II).

Generally, this was believed to be the result of changes in control policies due to much better understanding of the pathogenesis and transmission of the disease, to the use of preventive vaccination in many countries and stamping-out, which prevents the spread of FMD by the immediate slaughter and destruction of potentially infected animals (also referred to as 'pre-emptive culling' in the UK).

From the early days of the European Community, veterinary legislation sought to improve the health of the Community livestock and to ensure that food of animal origin was safe. The first Community veterinary legislation on intra-community trade in livestock was introduced in 1964 (6). Since 1985, the procedures any EU member state should follow in response to

Table I
Principal outbreaks of foot and mouth disease in the Netherlands between the end of the 19th Century and 1938 (3) and approximate number of outbreaks of foot and mouth disease in the Netherlands between 1937 and 2001 according to the Dutch Institute for Animal Science and Health in Lelystad (B. Luurs, personal communication, 2002)

Years	Approximate number of outbreaks
Figures calculated by van Bakkum, 1987	
1894	15,500
1897	42,500
1907	18,000
1911	70,518
1920	53,280
1924	88,930
1926	62,756
1937	94,500
1938	112,900
Figures calculated by Luurs, 2002	
1937 ^(a)	82,398
1938 ^(a)	106,268
1939	56,055
1940	2,850
1941	7,600
1942	10,360
1943	37,020
1944	20,657
1945	1,800
1946	22,125
1947	600
1948	1,500
1949	5,200
1950	2,485
1951	20,750
1952	7,654
1953 ^(b)	308
1954	54
1955	48
1956	47
1957	40
1958	11
1959	6
1960	3
1961	282
1962	5,470
1963	2,122
1964	184
1965	1,426
1966	2,194
1967	196
1968-1970	0
1971	21
1972	7
1973	0
1974	3
1975	2
1976	0
1977	1
1978-1982	0
1983	4
1984	2
1985-2000	0
2001	26

a) Figures for 1937 and 1938 differ from those given by van Bakkum in 1987

b) Annual vaccination commenced in the Netherlands in 1953

Table II
Number of outbreaks of foot and mouth disease in the United Kingdom between 1957 and 2001
 (18, 22)

Year	No. and localtion of outbreaks
1957	184
1958	116
1959	45
1960	298
1961	103
1962	5
1963-1964	0
1965	1
1966	34
1967	2,210
1968	187
1969-1973	0
1974	1 (Jersey)
1975-1980	0
1981	2 (Jersey and Isle of Wight)
1982-2000	0
2001	2,030

an outbreak of FMD are described in detail in European Community Directive 85/511/EEC. Amongst other things, the Directive introduced protection and surveillance zones around infected premises based on a minimum radius of 3 and 10 km respectively, taking account of natural boundaries and supervision facilities (7).

The desire, at the time, of EU member states to create a single internal European market made a uniform FMD control policy imperative. As explained before, some EU member states did not apply annual compulsory preventive vaccination. Apart from the UK, these countries included Denmark, Greece (with the exception of Greek Thrace, along the border with Turkey) and the Republic of Ireland. These countries are generally believed to have pushed for the cessation of compulsory preventive vaccination against FMD (24). In the Netherlands, however, a study based on an epidemiological model and an export model showed that the discontinuation of annual vaccination of the cattle herd would be financially profitable. This resulted in the Government of the Netherlands supporting the cessation of annual vaccination (5).

A new Directive, 90/423/EEC, therefore amended the legislation applied until then (8). This Directive, still in force today, ended compulsory prophylactic vaccination of cattle against FMD. From then on, the measures to control outbreaks and eliminate the virus should the disease gain entry were based on the strategy of slaughtering infected herds, with appropriate disposal of potentially infective material ('stamping-out') and controlling the movements of live

animals, meat, meat products, milk, milk products, animal by-products, persons, vehicles, farm fomites and any other substances likely to transmit the disease. However, as this strategy alone might not be sufficient to eradicate the virus, Council Directive 90/423 permits the use of emergency vaccination in addition to the control and eradication measures. In this sense, a distinction is made between suppressive and protective vaccination. Protective emergency vaccination is used to create an immune zone and to protect the animals within the vaccinated area against airborne infection from an infected area. Suppressive vaccination, on the other hand, is carried out in conjunction with a pre-emptive slaughter policy in an area where there is an urgent need to reduce the amount of virus circulating and there is a risk of spread beyond the area (20).

The new Directive also obliges EU member states to draw up contingency plans specifying the national measures that would be implemented in the event of an outbreak of FMD. Such a plan, approved by the Chief Veterinary Officer of the Netherlands on 20 September 1996, was available during the FMD epidemic of 2001 in the Netherlands (1).

The new policy was effective in eradicating FMD in Italy in 1993 and in Greece in 1994 and 1996 (20). However, FMD continues to occur world-wide, even in countries such as Japan, the Republic of Korea and Taipei China, that had been free of FMD for most of the 20th Century (Table III).

Table III
Selected outbreaks of foot and mouth disease in various countries and their causes (10)

Year	Country	Serotype	Cause
1996	Albania, Macedonia, Bosnia	A	Beef on the bone from infected areas
1996	Thrace (European Turkey), Greece, Bulgaria	O	Carried across borders
1997	Taipei China (free from FMD for 60 years)	O	Illegal import of pigs/pork, inadequate control (delayed diagnosis, vaccine not available)
1999	Algeria, Morocco, Tunisia	O	Imported in animals and products of animal origin from West Africa
2000	Japan (free from FMD for 98 years)	O	Probably import of infected rice straw
2000	Republic of South Korea (free from FMD for 66 years)	O	Probably import of infected rice straw
2000	Argentina	A	Illegal imports from Paraguay
2000	Uruguay	O	Not fully explained
2001	Argentina, Uruguay, Brazil	A	Probably import of animals
2001	United Kingdom, France, Netherlands, Ireland	O	Probably infected waste in animal feed

The Office International des Epizooties (OIE: World organisation for animal health) web site shows that over thirty countries reported outbreaks of FMD in 2001. Therefore, it seems safe to conclude that there is a continuing threat of reintroduction of FMD into the EU or even the Netherlands.

The 2001 outbreak from the Dutch farmers' perspective

On the morning of Monday 19 February 2001, a veterinary surgeon working for the Government Meat Hygiene Service of the UK at Cheale Meats abattoir in Little Warley in Essex, found pigs showing blisters. This was the commencement of the FMD epidemic that occurred in the EU in 2001. For easy reference, Table IV presents a concise summary of what occurred in the Netherlands and of the main actions undertaken by LTO-Nederland.

What cannot be reflected by Table IV, is the enormous strain experienced by farmers in the Netherlands and their families and friends, the people working in the delivering and processing industries and all the people living in the areas directly affected by FMD. The slaughter of so many animals, the large majority (probably over 90%) not infected by FMD (A.E. Füssel, personal communication, 2001), led to much discussion in the general press and in the Parliament of the Netherlands, and to much public opposition against stamping-out. A number of local action groups were created, campaigning for the slaughter-only policy to be ceased immediately. This also caused much discussion within the regional LTO departments. The LTO did all possible to explain the policy adopted to members and the general public but when the Government of the Netherlands clearly failed at some points in explaining the actions taken, the LTO sometimes became the main scapegoat and therefore a focus for criticism. In short, the 2001 FMD epidemic was a very stressful period for the LTO.

Discussion

Much discussion has taken place on the source of the 2001 epidemic. The origin of the epidemic in the UK will probably be addressed in this OIE publication by scientists in the UK. In the Netherlands, infection is thought to have occurred following the import, on 22 February 2001, of fattening calves from Ireland via an FMD-contaminated staging point at Mayenne in France. These calves were transported to a farm in the village of Oene, showed no signs of FMD, but passed the virus on to goats that became clinically affected. The farmer concerned had been ill recently and had received help from colleagues. This is probably how the virus was able to spread.

However, how the virus spread to the Province of Friesland, about 200 km to the north is still unclear. From early times, infection was thought to be transmissible by the wind. In the

earliest known description of FMD, writing of an earlier outbreak in northern Italy, Fracastorius commented in 1546 'Now of these contagions which come from without, the air is potent cause, though they may also come from water and marshes and other sources'. This is quite remarkable, given the level of knowledge of transmissible diseases at the time (17). Subsequently, over the years there have been reports speculating that, since no other mechanism of transmission could be identified, the only remaining conclusion was that the virus had been transported by the wind. After the major 1967 to 1968 outbreak in the UK, investigations were made into the airborne spread of virus and it became clear that transmission by this route was indeed possible under certain circumstances. Smoke from a rendering plant in Friesland, where animals from FMD-affected areas were destroyed was blamed for the outbreak in Friesland. The Dutch Institute for Animal Science and Health in Lelystad, however, maintains that meteorological data do not support the theory that the virus was spread aerogenically. The reason for the outbreak in Friesland must therefore lie in the illegal transport of animals, although no proof of this has been found to date.

Many scientists have stressed the importance of the control of movement of animals during the initial stages of an outbreak. Sellers *et al.* (23) suggest control of movement for two weeks after contact with infection as a means of preventing spread of FMD in areas that contain vaccinated animals. Reports from the UK, however, suggest the Government of the UK prohibited the transport of animals throughout Great Britain only four days after the first FMD case was confirmed. This might have contributed significantly to the spread of the disease down the west coast of the country.

Retrospective examination of the FMD control policies of the European governments since the 1950s gives the impression that the UK, Denmark and Ireland have been protected by a buffer zone created by those countries that carried out compulsory annual vaccination. This buffer zone was gradually removed when the immunity of the vaccinated animals waned due to the discontinuation of annual vaccination in 1992. This new policy was introduced at the same time as the European Commission (EC) was pursuing an open border policy. Combined with an enormous increase in traffic across the globe, this amplified chances of outbreaks of FMD. The Netherlands were probably lucky to have avoided FMD for ten years following the cessation of annual vaccination. This is confirmed by recent outbreaks in Taipei China (1997), Japan (2000) and the Republic of Korea (2000), countries that were free of FMD for most of the 20th Century (Table III).

Carrier animals

Since the 1960s, animals have been known to continue to harbour the FMD virus (FMDV) 28 days after infection. Such animals are called carrier animals as they carry the virus in the soft palate, from where it can be isolated in oropharyngeal fluid (OPF) samples collected with a probang cup. There has been

much discussion between scientists on whether carrier animals are able to spread the virus. The 2002 report on infectious diseases in livestock of the Royal Society of the United Kingdom provides an excellent overall picture of this discussion (22). The Royal Society concludes that detailed scientific evidence for the infectiousness of carriers is weak. If transmission of infection from carriers does occur, it is at very low frequencies and under a particular set of circumstances that are as yet undefined, from either field or experimental studies. Although it is impossible to exclude the possibility that a very small number of vaccinated and challenged animals might transmit infection, the fact that vaccination was used to eradicate FMD in Europe and parts of South America, as well as recent outbreaks in Albania, the Republic of Korea, Uruguay and South Africa, argues against the contention that the carrier animal is a significant risk factor in spreading or maintaining the disease. The Royal Society does not consider that risk of the carrier state precludes the use of emergency vaccination, although it does demand a clearly defined strategy for monitoring vaccinated animals after the cessation of an FMD epidemic (22).

Donaldson and Kitching (9) indicate that when three weeks elapse between the time of primo-vaccination and natural exposure to virus, the quantity of infection emitted by immunised cattle immediately afterwards is unlikely to result in the transmission of infection, even to animals in very close contact. Their study shows that a two-week period from vaccination to challenge did not result in spread of disease immediately afterwards, but two of four in-contact cattle became subclinically infected, suggesting that the quantity of virus excreted was very low.

Therefore, it is important to use vaccines that result in animals developing rapid immunity in order to minimise the period during which animals remain susceptible to infection. According to the Chief Scientific Advisor of the UK Government, International Vaccine Bank (IVB) vaccines can build up sufficient immunity within three to four days. These vaccines are kept at the Institute for Animal Health at Pirbright (12). Other (commercial) vaccines require ten to twelve days for immunity to develop. The longer the time between vaccination and exposure to infection, the more effectively animals are protected against FMD.

Although evidence suggests that the risk of carrier animals spreading FMD is almost non-existent, the implications of protective vaccination for trade are still very severe, especially for an exporting country such as the Netherlands. These implications have much more impact on international trade than the use of stamping-out, and this is currently influencing political discussions, in which scientific opinions are either used or left out, whichever is more convenient to the parties concerned.

The issue became highly political in the Netherlands towards the end of May 2001, when discussion arose on whether, and when, Uruguay and Argentina would be allowed to resume exports of beef to the EU. Both countries had been affected by FMD in 2001 and had resolved to vaccinate their cattle herds. In November 2001, however, the EC granted Uruguay permission to resume beef exports to the EU. Argentina was permitted to resume exports in January 2002. The example from South America shows that vaccination against FMD should not endanger beef exports, as long as good procedures are in place. These include the use of a differentiating test. Whether exports from South America are an example for exports of other types of meat is a question that still remains to be answered.

The import of beef from South America seemed unfair to the cattle farmers of the Netherlands who had to endure stamping-out to regain permission to export. However, this can be explained. Animal husbandry in South America is very different from that in the Netherlands, and only certain parts of the carcasses are exported to the EU, using slaughtering procedures that eliminate any chance that this meat may be FMDV-contaminated. However, the case of Uruguay and Argentina proves that the resumption of exports is greatly facilitated when the animal products of the countries concerned are highly competitive compared to those of the importing countries. This is the case with beef from Uruguay and Argentina, which is of high quality and for which a ready market exists in western Europe.

Currently, tests based on discrimination for the polypeptide 3ABC [Western blotting and enzyme-linked immunosorbent assay (ELISA)] can be used to distinguish vaccinated animals from infected animals (19). At the workshop on persistence of FMDV and the role of carrier animals, Brocchi stated that some protected animals, which have developed a carrier state proven by intermittent recovery of virus, do not respond to this non-structural protein (NSP) test. However, the NSP test has been used extensively in several countries and has proven a valuable instrument for detecting viral activity in herds, irrespective of the vaccination status. The results obtained contributed to support the OIE requirements for recognition of FMD-free areas in South America, and gave input to assessments of risk analysis during import/export testing.

The Dutch Farmer's Union, therefore, understands the importance of the OIE and the EC recognising differentiating tests to distinguish between infected and vaccinated animals in the EU, so that waiting periods for regions where vaccination has been applied can be shortened. To the knowledge of the authors (A. Bianchi, personal communication, 2001), 3ABC tests are currently under scientific review, but the results of these investigations may only be ready for publication in 2003 or 2004. The OIE describes one of the 3ABC tests for use on a herd or group basis in the 2000 *Manual of standards for diagnostic tests and vaccines* (19) and in May 2002, the OIE

Table IV
Chronology of principal events and response to the foot and mouth disease epidemic of 2001 in the Netherlands (2)

Date	Main event	Action undertaken by the Dutch Farmer's Union, LTO
19 Feb.	Signs of foot and mouth disease (FMD) found in Essex	The LTO assigns various tasks within the organisation in preparation for a possible FMD outbreak in Netherlands
20 Feb.	The United Kingdom (UK) Government informs European Commission of two outbreaks of FMD in pigs in a slaughterhouse (21-30)	The LTO decides that everything possible needs to be done to keep FMD out of the country and advises the Minister of Agriculture of the Netherlands along these lines
21 Feb.	The European Commission imposes a world-wide ban on all exports from Great Britain of livestock, meat and animal products	
22 Feb.	The Government of the Netherlands closes all animal markets	
23 Feb.	The UK Government prohibits the movement of all susceptible livestock throughout Great Britain Pre-emptive cull carried out on 11 farms in the Netherlands identified as having recently imported animals from the UK	
1 Mar.	Northern Ireland reports the first outbreak of FMD (three more outbreaks are reported on 13 April, 15 April and 22 April)	
13 Mar.	The Government of France reports the first FMD outbreak in Mayenne	
13 Mar.	All animal movement in the Netherlands is prohibited (movement of sheep and goats had been prohibited on 26 February)	
17 and 19 Mar.	Suspicion of FMD on two farms. All suspected animals are killed and destroyed immediately. Serological tests are carried out	
21 Mar.	First FMD case confirmed in the Netherlands The Government of the Netherlands imposes a 72-h standstill, which includes no collection of milk (at the request of the ITO)	The LTO sets up crisis centres in the main office and the five regional offices The LTO strongly advises the Minister of Agriculture to do whatever is needed to eradicate the FMD virus
21 Mar.-26 Apr.	26 cases of FMD confirmed in the Netherlands, of which two in the Province of Friesland, and 23 in the area between Zwolle, Deventer and Apeldoorn and 1 case in the village of Kootwijkbroek, to the south-west of Apeldoorn Protection (3-km radius) and surveillance zones (additional 10-km radius) are established around all infected and suspected premises All animals on infected premises are culled within 24 h. Animals on premises within a 2-km radius are also culled Total standstill imposed in all protection and surveillance zones	The LTO strongly advises the Minister to stop the collection of milk during the 72-hour standstill every day. About 20% of the incoming calls are not from LTO members The LTO operates an FMD internet information site receiving up to 5,000 visitors per day The LTO distributes about 100 FMD newsletters by email to members, sometimes twice or three times daily
22 Mar.	Ireland reports the only outbreak in this country The Netherlands request suppressive vaccination, partly because of fear of shortage of culling capacity. Authorised by the Standing Veterinary Commission (SVC) on 23 March	
23 Mar.	France reports the second and last confirmed outbreak	The LTO decides that the current 'non vaccination' policy must be changed, in order to be able to vaccinate animals and let them live out their economic life, without serious implications for trade The LTO informs the Minister of Agriculture and the press about this decision
30 Mar.	The Netherlands request protective emergency vaccination for the area between the towns of Zwolle, Deventer and Apeldoorn	

Table IV (contd)

Date	Main event	Action undertaken by the Dutch Farmer's Union, LTO
3 Apr.	<p>The SVC allows the Netherlands to perform protective emergency vaccination of cattle, prohibiting the movement of vaccinated cattle for a period of at least one year. The Government of the Netherlands reads this as follows: empty farms within the vaccination zone and the surrounding surveillance zone cannot be restocked for at least one year following the completion of vaccination. This is based on the assumption that the OIE will require a 12-month waiting period before the region can regain the FMD-free without vaccination status</p>	<p>After much internal discussion, the LTO decides there is no real choice to be made, as the conditions of the SVC, as read by the Government of the Netherlands, will force all farmers in the vaccination zone and the surrounding 10-km surveillance zone to go out of business, because they will not be able to restock their farms for at least one year. The LTO is also of the opinion that it is not advisable to seal off the vaccination and surveillance zones for at least one year because of the costs involved and because this will cause too much inconvenience to the general public</p>
5 Apr.	<p>The Minister of Agriculture of the Netherlands asks the advice of the LTO on whether to perform suppressive or protective vaccination in the area between Zwolle, Apeldoorn and Deventer</p>	<p>Therefore on 10 April, the LTO, with the dairy industry and the meat-processing industry, advises the Minister of Agriculture of the Netherlands to proceed with suppressive vaccination</p>
6 Apr.	<p>The Government of the Netherlands divides the country into six 'zones' or 'compartments', prohibiting animal transport between zones, including transport to slaughterhouses. A total standstill is implemented in all protection and surveillance zones. Only milk is collected and processed through channels kept strictly separate from the main production streams</p>	<p>The LTO continuously advises the Government of the Netherlands on the practicalities and details of the implementation of all measures concerning the combat of FMD</p>
10 Apr.	<p>Suppressive vaccination is carried out in the area between the towns of Zwolle, Deventer and Apeldoorn, and in the two 2-km zones in Friesland. All vaccinated animals are subsequently killed</p>	
26 Apr.	<p>Report of the 26th and last case of FMD in the Netherlands</p>	
28 Apr.	<p>Report of the 1,500th outbreak of FMD in the UK</p>	
25 May	<p>Last vaccinated animal in the Netherlands killed, leading to a total number of 265,000 animals killed because of FMD</p>	<p>The LTO reduces crisis facilities as the demand for information and policy-making diminishes The LTO has continued to press for a change to the current 'non-vaccination' policy of the European Commission, so that protective emergency vaccination can be applied without major negative consequences for export of animal products from outside the surveillance and protection zones. This resulted in the LTO becoming involved in veterinary discussions about the possible danger of carrier animals spreading the virus, and therefore, the implications vaccination might have on international trade</p>
31 May	<p>Discussion in the Parliament of the Netherlands on the EU proposal to allow Argentina and Uruguay to resume beef exports to the EU</p>	<p>The LTO uses arguments to press for acceptance of protective emergency vaccinations in the EU</p>
19 Sept.	<p>The OIE accepts application of the Netherlands for recognition of freedom from FMD without vaccination</p>	
30 Sept.	<p>Report of the 2,030th and last case of FMD in the UK (at 15 December 2001)</p>	

recognised three differentiating tests for official use in herds. In the opinion of LTO, the development of commercially available test kits is important, but this is most likely to happen if the OIE and EU recognise one or more of these differentiating tests for official use in single animals. This will only happen when the OIE and the EC have received data that prove that the NSP tests are reliable for use in individual animals. As seen above, this might still take until 2003 or 2004. Once recognised officially, a differentiating test for use in individual animals will be very useful in helping countries or regions that have used protective emergency vaccination to apply successfully for re-instatement of the status of 'free country or zone without vaccination'. Under current OIE regulations, this is only possible after a delay of six months (previously 12 months) after the last case or last vaccination, which is three months longer than when suppressive emergency vaccination is applied (22).

Foot and mouth disease prevention and control in addition to vaccination

Apart from the discussion about vaccination and stamping-out, there is no major international difference of opinion about the need for measures to prevent new outbreaks. The following preventive actions should be implemented:

- stringent import control measures, including strict precautions and procedures at cross-border entry points for animals and animal products
- animal movement and transportation distance and time must be limited. The use of staging points is a critical issue that must be further evaluated
- awareness in both the agricultural and the tourist industry on how animal diseases are spread and what can be done to minimise risks must be increased. Increased awareness may be the key to the prevention of new outbreaks of FMD. The distribution of leaflets in planes, trains and ferries that inform travellers of possible risks may be a solution. Good hygiene rules taking into account both animal and public health aspects must be applied on farms
- within the EU, identification systems that help to monitor animal movements must be introduced in all EU member states, enabling veterinary services to rapidly back trace animal movements and track producers and traders should an outbreak occur. Farmers need to pay special attention to all live animals entering their farms
- national research institutes and Veterinary Services imperatively need to co-operate in the development of diagnostic tools and criteria
- all countries across the world must co-operate in the control of FMDV by reporting all outbreaks immediately and fully, by maintaining sufficiently well resourced Veterinary Services themselves (or with support from other countries), enabling these Services to use internationally recognised procedures for diagnostics and vaccines.

Apart from the issue of vaccination, the following is essential during an outbreak:

- research institutes and Veterinary Services should co-operate in the identification of suspected cases and possible vaccination. Within the EU, these procedures must be part of an EU-wide contingency plan, in which a reference laboratory plays a key role. Institutes and Veterinary Services must share information fully and immediately should an outbreak occur
- very rapid decision-making by the competent bodies is vital. This includes the enforcement of a standstill immediately after the first report of FMD
- all parties involved in the industry must co-operate in the containment and elimination of the virus through vigilance and the implementation of a range of bio-security measures that may also affect farm-to-farm movements of animals, vehicles and people
- a compensation package must be proposed to those farmers affected by an outbreak.

Rapidity and accuracy are the key words to be used during an FMD outbreak. This has been shown many times in the past, for example in Taipei China in 1997 (11).

The economic dimension

As mentioned above, a Dutch study based on an epidemiological model and an export model showed it to be financially profitable to cease annual vaccination of cattle herds in 1992. This led to the Government of the Netherlands supporting the cessation of annual vaccination in the then European Community (5). Since then, the University of Wageningen has continued to investigate the economic aspects of FMD prevention and control (18). Taking a much closer look at the 1990 study, the LTO is of the opinion that the 2-km ring cull was not included. This led to many more farms being pre-emptively culled in 2001 than would have been expected from the 1990 study. Of even greater financial impact, however, is the effect that FMD control policies have on tourism, the recreational sector and the wider rural economy, which were also not taken into account. More recent studies on the economic effects of animal health management now make serious attempts to consider the consequences for the rural economy as a whole, and these studies, therefore, more easily reach conclusions that are positive about the use of vaccination in comparison to the use of stamping-out. Under current OIE regulations, however, protective vaccination is mostly still not a financially viable option, as the zones concerned need to wait six months after protective emergency vaccination has ceased before re-acquiring the status 'FMD-free zone where vaccination is not practised'. This is an additional three-month delay over the use of a slaughter only policy (22). As long as this waiting period is not shortened, protective emergency vaccination will not readily be applied on economic grounds alone.

Organisations involved in the marketing of animal products, such as supermarkets, dairy co-operatives and meat processing industries, should assist farmers to find markets for products produced in regions affected by FMDV, in order to limit the loss of income of farmers living in these areas. Farmers will usually co-operate fully with the authorities to eradicate FMDV, if they are sure they can continue their business.

The role of the food chain should be clearly defined in any contingency plan dealing with the control of an outbreak of FMD. It is also very much in the interests of these organisations to eradicate any FMD outbreaks and the resulting marketing problems as rapidly as possible. Any remaining financial loss should be compensated by the government(s) concerned to ensure the co-operation of the farmers with the control policies. Governments must be aware that arable farms and nurseries may also be affected by an outbreak of FMDV, especially if these businesses depend on export.

The animal welfare dimension

Animal welfare organisations have stated that it is widely accepted to keep animals for farming purposes, as long these are treated and handled with care (14). The public also accepts the slaughter of animals for meat production. Many governments have implemented rules that govern animal husbandry. The slaughter of animals does not create concern unless this is done in an inhumane way. Regarding stamping-out, however, many people consider that killing animals that have a chance of not being infected with FMDV is unethical when alternatives for the control of FMDV are available.

The ecological aspect

The FMD epidemic which took place in the Netherlands in 2001 resulted in discussions about the culling of pedigree animals, zoo animals and of animals living in nature reserves. An even larger scale pre-emptive cull might have led to endangering rare species, rare breeds and animal stock of special quality. The LTO has concluded that, while rapid eradication of FMD has the highest priority, a slaughter-only policy may lead to the extinction of rare breeds, high-value genetic stock and endangered species.

The human dimension

Amid all the words on science, economics and animal welfare, a few words must also be said on the human aspect. In 2001, hundreds of European farmers and their families had to remain on their farms for weeks, anxiously waiting for what might come next. A number of farmers saw their livestock taken away from them. When the veterinary slaughter force finally moved on and all the disinfecting and paperwork had been completed, the farming families remained, dismayed, trying to come to grips with what had actually happened. The LTO feels very strongly that any contingency plan must include psychological help for those farmers and their families directly affected by the virus and/or the measures implemented to stop the spread of disease. Any strategy for the control of FMD must aim at

minimising the stress and sorrow endured by farmers and their families.

Conclusions

While epidemiology is about the incidence, the mechanisms of spread and understanding the life-cycle of an infective agent, control is very much concerned with how to break into that life-cycle and so prevent spread of the organism and maintenance of the disease. During an FMD outbreak, vaccination might be one such tool. The LTO therefore proposes the use of protective emergency vaccination as an effective method to combat FMD in the future. This includes the use of internationally recognised diagnostic tests and vaccines that create sufficient immunity within a few days. This will eradicate the virus within weeks, allow vaccinated animals to complete their working lives and enable the marketing of their products in specially designed regions or compartments within the EU. The idea would end the current slaughter-only policy in the EU.

The position of the LTO is described below:

Continuation of the current slaughter-only policy is ethically unacceptable, both in regard to animals and their owners. A rigorous culling policy has very serious social consequences: control of FMD is not only a technical challenge.

The current FMD control policy is clearly not without cost to tourism and businesses in the wider rural economy.

The slaughter-only policy may result in the extinction of rare breeds, high-value genetic quality stock and endangered species.

In the case of a large outbreak, the current culling capacity of the veterinary and rendering services of the EU member states very rapidly becomes saturated. This favours new infections, because FMD can be infectious days before clinical signs develop.

The duration of new FMD outbreaks can be curtailed within weeks, and the costs of these outbreaks can be greatly reduced with the use of protective emergency vaccination and a differentiating test. This should allow the OIE to, on the basis of sound science, considerably shorten the waiting period until the vaccination zone may regain the status 'FMD-free without vaccination'. Moreover, this method is ethically acceptable, while still being a rational response to an exceptionally infective disease, which continues to occur in many places around the world.

Apart from vaccination, other important preventive measures consist of the following:

- strict control and limitation of animal movements

- increased awareness in both the agricultural and the international tourist industry on the spread of animal diseases
- introduction of international identification and registration of animals
- close cross-border co-operation between national research institutes and Veterinary Services
- all stakeholders must be sufficiently involved in the development of contingency plans.

During an outbreak, the following is essential:

- research institutes must co-operate fully on all matters regarding the control of the outbreak

- competent bodies must make decisions very rapidly
- all parties in the industry should co-operate in the containment and elimination of the virus; industries must make an effort to help market products from crisis areas
- farmers must be compensated for the losses caused by FMD. They and their families should receive psychological support upon request
- given all the dimensions involved in the eradication of FMD, the control of FMD clearly requires very good public relations management.

Position du syndicat agricole néerlandais par rapport aux enseignements de la crise, ainsi qu'aux futures mesures de prévention et de prophylaxie de la fièvre aphteuse

M.P. Cuijpers & K.J. Osinga

Résumé

La fièvre aphteuse a souvent décimé les élevages néerlandais dans le passé et constitue toujours une menace. Toutefois, l'utilisation de la vaccination, au *xx^e* siècle, a entraîné une réduction du nombre de foyers observés aux Pays-Bas. Le souhait émis par plusieurs États membres de la Communauté européenne de ne pas recourir à la vaccination a conduit à l'établissement d'une nouvelle stratégie fondée sur l'abattage sanitaire des animaux atteints et contagieux et l'adoption d'une réglementation draconienne des transports. En 2001, cette stratégie a fortement perturbé l'ensemble de l'économie rurale et notamment les secteurs du tourisme et des loisirs. La politique adoptée a eu de graves répercussions sur le bien-être animal et a suscité des problèmes psychologiques chez les éleveurs et leur famille. Cette situation a entraîné des remises en question sur les implications des stratégies de lutte contre la fièvre aphteuse qui ont largement débordé du cadre vétérinaire ou agricole. Les progrès technologiques semblent autoriser le retour à une vaccination préventive contre la fièvre aphteuse en cas d'épizootie, pour autant que l'OIE et la Commission européenne obtiennent des données confirmant la fiabilité des épreuves de différenciation, comme la méthode immuno-enzymatique (ELISA) 3ABC qui est applicable à l'échelle individuelle. Les recherches sur cette méthode sont en cours, mais leurs résultats ne sont pas attendus avant 2003 ou 2004. Il convient d'employer des vaccins assez performants pour conférer une immunité suffisante en l'espace de 3 à 4 jours. Il importe, dans une situation de crise liée à la fièvre aphteuse, que l'on se mobilise pour aider les exploitants à trouver des débouchés pour leur production issue des zones touchées par la fièvre aphteuse. La dimension humaine des épizooties de fièvre aphteuse doit figurer en bonne place dans les plans d'urgence.

Mots-clés

Fièvre aphteuse – Pays-Bas – Perspectives agricoles – Prévention – Syndicat agricole – Vaccination.

La postura del sindicato agrícola neerlandés sobre las enseñanzas extraídas de la fiebre aftosa y su prevención y control en el futuro

M.P. Cuijpers & K.J. Osinga

Resumen

En el pasado, la fiebre aftosa tuvo a menudo consecuencias devastadoras para la industria neerlandesa de producción animal, y todavía hoy sigue constituyendo una amenaza. Durante el siglo xx, el uso de vacunaciones redujo el número de brotes surgidos en los Países Bajos. Pese a ello, el deseo de algunos países de la Comunidad Europea de no aplicar vacunaciones condujo a una nueva estrategia basada por un lado en el sacrificio sanitario total en las explotaciones infectadas y contagiosas y por el otro en estrictas reglamentaciones de transporte. En 2001 se demostró que esa política resultaba muy dañina para el conjunto de la economía rural (que incluye sectores como el del ocio o el turismo) y generaba no sólo problemas de bienestar animal sino también desórdenes psicológicos entre los productores y sus familias. Ello llevó a considerar las repercusiones generales de las estrategias de control del virus en un plano más general, y no sólo en el veterinario o el agrícola. Todo parece indicar que existe la tecnología necesaria para volver a utilizar vacunaciones protectoras contra la enfermedad durante los brotes, a condición de que la OIE y la Comisión Europea reciban datos que demuestren la fiabilidad de ensayos discriminatorios como el inmunoenzimático (ELISA) 3ABC para su aplicación a ejemplares concretos. Aunque hay investigaciones en curso, es posible que ese tipo de datos no existan antes de 2003 o 2004. Convendría utilizar vacunas de gran potencia para proporcionar un nivel suficiente de inmunidad en el plazo de 3 o 4 días. Durante una crisis de fiebre aftosa, se debería ayudar a los ganaderos a encontrar mercados para los productos procedentes de zonas afectadas por el virus. Cualquier plan de atención a eventos imprevistos debe prestar la debida atención a la vertiente humana de un brote de fiebre aftosa.

Palabras clave

Fiebre aftosa – Países Bajos – Prevención – Punto de vista de los productores – Sindicato agrícola – Vacunación.



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