

# The 2001 foot and mouth disease epidemic in the United Kingdom: animal welfare perspectives

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## Summary

The management of the foot and mouth disease (FMD) epidemic which occurred in the United Kingdom (UK) in 2001 resulted in widespread animal welfare problems. These problems arose firstly because of the large numbers of animals slaughtered to bring the epidemic under control, which meant that the conditions under which animals were slaughtered and the manner in which this was carried out often breached regulations concerning welfare at slaughter. Secondly, the restrictions imposed on movements, especially animal movements, resulted in what appeared to be readily avoidable difficulties with livestock dying from, for example, food shortages and pregnant animals giving birth under unsuitable conditions. This brief review is based on the personal experiences of the authors as well as relevant observations and reports from a variety of sources.

## Keywords

Animal welfare – Farm livestock – Foot and mouth disease – Legislation – Management – Movement restrictions – Regulations – Slaughter – United Kingdom.

## Introduction

A 'stamping-out' policy is the current approach used to control and eliminate foot and mouth disease (FMD) in those member states of the European Union with FMD-free status. There is provision for emergency vaccination by member states and the Netherlands adopted this strategy in 2001, but the United Kingdom (UK) did not. The adjunctive control measures of contiguous and 3-km culling used in the UK, which were adopted following advice from the Chief Scientific Adviser to the Government on 23 March 2001 (15), had not been used previously. The consequences for animal welfare may not have been appreciated fully when these policies, which largely derived from computer-based mathematical models, were introduced.

Since the last major FMD epidemic which occurred in the UK in 1967 and 1968, the number of veterinary surgeons working for the State Veterinary Service has been more than halved and local decision-making has largely been superseded by a centralised London-based National Disease Emergency Control Centre. The 2002 National Audit Office (NAO) report stated that at least 57 farms had already been infected with the virus when the disease was confirmed on 20 February 2001, and between confirmation and imposition of a national movement ban on 23 February, another 62 premises were believed to have

become infected (25). Woolhouse suggested that if a national movement ban had been imposed on 20 February, the epidemic would have been between one third and one half smaller than it actually was (31). These factors meant that very early in the epidemic the manpower resources were overwhelmed – so the stamping-out policy could not function as effectively as in the past, especially in the face of multiple primary outbreaks. These simple facts may partly explain why the response moved from the traditional approach, in which local veterinary risk assessment is pivotal, to the infinitely less targeted approach associated with pre-emptive culling. Such widespread slaughter has an important ethical dimension, especially when healthy animals are slaughtered as a means of disease control. Future discussions of control policies must take this into account. However, this paper will concentrate on the welfare problems that were associated with the slaughter of millions of farm animals for disease control and welfare purposes (Table 1).

## Animal welfare and the current regulatory framework

The ethical framework comprising the 'five freedoms' is summarised in the Farm Animal Welfare Council Report on Priorities for Animal Welfare Research and Development (12).

**Table I**  
**Livestock slaughter figures associated with the foot and mouth disease epidemic of 2001**

Animals slaughtered	Total animals slaughtered	Additional information	Source
<b>Sheep</b>			
– 3.4 million culled for disease control purposes	≅ 5.5 million	Additional culling of 3-4 million lambs estimated (this derives from the estimate of the MLC of 1.2 lambs culled per breeding ewe, and cross-checks with the shortfall in lambs marketed in 2001, down from 15 million to 11.1 million)	DEFRA MLC RPA
– 1.6 million culled under the LWDS			
– 525,000 lambs culled under the Light Lambs Scheme			
<b>Cattle</b>			
– 590,000 culled for disease control purposes	≅ 759,000	Additional culling of up to 100,000 calves estimated	DEFRA MLC
– 169,000 culled under the LWDS			
<b>Pigs</b>			
– 145,000 culled for disease control purposes	≅ 432,000	Additional culling of piglets not estimated as most pigs slaughtered were assumed to be fattening pigs rather than breeding stock	DEFRA MLC
– 287,000 culled under the LWDS			
<b>Others: this group includes goats and deer</b>			
– 4,000 culled for disease control purposes	≅ 7,000		DEFRA MLC
– 3,000 culled under the LWDS			

DEFRA : Department for Environment, Food and Rural Affairs  
 MLC : Meat and Livestock Commission  
 RPA : Rural Payments Agency  
 LWDS : Livestock Welfare (Disposal) Scheme

This Report underpins the regulatory legislation and codes of recommendations for the welfare of livestock adopted by statutory government agencies (17, 18, 19, 20, 21, 22, 23, 24, 28). In specific disease situations, primary and secondary UK legislation direct the action of government agencies and deputies (3). The Animal Health Act of 1981 sets out the general powers of ministers to make orders and to authorise regulations in relation to animal disease, including FMD (3). Under this Act, any animal which is affected or suspected of being affected, or which has been exposed to FMD infection, may be slaughtered if the Minister thinks fit.

Much of this legislation is of relevance to the veterinary profession in the UK (27) and members of the Royal College of Veterinary Surgeons (RCVS) are obliged to observe the provisions of the current RCVS Guide to Professional Conduct (8). In so doing, they make 'animal welfare their overriding consideration at all times'.

## Animal welfare problems associated with the slaughter of animals

The large numbers of animals culled and the circumstances under which this took place during the 2001 FMD epidemic meant that the manner in which animals were killed often contravened statutory regulations and codes of practice (4, 6).

Early in the epidemic, it became apparent that the logistics of killing large numbers of animals, including late-term unborn animals and young animals in the field, had received little consideration. There were concerns, for example, that viable late-term unborn animals died of oxygen starvation after their mothers had been killed and there were no clear guidelines for the humane slaughter of very young livestock. The slaughter of adult animals also posed problems, as exsanguination after stunning was not an option because of the potential for disease spread in the event of the animal being infected.

Improper or inappropriate slaughter methods were reported regularly and some were recorded on film by members of the public and the media. Incidents of this type ranged from failure to use sedatives prior to slaughter of cattle in situations where sedation would have been indicated, to shooting sheep and lambs using free bullets in an open field. The latter incident was recorded on video-camera and broadcast widely on television. The Royal Society for the Prevention of Cruelty to Animals (RSPCA), in evidence to the NAO, indicated that 'in many cases there was very good circumstantial evidence that an offence had been committed, but without physical evidence, since the carcasses had been disposed of, prosecution would be fruitless' (25).

A number of decisions were made that had implications for the slaughter of large numbers of animals and the implementation of these decisions led, both directly and indirectly, to welfare problems. Foremost amongst these was the fact that slaughtermen were paid on a piece-rate basis rather than by the hour, and that a 24-h target was imposed to kill livestock on

infected premises and a 48-h target to slaughter livestock on contiguous premises. The diagnosis, culling and disposal of infected animals is of utmost importance in limiting disease spread for such an infectious disease when a slaughter policy is the control method used and should, ideally, take place much sooner than a 24-h target would imply. However, the necessity to slaughter animals on contiguous premises within 48 h remains less scientifically robust, especially as this target was seldom met (Table II) and some farmers were subjected to substantial delays, during which daily farming practices, such as milking and lambing, had to proceed. The delay was illogical on occasions when applied to the contiguous cull, as for some of the animals, the incubation period for FMD virus had been largely exceeded by the time they were killed (29) and in such cases, it can be unequivocally stated that infection was not present. The setting of explicit targets of 24 h and 48 h, together with piece-rate incentives were criticised by the Farm Animal Welfare Council (13) as 'not consistent with welfare-friendly handling and accuracy'.

**Table II**  
**Parliamentary Questions 5479 and 5478 on the slaughter times on infected and contiguous premises**

Parliamentary Question No.	Slaughter times	Number of hours within which animals were slaughtered (%)				
<b>5479</b>	Infected premises	24 h	48 h	72 h	>72 h	>96 h
	– first 4 weeks	10	40	65	80	100
	– first 9 weeks	24	65	85	93	100
	– epidemic as a whole	33	72	88	94	100
<b>5478</b>	Contiguous premises (dangerous contacts)	48 h	72 h	96 h	>96 h	>120 h
	– first 4 weeks	0	4	11	24	100
	– first 9 weeks	2	12	27	49	100
	– epidemic as a whole	5	29	50	71	100

*Notes*  
Figures are only for 1,444 of the infected premises (IPs). Data are missing for 582 premises. In 1967, for the epidemic as a whole: 72% of IPs and dangerous contacts were slaughtered within 24 h and 97 % within 48 h. In 1967, the classification of dangerous contacts was much more stringent, thus minimising the number of premises culled.

The written answer to the House of Commons by E. Morley (*Hansard*, 6 November 2001, Column 146) provided the following information regarding laboratory test results on 22 October 2001:

- dangerous contacts (7,294 cases tested)
- slaughter on suspicion cases (255 cases tested)
- total positive cases recorded: 5.

The data provided by DEFRA for infected premises were as follows:

- premises classified as infected: 2,026
- positive laboratory results: 1,324
- negative laboratory results: 401
- untested: 301.

Parliamentary Question 6649 revealed that of the 10,509 premises culled in total, 2,370 were tested.

The RSPCA expressed 'grave concern' regarding the level of veterinary supervision at slaughter in their submission to the NAO (25) and in its evidence stated that 'in some cases one temporary veterinary inspector could be charged with supervising up to 10 slaughter sites simultaneously'. This was an approach that was likely to cause conflicts of interest for the Temporary Veterinary Inspectors (TVIs) involved in supervising slaughter, especially so because of the variations in ability of the slaughter teams involved. The RSPCA also criticized the time taken by the Department for Environment, Food and Rural Affairs (DEFRA) to issue clear instructions about the need to pith animals in addition to stunning them. In their presentation to the NAO, the RSPCA declared that 'this led to a significant number of animals regaining consciousness after stunning, causing great suffering' (25).

Many animals were slaughtered on the farms, but the facilities often made culling difficult to perform efficiently and humanely. Other animals, mainly sheep, were transported to mass burial sites and killed there. The epidemic reached a peak when most sheep flocks were lambing, with obvious welfare implications for the transport and slaughter of pregnant animals, post-parturient ewes and neonatal lambs. The Welfare of Animals (Transport) Order 1997 sets out clear guidelines with regard to animal transport, particularly in relation to whether the animal is fit for the intended journey, so as to prevent unnecessary suffering (5). The guidelines were not always followed and the situation was exacerbated because sheep were particularly targeted for killing (Table I). Consequently, transport to a place of slaughter inevitably involved large numbers of pregnant and post-parturient sheep.

All the local inquiries covering Cumbria, Devon and Northumberland (7, 16, 26) have also provided evidence of gross breaches of animal welfare at slaughter. The list below summarises some of the welfare problems associated with slaughter during the 2001 epidemic:

- delays in the slaughter of infected animals
- unsuitable on-farm and off-farm conditions for slaughter (e.g. poor handling and restraint facilities)
- animals awaiting slaughter were kept close to and in sight of those being slaughtered
- incompetent animal handling and inhumane slaughter (e.g. inexperienced handlers, unskilled slaughter teams, lack of training, lack of compassion, failure to pith slaughtered animals)
- policy of paying slaughtermen for each animal they destroyed (piece-rate basis) led to a lack of care

- inadequate veterinary supervision (Emergency Instruction 2001/06/AWVT)
- failure to kill animals effectively (particularly associated with use of barbiturates and stunning procedures) so that they subsequently regained consciousness
- unsuitable slaughter methods, failure to follow the Ministry of Agriculture, Fisheries and Food (MAFF)/DEFRA guidelines on facilities, handling, equipment and use of sedatives; the most frequent problem was the selection of unsuitable weapons and ammunition (for example, weapons or ammunition that were not powerful enough and that failed to kill the animal at the first attempt)
- animals escaping, being chased and wounded by slaughtermen using free bullets (examples shown on television of ewes and lambs in Monmouth, South Wales, and cattle at Knowstone in Devon, England)
- transport of unfit animals (e.g. heavily pregnant animals being transported to slaughter, sometimes giving birth en route or whilst being slaughtered)
- late-term and full-term foetuses dying of anoxia and circulatory collapse because the mother was dead.

Future planning for any policy that involves euthanasia of animals as a means of disease control must ensure that the slaughter methods used are both scientific and humane (9, 10). Furthermore, humane methods of slaughter under emergency conditions urgently need to be identified. The Farm Animal Welfare Council has already produced a report on the animal welfare issues that were a cause for concern during the 2001 FMD epidemic (13). This report recommended that detailed strategies for killing in the field of animals of all species and ages, should be available as part of contingency plans and, in addition, that such strategies should be based on sound scientific research.

## Animal welfare problems associated with movement restrictions

When a farm is declared an infected place, serving Form A restricts all movements of animals and people on and off the farm. Form C declares the farm to be a confirmed disease site and results in all farms within a 3-km radius being placed under a Form D, which severely restricts the movement of people and completely prohibits the movement of animals within this zone.

The widespread implementation of movement restrictions caused hardship for animals – and their owners – and many reports concerning welfare were made to local police, veterinary surgeons, animal protection organisations, such as the RSPCA, and any other authority to which the lay public had

access. In addition, there was widespread media coverage of some of the more graphic problems, such as lambs covered in mud and livestock that became marooned on waterlogged ground, for example, in such areas as the lowlands next to the River Severn (E.J.P. Wood, personal communication). The Devon foot and mouth inquiry (16) identified the pressing animal welfare problems experienced by those farmers who, often for months, remained subjected to Form D movement restriction.

The bureaucracy and understaffing of the State Veterinary Service precluded clear directions and unequivocal dissemination of information and this had deleterious effects on animal welfare. Apart from the time taken to obtain rulings on matters of welfare concern from the National Disease Emergency Control Centre in London, the inflexible licensing system exacerbated animal suffering. For example, animals were sometimes denied the opportunity of moving from heavily grazed pasture to a neighbouring field with fresh pasture, despite negligible risk of disease transmission. In a normal, non-emergency situation, these conditions would have led to prosecution under the Protection of Animals Act of 1911 (1) or the Agriculture (Miscellaneous Provisions) Act of 1968 (2). A matter of great concern is that the licensing arrangements rarely left provision for veterinary risk assessment, especially when so many of the decisions that should have been taken required only a modicum of common sense and involved no risk of disease spread. Matters did improve during the epidemic as the licensing arrangements were modified. However, the licensing difficulties should have been anticipated well in advance of any epidemic and licensing arrangements must be simplified if future infectious disease outbreaks are to be handled effectively. The Livestock Welfare (Disposal) Scheme (LWDS) was introduced by the MAFF as it then was, on 22 March, but was not an unqualified success as the decision-making process was not streamlined enough to deal with the acute nature of many welfare problems.

Another unanticipated problem that arose from the lack of feed was that traumatic damage from foraging in hedges and subsisting on unsuitable food, such as brambles and gorse, was sometimes misdiagnosed as FMD (11). Misdiagnoses of this type had both welfare and ethical implications as the numbers of animals killed were increased substantially because of the contiguous culling policy.

Some of the welfare problems arising directly and indirectly from movement restrictions were as follows:

- inability to move periparturient animals, so that such animals gave birth under unsuitable conditions with high maternal and perinatal mortality as a consequence
- farms became seriously overstocked and there was a lack of feed, bedding and shelter
- conditions for hill sheep deteriorated because of movement restrictions

– the usual levels of stockmanship could not be maintained and many farmers were placed under extreme stress, as they could not look after their animals properly; the stress was exacerbated if welfare problems became so acute that the LWDS became the only option (as not all the affected animals were destined for the food chain, this was not wholly satisfactory and the LWDS arrangements were cumbersome and slow)

– the bureaucratic nature of licensing arrangements allowed little flexibility for veterinary-based decisions and often led to unacceptable delays; for example, delays in issuing movement licences resulted in many animals becoming eligible for the LWDS only

– the LWDS became over-subscribed and this resulted in further delays and animal welfare problems, for example, cattle reaching over 30 months of age and mature males being kept under unsuitable conditions.

## A consensual approach to disease control

An ethical, socially integrated and acceptable policy for the control of infectious disease in food-producing animals needs to be developed (14, 29, 30). A consensual approach and communication between stakeholders are key factors, so that

all sectors of the community understand and accept the rationale behind the measures outlined. The report of the Royal Society on infectious diseases in livestock recommended that 'better contingency planning is vital' (30). To be effective, contingency plans need to be prepared, widely available, kept up-to-date and practised regularly, so that in the eventuality (or inevitability) of FMD occurring, a well-understood strategy can be implemented rapidly. Most importantly, one of the lessons to be learned from the 2001 FMD epidemic is that animal welfare must be built into new policies and procedures: 'a balance must be struck between disease control and welfare but welfare must not be set aside, even in an emergency' (13).

The views expressed in this paper are based on the published literature and the first-hand experience of the authors, three of whom worked as temporary veterinary inspectors and one as a local veterinary inspector during the 2001 FMD epidemic.

## L'épizootie de fièvre aphteuse de 2001 au Royaume-Uni : le bien-être animal en question

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### Résumé

La gestion de l'épizootie de fièvre aphteuse survenue en 2001 au Royaume-Uni a soulevé de nombreux problèmes liés au bien-être animal. Ces derniers s'expliquent d'abord par le nombre élevé d'animaux abattus pour maîtriser l'épizootie ; les conditions et les modalités de leur abattage étaient souvent en infraction aux réglementations régissant le bien-être animal à l'abattoir. D'autres problèmes sont également survenus du fait des restrictions imposées à tous les déplacements, et notamment aux déplacements d'animaux, qui ont provoqué de véritables désastres qui auraient pu être facilement évités (animaux mourant de faim par manque de nourriture, femelles gravides mettant bas dans des conditions inacceptables, etc.). L'article est fondé sur l'expérience personnelle des auteurs ainsi que sur des informations et rapports émanant de diverses sources.

### Mots-clés

Abattage – Animaux d'élevage – Bien-être animal – Fièvre aphteuse – Gestion – Législation – Réglementation – Restriction des déplacements d'animaux – Royaume-Uni.

## La epidemia de fiebre aftosa de 2001 en el Reino Unido en relación con el bienestar de los animales

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### Resumen

Las medidas adoptadas en el Reino Unido para luchar contra la epizootia de fiebre aftosa de 2001 dieron lugar a muy frecuentes problemas de bienestar animal, debidos sobre todo al elevado número de animales sacrificados para contener la epizootia y a los métodos y condiciones de sacrificio a que ese gran número obligaba a recurrir, a menudo en violación de la normativa sobre bienestar animal y sacrificio. Por otra parte, la restricción de los desplazamientos, en especial de animales, provocaron asimismo desastres que según todas las apariencias hubieran podido evitarse con facilidad, como la muerte de ganado por falta de alimentos (entre otras causas) o los partos realizados en malas condiciones. Los autores repasan sumariamente la cuestión basándose en su experiencia personal y en observaciones e informes procedentes de fuentes diversas.

### Palabras clave

Bienestar animal – Fiebre aftosa – Ganado – Gestión – Legislación – Reglamentación – Reino Unido – Restricción de los desplazamientos de animales – Sacrificio.



## References

1. Anon. (1912). – Protection of Animals Act (1911) British Legislation 1&2 Geo V, c 27. Her Majesty's Stationery Office (HMSO), London, 12 pp.
2. Anon. (1968). – Agriculture (Miscellaneous Provisions) Act British Legislation. Her Majesty's Stationery Office (HMSO), London, 62 pp.
3. Anon. (1981). – Animal Health Act 1981 as amended by the Animal Health Act Regulations 1992 (Statutory Instrument [SI] No. 3293, 1992). Her Majesty's Stationery Office (HMSO), London, 72 pp.
4. Anon. (1995). – Welfare of Animals (Slaughter or Killing) Regulations (Statutory Instrument [SI] No. 731, 1995) as amended by the Welfare of Animals (Slaughter or Killing) Regulations 1999 (Statutory Instrument [SI] No. 400, 1999). Her Majesty's Stationery Office (HMSO), London, 39 pp.
5. Anon. (1997). – Welfare of Animals (Transport) Order 1997 (Statutory Instrument [SI] No. 1480, 1997). Her Majesty's Stationery Office (HMSO), London, 31 pp.
6. Anon. (2000). – Welfare of Farmed Animals (England) Regulations 2000. Her Majesty's Stationery Office (HMSO), London, 16 pp.
7. Anon. (2002). – Cumbria Inquiry. Cumbria County Council, Carlisle, 124 pp.
8. Anon. (2002). – Guide to professional conduct. Royal College of Veterinary Surgeons, London 47 pp.
9. Baumans V., Meijer J.C., Haberham Z.L., Groot H.N.M. & Hellebrekers L.J. (1998). – Euthanasie bij jonge biggen: gas of injectie? *Tijdschr. Diergeneesk.*, **123**, 738-742.
10. Beaver B.V., Reed W., Leary S., McKiernan B., Bain F., Schultz R., Bennett B.T., Pascoe P., Shull E., Cork L.C., Francis-Floyd R., Amass K.D., Johnson R., Schmidt R.H., Underwood W., Thornton G.W. & Kohn B. (2001). – 2000 Report of the American Veterinary Medical Association (AVMA) panel on euthanasia. *J. Am. vet. med. Assoc.*, **218** (5), 670-696.
11. De la Rua R., Watkins G.H. & Watson P.J. (2001). – Idiopathic mouth ulcers in sheep. *Vet. Rec.*, **149** (1), 30-31.
12. Farm Animal Welfare Council (1993). – Second report on priorities for animal welfare research and development. Ministry of Agriculture, Fisheries and Food Publications, London, 26 pp.

13. Farm Animal Welfare Council (2002). – Foot and mouth disease 2001 and animal welfare: lessons for the future. Department for Environment, Food and Rural Affairs Publications, London, 21 pp.
14. Hancock R. (2001). – Effective cattle disease surveillance in England and Wales. *Cattle Pract.*, 9 (3), 203-204.
15. King D. (2001). – The impact of foot and mouth disease. In First Report of Session 2001-2002, House of Commons, Environment, Food and Rural Affairs Committee, 25 April, Column 399. Her Majesty's Stationery Office (HMSO), London, 60-82.
16. Mercer I. (2002). – Crisis and opportunity: Devon foot and mouth inquiry 2001. Devon Books, Devon, 93 pp.
17. Ministry of Agriculture, Fisheries and Food (MAFF) (1983). – Code of recommendations for the welfare of livestock: cattle. Her Majesty's Stationery Office (HMSO), London, 16 pp.
18. Ministry of Agriculture, Fisheries and Food (MAFF) (1983). – Code of recommendations for the welfare of livestock: pigs. Her Majesty's Stationery Office (HMSO), London, 16 pp.
19. Ministry of Agriculture, Fisheries and Food (MAFF) (1987). – Code of recommendations for the welfare of livestock: farmed deer. Her Majesty's Stationery Office (HMSO), London, 12 pp.
20. Ministry of Agriculture, Fisheries and Food (MAFF) (1989). – Code of recommendations for the welfare of livestock: goats. Her Majesty's Stationery Office (HMSO), London, 11 pp.
21. Ministry of Agriculture, Fisheries and Food (MAFF) (1989). – Code of recommendations for the welfare of livestock: sheep. Her Majesty's Stationery Office (HMSO), London, 15 pp.
22. Ministry of Agriculture, Fisheries and Food (MAFF) (1995). – Summary of the law relating to farm animal welfare (reprinted 1998). Her Majesty's Stationery Office (HMSO), London, 34 pp.
23. Ministry of Agriculture, Fisheries and Food (MAFF) (1998). – Guidance on the welfare of animals (transport), Order 1997. PB 3766. Her Majesty's Stationery Office (HMSO), London, 93 pp.
24. Ministry of Agriculture, Fisheries and Food (MAFF) (1998). – Guidance on the transport of casualty farm animals. PB 1381. Her Majesty's Stationery Office (HMSO), London, 18 pp.
25. National Audit Office (NAO) (2002). – 2001 outbreak of foot and mouth disease. Her Majesty's Stationery Office (HMSO), London, 133 pp.
26. Northumberland Foot and Mouth Disease Public Inquiry (2002). – Report of the Inquiry Panel. Northumberland County Council, Northumberland, 166 pp.
27. Porter A.R.W. (1991). – Animal welfare. In Legislation affecting the veterinary profession in the United Kingdom. Royal College of Veterinary Surgeons, London, 17-45.
28. Radford M. (2001). – The contemporary legal framework. In animal welfare law in Britain. Oxford University Press, Oxford, 131-166.
29. Royal Society of Edinburgh (2002). – Inquiry into foot and mouth disease in Scotland. The Royal Society of Edinburgh, Edinburgh, 77 pp.
30. Royal Society (2002). – Infectious diseases in livestock. The Royal Society, London, 160 pp.
31. Woolhouse M. (2001). – The impact of foot and mouth disease. In First Report of Session 2001-2002, House of Commons, Environment, Food and Rural Affairs Committee, 7 November, Column 214. Her Majesty's Stationery Office (HMSO), London, 45-71.