EFRC SUBMISSION TO THE LESSONS LEARNED INQUIRY INTO FOOT AND MOUTH DISEASE

By Lawrence Woodward, Director of Elm Farm Research Centre

15th MARCH 2002

Introduction

1) This response is based upon evidence collected, analysed and synthesised by ourselves and others with direct experience of the Foot and Mouth Disease (FMD) outbreak and/or knowledge of the epidemiology, policy measures and economic consequences of FMD in the UK and internationally.

2) During March and April 2001, Elm Farm Research Centre (EFRC) was very active in pulling together and presenting the case for the use of vaccination along side the use of slaughter. During this period we assembled scientific evidence to support the seeking of a Judicial Review of MAFF's policy by Mr Peter Kindersley; we published information about vaccination; we set up two widely used websites on the outbreak; and attended meetings at 10, Downing Street to brief the Prime Minister.

3) This submission draws upon meetings at Downing Street and Chequers chaired by the Prime Minister in March 2001 and attended by Lawrence Woodward (Director, EFRC) and Patrick Holden (Director, Soil Association); material gathered for the Judicial Review sought by Peter Kindersley, also March 2001; the contributions of participants in a conference organised by EFRC held on 13th June 2001, who had been directly involved in the outbreak in various capacities (*The Need to Inquire and Learn: In Search of Truth*) and communications from two websites – Sheepdrove.com and efrc.com – which for a period were amongst the most heavily used non-government sources of information about the outbreak.

How adequate were the contingency plans at national and local levels for dealing with foot and mouth disease in GB? What were the specific strengths and weaknesses?

4) Before the outbreak, we believed that under EU rules a government FMD contingency plan, regularly updated, is lodged with the EU Standing Veterinary Committee. As part of preparations for the Kindersley Judicial Review, our legal team made a formal request to MAFF lawyers for sight of this plan, but it was not forthcoming. Indeed, to the best of our knowledge, if it exists, it has never been published and subjected to external examination. Consequently it is not possible for us to comment directly on whether the contingency planning was adequate.

5) However, for the following reasons, we have concluded that an adequate contingency plan was either not in existence or was ignored:
    a) Key recommendations from the Northumberland Inquiry following the 1967 outbreak were not implemented.
    b) Intense international research and development on FMD, coupled with the prevalent risk of FMD in Europe prompted the Animal Health and Welfare Committee of the EU to develop a strategy on emergency vaccination against FMD. The Committee met through 1998/99 and reported in March 1999. The proposals covered issues of trading of products from vaccinated animals. This strategy seems to have been

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ignored throughout the outbreak. Indeed, MAFF officials in the meetings we attended exhibited no knowledge of its existence [4].

c) There were well-publicised fears during the early 1990s over the extent and nature of sheep movements between the open borders of Europe. The livestock dense regions of the EU were considered major risk areas for FMD and in the EU, the highest concentration of sheep is in the UK. Warnings regarding sheep have also been evident through the 1990s following outbreaks with major sheep involvement in Greece, North Africa and the Middle East. In addition, it should be noted that research work on FMD in sheep indicated the problem of sub-clinical infection that features so importantly in the UK 2001 outbreak [4]. The failure to impose an immediate movement ban on sheep, the apparent failure of the epidemiological models to take into account the way the O1 virus strain shows in sheep and its transmission mode indicates that this information was not included in any contingency planning.

d) There is no evidence that the wider costs, beyond the food and farming sector, of the implemented control strategy were considered in any prior contingency planning. Certainly these costs were not taken into account during the discussions attended by EFRC at Downing St [1]. The obvious changes in the balance between farming and other activities in the rural economy over the past decades, and the enormous current importance of tourism, leisure and other industries in comparison with farming, would surely have been more fully taken account had adequate contingency planning taken place.

How effective and timely was the Government's response to the emerging crisis nationally and in local communities?
and
What roles did MAFF/DEFRA, the State Veterinary Service, the devolved administration in Scotland and Wales, local government, the Armed Forces and others play in the crisis? Were they adequately organised, co-ordinated and resourced to do so?

Our experience of the scientific advisory process

6) Central to this submission is the view that the government was badly advised by its scientific advisors and by the informal group put together by Professor King. We witnessed at first hand antagonism between different groupings; we heard for ourselves complaints made to Prof. King by the Deputy Director of the Institute of Animal Health, Pirbright Laboratory that their information on the transmission mode of the virus was being ignored by the modelling groups and King's committee at a critical stage of the outbreak; we witnessed a leading scientist attempting to give misleading information on vaccination to the Prime Minister. Additionally we perceived that Chief Veterinary Officer, Mr Jim Scudamore, was being sidelined by Prof. King's committee; and that the Minister, Nick Brown was overly influenced at critical stages by the National Farmers Union's narrow economic views.

7) It might be argued that as we were, at best, only briefly peripheral to the main action at one stage of the outbreak, that we have misunderstood the things we heard and witnessed; and that we have filled in the gaps in this limited experience with speculation. In fact, we have thought long and hard about our experiences during those few weeks and accepting that they are partial believe they are an important pointer to the manner in which the outbreak was handled. What is incontrovertible is that what we witnessed is at odds with the government's own guidelines on scientific advice and policy-making. It is also at odds with a key recommendation of the Phillips Inquiry into BSE regarding science advice to government [16] - to consider, properly, unorthodox and contrary views.

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8) We feel it is necessary to back up this point by describing in a little detail our experience in trying to raise the case for the use of vaccination alongside the slaughter policy. Given that vaccination was accepted in the control strategy of the EU Standing Veterinary Committee, this could hardly be considered an unorthodox and contrary view but as far as we could tell had not considered or had been summarily dismissed by MAFF.
    a) We were asked by several of our farmer clients who were appalled by the slaughter policy to investigate possible alternative policies in FMD control.
    b) We commissioned and circulated three papers on the use of vaccination.
    c) In the interim we noted MAFF's reluctance to consider anything other than slaughter only and a good deal of misinformation about vaccination emanating from MAFF and from scientists at Pirbright,
    d) Consequently, Mr. Peter Kindersley and other concerned farmers took steps to seek a Judicial Review of MAFF's FMD control strategy with the aim of getting the use of vaccination properly considered.
    e) MAFF contested the action and Pirbright and others seemed to step up the campaign of misinformation.
    f) The scientific review, which formed part of the Kindersley case, was published in several newspapers and we therefore circulated our three background papers to our advisory clients and supporters and posted them on the Sheepdrove and EFRC websites.
    g) EFRC Director, Lawrence Woodward was invited, with only a few hours notice, to attend a meeting with the Prime Minister to discuss vaccination. He went to the meeting accompanied by Dr. Keith Sumption, who had written the scientific review. We formed the impression that the Prime Minister had become aware of our papers through non-government sources and was sympathetic to our case. There was however a great deal of antagonism to our case and indeed our presence from others present including Mr. Scudamore, the Minister Nick Brown, Prof. King and the Deputy Director of Pirbright Laboratory. In our opinion much of the arguments used against vaccination in that meeting were in correct and on occasion deliberately misleading. The outcome of the meeting was that a limited use of vaccination on cattle in Cumbria would be considered but that the availability and supply of vaccine was problematic.
    h) A second meeting chaired by the Prime Minister was called a few days later. This had a different composition and was not antagonistic. Vaccination was viewed much more sympathetically and a member of the "pro team" that day, Mr. Gareth Davies was invited by Prof. King to join his advisory committee.
    i) As we felt from both meetings that the Prime Minister's support for the use of vaccination would now mean that it would be properly considered as part of the control strategy, Mr. Kindersley halted his action for Judicial Review.

9) Subsequent events showed this decision to be premature. However, the main point is that this course of events demonstrates a shambolic way to conduct policy-making. The fact that a Prime Minister has to find out about options for himself in opposition to his scientific advisors is hardly good governance; and that he has to question closely a government scientist to drag out a balanced answer on a scientific matter is scandalous.

The control strategy and its implementation was flawed

10) It is fundamental to establishing an effective FMD control policy to recognise that transmission of the virus is partly controllable and partly uncontrollable. Controllable factors include movements of animals, animal products and humans; bio-security and disinfection measures. Uncontrollable factors include airborne spread and wildlife transmission [(4)]. An

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effective control policy also depends on information on the efficiency of the control measures put in place over the course of the outbreak. In our view none of the controllable factors - including bio-security measures on and between farms, disposal sites and other premises (milk collection, feed lorries, transport of carcasses to disposal sites), [17, 4] were effectively dealt with at the start of the outbreak and were inconsistently managed throughout, whilst key uncontrollable factors were misunderstood leading to the application of inappropriate policies.

11) Detailed analysis of the data is required to determine whether the intensity of the outbreak was the result of uncontrollable or controllable factors - the implications of this for the Inquiry are central. Fear of airborne transmission has been dominant since the 1967 outbreak and in this outbreak emphasis on airborne spread has been repeated. We believe this to have been both false and diversionary. From the start of the outbreak the evidence did not support it.

12) The primary infection in a large number of pigs was said to have been present for two to three weeks when discovered. Thus there was an extended opportunity to 'emit' virus, sufficient to infect cattle and other stock over an area up to 100km from Heddon. This would have resulted in a clear distribution and concentration of cases according to the (airborne) dispersal of the virus. This spread and pattern were not observed. Furthermore, it was known that the pan-Asian type of the virus (O1) is characterised by low aerosol emission [4]. By the end of the second week (7 March), it should have been clear that airborne spread was not implicated and there was no justification for the view that the outbreak was out of control. In our view the work completed by those modelling the outbreak and the data they used to parameterise the models were flawed, the advice to government was thus incorrect.

13) The advice to implement a strategy of 'pre-emptive culling' was similarly flawed. Such a strategy had not been previously used anywhere for FMD control, with the exception of limited use in Greece. As far as we are aware, no protocols had been agreed that would guide the selection of this policy, furthermore, neither the feasibility nor the economic nor environmental impact seems to have been considered.

14) The national movement ban was imposed five days after the first case was suspected and three days after the ban on exports. There were substantial movements of livestock during this period [10]. It is possible that an effective and immediate ban on transport of susceptible animals - necessary for control - would have considerably limited spread [9, 4].

15) The army was not fully and effectively deployed at the start of the outbreak. The inadequacy of MAFF's logistical and resource planning ability to implement the chosen eradication policy was clear within two weeks and became very evident when the army was finally deployed [10].

16) The specific virus strain causing the 2001 outbreak (O1) is associated with spread without expression of symptoms in infected sheep. Sheep were the main focus of the outbreak and the areas affected have been densely populated with sheep [9]. This seems not to have been adequately taken account of. Positive diagnosis by laboratory testing of the disease failed to keep up with the rate of notification alarms. This resulted in extremely questionable confirmation of disease status from symptoms rather than laboratory analysis.

17) Notwithstanding the problems of diagnosis, the time from diagnosis to slaughter was, for the first few weeks of the outbreak considerably longer than acceptable. This will have contributed substantially to spread. Slaughter to disposal also took unacceptably long - increasing the risk of spread. Disposal by either burial or burning will have contributed to spread, particularly because of the very large numbers of animals requiring disposal. The logistical problems of the diagnosis, slaughter and disposal placed an enormous strain on government departments and the government's agents. The workload and emotional stress

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inevitably had a profound impact on human resources, possibly leading to the reported (in the press) inadequate application of bio-security procedures or even negligence occurring in the slaughter and disposal of animals.

18) The legality of some aspects of the government's actions requires further examination and illustrates that government departments were not able to cope with the outbreak in administrative terms. The legal basis for the contiguous cull [12] and the justification for closure of access to the countryside [12, 10, 2] are both uncertain; the definition of adjoining and contiguous holdings was often inaccurate and was frequently challenged [12]

19) However, the conditions under which MAFF and other agencies were operating were intolerable and conducive to neither effective strategy development nor effective monitoring and evaluation:

- Political pressure caused by the imminent local and national elections
- Farming lobby pressure on government from the NFU (not well representative of farming and food interests)
- Meat export trade and national FMD-status lobbying of government to enable continued international trade
- Inadequate information on the actual movement of livestock and the course of the outbreak made it all but impossible to provide reliable predictive models and track the likely spread of the disease.
- The compensation scheme militated against achieving farmer support for a vaccination strategy. The way in which a compensation policy would work with vaccination was not established, even though the EU proposals covered the trading of products from vaccinated animals.

Would the use of vaccination have made any difference to the scale and/or duration of the outbreak, and its wider impact?

20) The balance of science advice to government during the current outbreak has been that vaccination is not a viable control strategy. To date, no convincing rejection of our paper arguing the case for vaccination, initially presented as part of the judicial review and to the Prime Minister and later published, has ever been published [1]. Furthermore, NFU, the meat export trade and to a lesser extent the retail sector all lobbied government against considering vaccination. We remain convinced that vaccination should have been a key element in the strategy for control of the outbreak.

21) Ring vaccination is a well-known strategy for FMD control and is accepted within the EU Veterinary Committee Emergency Strategy. It was eventually successfully used in the Dutch outbreak. It has been used worldwide, generally with success. Lessons learnt from control of FMD (and specifically the pandemic O1 strain) were not fully taken into account in the science advice to government [9, 8, 4]. This failure has had severe consequences and indicates that MAFF were ill prepared to deal with a major outbreak of FMD.

What could have been done differently to alleviate the economic, social and animal welfare impact of the unprecedented level of culling and disposal?

22) We believe that even the narrowest employment of the vaccination tool - where all vaccinated animals are eventually destroyed (an option we do not support) - would have significantly reduced the damage of the present outbreak (to the farming, other rural and tourist sectors). As happened in Holland, this use of vaccination allows the slaughter of animals and disposal of carcasses to be carried out in a planned and orderly way. A proportion of animals would have

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to have been slaughtered in situ and disposed of quickly nearby. But the massive pyres burning for days and the disposal pits that have blighted the countryside would have been avoided, along with the pictures and adverse publicity.

How effective were the communications systems for handling and responding to the outbreak?

23) All communication during the outbreak was poor –whether to farmers and communities caught up in the outbreak or to the outside world. One indication of this was the popularity of the websites we set up to provide information primarily on alternative strategies but eventually on all aspects of the outbreak. At its most intense these sites were receiving over thousands of "hits" a day. We also established a telephone "helpline" which was constantly busy. Many people told us that they were ringing us because they could not get "any sense of MAFF". Users ranged from farmers and their families to the general public.

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APPENDIX 1

THE NEED TO INQUIRE AND LEARN

Introduction and Summary *Lawrence Woodward*

(Lawrence Woodward is Director of Elm Farm Research Centre. He worked on the technical aspects of the application for Judicial Review brought by Peter Kindersley in March/April and participated in two meetings with the Prime Minister on the use of vaccination).

On the 13th June 2001, Elm Farm Research Centre (EFRC) organised a conference that called for a full and open public inquiry into the FMD outbreak, its management and its consequences. Participants came from all walks of life including farming, tourism, the research community, the media, the legal and veterinary professions, environmental and community activity. For the most part they had been involved in opposing the prevailing slaughter only policy or had been caught up in its consequences.

We listened to a number of powerful descriptions of life right at the centre of the epidemic and heard about things that need further investigation. For example what were the dealers who buy animals for supermarkets doing between the 19th of February when the first case was suspected and the 24th when a national movement ban was introduced?

Several eminent speakers raised questions about the control strategy used and others spoke of panic or partiality at the heart of the decision- making process. There have been reports that FMD experts from Pirbright felt that their advice was being ignored (whilst they themselves seemed to be energetically briefing all and sundry against vaccination). In the wake of those, the question was raised as to how the recommendation of the Philips Inquiry (into BSE), that government should ensure that "dissident voices" are heard, in any similar crisis in the future, was implemented.

And what went wrong at Maff? Despite being under resourced, they seemed to start well. Brown and Scudamore looked and sounded authoritative and competent. But they lost it somewhere. How and why?

As the conference progressed and surveyed the available evidence, listened to first hand, on the ground experience and discussed the significance of the various issues, a heightened awareness of the need for a public inquiry grew. But it is not inevitable that such an inquiry will happen. As some have pointed out, the Prime Minister himself took overall charge of the management of this outbreak. Self-serving factors like the election date may well have played a distracting and possibly decisive role in how the outbreak was managed. Few of us are easy with our naked self- interest being exposed and newly re-elected Ministers and Prime Ministers are rarely exceptions.

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We have to hope that Tony Blair is. Only by evaluating and learning from this outbreak and its consequences can we ensure that it does not happen like this again. To encourage Mr Blair, the conference participants signed a letter asking for a public inquiry.

Any inquiry must be full and wide-ranging. It must take into account tourism and the impact on rural communities as well as on agriculture. For decisions taken solely on agricultural grounds have had a profound effect on other sectors. The most obvious one is the decision not to use vaccination. Even the narrowest employment of the vaccination tool – where all vaccinated animals are eventually slaughtered (an option we do not support) – would have significantly reduced the damage to the tourist industry. As happened in Holland, this use of vaccination allows the slaughter of animals and disposal of carcasses to be carried out in a planned and orderly way. Yes, a proportion of animals, those that actually contracted the disease would have had to be slaughtered in situ and disposed of quickly nearby. But the massive pyres, burning for days, which have blighted the countryside, would have been avoided, along with the pictures and adverse publicity.

As our conference progressed key issues emerged which an inquiry will have to focus on. Amongst these are the following:

- What was the impact in delaying the imposition of a ban on national movements of animals (24th Feb) until several days after the ban on exports (21st Feb)? During this time several markets took place and it seems that dealers whose export outlets were suddenly closed took animals to those markets. The spread of the infection was seeded during those days. On the 28th Feb, at the end of the first week, outbreaks were confined to Essex, Northumberland and Devon. The hotspots of Dumfries, Galloway and Cumbria were unaffected. Would an immediate national movement ban imposed on the 19th/20th of Feb have stopped the disease breaking out? Possibly. Why was such a ban not imposed?
- From an early stage – week 2 certainly – it was clear that sheep were a major foci of this outbreak. So was ring vaccination of areas densely populated with sheep considered at this stage? Why was it not implemented? The strategy is well known, is an accepted part of the EU Veterinary Committee Emergency Strategy and was eventually used successfully in the Dutch outbreak. An early and rigorously imposed movement ban together with ring vaccination could well have stopped this disease spreading by week 3. It is easy to see this with hindsight but the strategy was already written in the EU manual. Did anyone read it? And by the way, where is the UK FMD contingency plan that is supposed to be regularly updated and lodged with the EU?
- On the 16th March the reproductive rate of the disease was 1 (MAFF information, data put together by Prof. Woolhouse of Edinburgh University). That is to say the disease was not out of control and the movement ban was working. This was before preventative or firebreak culling started. So how do we account for the rise in reported cases to levels that seemed to be out of control after this date?
- Not by airborne spread. Analysis of the situation at Heddon Farm, the original outbreak, gives no grounds for thinking that this virus was spreading by the airborne route. This was known around week 2 to 3 and Pirbright seemed to have formed that view by the week beginning 19th March. In which case what was the point of the preventative cull (firebreak, contiguous, call it what you will)? The point has been made that Pirbright's analysis was not adequately reflected in the model constructed by Prof. Anderson and used, almost to the exclusion of everything else by Prof. King. Is this so?
- How many actual cases of FMD occurred after 16th March? There were more vets in the field from week 3. Were they picking up actual cases or were diagnostic mistakes being made? After the preventative cull was introduced laboratory confirmation of cases seemed to be pushed to one side. Was laboratory diagnosis used fully at this stage? It is now reported that a large proportion of samples taken from slaughtered animals are proving to be negative. So how far did the disease actually spread and how far and deep did panic spread?

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- And then Professor Anderson appeared on television and revealed that his model predicted that the disease was heading out of control and that a large proportion of UK livestock would contract it. But did that model take into account all the relevant factors? It seems not to have given due allowance for movement controls to have an impact. It seems to have ignored Pirbright's information about the relative unimportance of windspread and it ignored or was partial about the effect of vaccination. Anderson's television interview galvanised the government or caused it to panic, depending on your view. Tony Blair took over, Professor King was given the reins and the slaughter recommenced with a new vigour. The models and charts took on a huge significance as the countdown to June 7th began. Was this panic or political expediency? Were the politicians villains or victims? Were scientific advisors at each other's throats, not talking to each other or just not listening?
- Why were the findings of the Northumberland Inquiry ignored? Why was the experience of other outbreaks of this virus strain apparently ignored?
- Was there any real technical, operational or legal basis for the contiguous cull? Was this ever independently reviewed?
- How could we have so lost perspective that bullying and intimidation of farmers was so widespread and that inhumane treatment of animals so apparently commonplace?

Participants left the conference to continue their various activities. Some to their farms, now empty of livestock; some to continue campaigning for an end to the slaughter – only policy; some to mount fresh legal challenges to the government's policy; and some to report on what all agreed is folly and failure on a massive scale.

There was clear agreement on the vital need for a full and open public inquiry. Not primarily to place blame but to find out why things happened as they have. In part to prevent them happening again but also to come to terms with the traumatic experiences many participants have faced.

The conference also highlighted at least one bright spot that has emerged during the epidemic. That is that there still exists a strong, deep and widespread concern about what happens in the countryside. It is notable how many people who before this outbreak had not been involved in agriculture or animal welfare or rural issues, who had never before been activists or campaigners became involved. Ordinary people, who have emerged and taken responsibility, campaigned and acted and shown concern for rural livelihoods and the state of agriculture; people who became active citizens because they want to ensure that we can still claim to live in a civilised society.

Lawrence Woodward

APPENDIX 2

The Control Strategies *Dr. Keith Sumption*

The Control Strategies; Paper presented to the "In search of truth" conference, 13th June 2001

K.J Sumption, Edinburgh University
Lecturer in International Animal health at the Centre for Tropical Veterinary Medicine (CTVM), University of Edinburgh, specialising in control of internationally significant virus infections, and vector borne diseases. Edinburgh is the only UK University to run annual FMD outbreak simulation exercises as part of their international disease control training.

Preface to Pretyman report, 1925

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"The real trouble with foot-and-mouth disease is not its deadliness but its extra- ordinary infectivity, and we do not have to consider its effects upon the animals actually attacked but upon the flocks and herds of the United Kingdom as a whole. Movement, both human and animal, is now much more extended than it used to be, and infection would constantly be carried from one part of the kingdom to another. "

FMD in the UK 2001- is it truly "unprecedented?"

Figures from MAFF on the 10th June indicated that culling of livestock had occurred on 8100 farms, which exceeds in number that of any previously recorded FMD control campaign. In 1997 6156 outbreaks were recorded in Taiwan, which also pursued a culling strategy to the point that this statistic was given. Prior to the Taiwan epidemic, the previous highest control by culling was in the UK in 1967-8, with about 2.5 thousand farms affected. However statements that this is the "worst ever epidemic" are misleading, since prior to effective vaccination campaigns or the use of the movement control/slaughter policy very major epidemics did occur; for example in 1872 in the United Kingdom, 52,164 cases were recorded in one year, and in France in the early 1950's – pre-mass vaccination – 330,000 outbreaks occurred in one year. The true incidence per year or per "epidemic" in most developing countries remains unknown, since recording of FMD infected premises depends very greatly on the willingness to report or the intensity of surveillance.

Where the slaughter policy is pursued, FMD is probably the one disease feared more for the control policy imposed than for any clinical impact. What is unprecedented in the UK 2001 epidemic is the scale of cull; 83,000 per day, on the week up to April 15th; with 3.2 million ruminants and 125,000 pigs having been slaughtered in control measures to June 10th. This exceeds any previous control campaign; in Taiwan, 3.8 million pigs were slaughtered before the control strategy changed to use of vaccination.

The major difference is the use of unprecedented control measures – the 3km cull of sheep, and the automatic culling on contiguous premises, compared to any known previous FMD control measure used in the UK or elsewhere. These measures were mostly developed de novo without recommendation from previous reports (although the idea of a pre-emptive cull has been discussed in certain FMD European non-refereed papers). We must therefore ask why these policies were adopted, and whether it was on scientific or circumstantial grounds – lack of preparedness in particular – that prevented the use of alternative additional measures to the slaughter policy such as vaccination. It must also address whether changes to the application of the slaughter policy in future will give a satisfactory indication of speed of return to normal trading in the countryside, or whether the use of vaccination in emergency situations could more rapidly and satisfactorily achieve this.

One major change from 1967 is that we are members of the EU; the enquiry must also consider the international perspective on the disease and the extent to which we have created in the form of regulations on FMD freedom, an importance for FMD that is beyond what is merited by the level of disease it induces. Britain's role in shaping the non-use of vaccination is well known; the inquiry must also consider the international perspective and whether the penalties on use of vaccination are currently scientifically justified, or the result of economic interests.

How did we learn in the past?

Most changes to our control strategy were based on our own experience in FMD control, and in the use of the stamping out policy we were almost alone in Europe and in the world. Each major outbreak prompted changes to the legislation, and since no greater than 5 years usually elapsed between outbreaks, the state veterinary service can be considered for most of the 20th century as a "standing army" with experience to bear upon each outbreak. Most of the issues of the current outbreak have either been experienced previously, or foreseen in papers emanating from the European Union's standing scientific committee on FMD over the past 5-10 years. For example, the Hay and Straw order, 1908, was prompted by an outbreak at Gorgie City Farm, Edinburgh, after 15 years absence of FMD in

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Scotland, which occurred after the importation of a contaminated consignment of hay from Holland; the role of feed stuffs in outbreaks thus became clear and although current regulations appear to manage this risk, the role that movement of feed and feed lorries had played in the current outbreak must be reviewed. Another example is of salvage slaughter (to the human food chain) of apparently healthy in-contact animals which has been used extensively in the past, but subject to much comment and review; in the Pretyman report of 1925 the practise was scrapped since it delayed slaughter, but re-introduced during the food shortages of the second world war; it was subsequently scrapped after the Gower's Report of 1954 following spread of infection via salvaged meat.

The practise should again be reviewed given the huge scale of mass slaughter in this outbreak; the accepted international practises of removal of potentially infected animal parts in FMD export slaughterhouses, and the potential ban on swill feeding, which should reduce risk of salvage to effectively zero.

The regular experience of FMD control and the almost unique dedication to the eradication by slaughter, and the great emphasis on learning from experience in order to prevent entry of infection in future probably underpins the lack of an international approach to the infection and the reliance on developing our own measures to combat the infection as and when it arose. It is curious that in the current outbreak farming opinion and the media focussed on the 1967-68 outbreak and did not seek the opinion of the European Union's own panel of FMD expertise, or international expertise in FMD in world bodies, but rather concentrated on the very limited, though experienced, pool of British expertise. It appeared that lessons learnt elsewhere in the past 30 years were not of interest, while after 34 years few persons in the State veterinary service would have experience of veterinary service in the 1967-68 outbreak, since with a retirement age of 60, they would have been graduates of only 1-2 years from University at the age of 23-24.

Did we take note of the changing international pattern of FMD epidemics?
Our traditional source of FMD has been continental Europe and South America, but since the control of FMD importation via export slaughterhouses and the removal of specified animal parts that might contain virus, this source has not been important since the 1960's. In the late 1980's and early 1990's FMD control has changed dramatically in each location; Chile has been free since the 1980's, and Argentina, Uruguay and the southern states of Brazil pursued a policy of eradication via vaccination, such that national or zonal FMD freedom has been accepted by the OIE (although in 2000/2001 breakdowns have occurred in these countries which ceased vaccination).

Instead of an improved worldwide situation, the years 1997-2000 saw instability in the world FMD situation; outbreaks occurred in countries which had been free since the 1930's, and vaccination was used for the first time ever in Taiwan in 1997 and Korea in 2000; the pan-Asian topotype was responsible for outbreaks in pacific rim countries previously free of the infection for prolonged periods but also for the first occurrence of the type O strain in South Africa, where outbreaks occurred near Durban and which could be seen to provide a clear warning shot to the UK authorities of the epidemiology of this virus type, being difficult to trace and requiring extensive use of serology to identify spread. Perhaps the greatest unknown risk is the level of infection in countries which are considered endemic but do not provide detailed information on location, scale and timing of outbreaks, such as China. It is noticeable that the outbreaks in pacific rim countries are in countries which border or are close to China, and that smuggling across the South China sea was considered the potential source of the 1997 outbreak and providing a reason for the use of vaccination compared to eradication followed by effective control of entry by this route.

We need to ask of our authorities;
What actions had MAFF taken in respect of:
The recent upsurge in FMD in from 1995 onwards: especially 2000

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Who does what and when in MAFF in response to occurrence of FMD around the globe?
What risk assessments had MAFF performed on the probable scale and impact of illegal animal product importations?
Who did what and when in 2000-2001 in regard to the worldwide pattern of FMD risk?
Were any early warnings given?
What change if any to inspection of free range or swill feeders?
What changes if any after the swine fever epidemic of 2000? (thus epidemic was attributed to probable illegal meat import being consumed by free-range pigs, close to footpath, and a possible far-east source was considered based on nucleotide sequencing of the CSFV strain involved).

How much did we consider the risk of spread of FMD in sheep before this outbreak?

This epidemic has been described as an accident waiting to happen – but to what extent was there a change in the livestock industry since 1992 and why did we seem to be so surprised about the extent and nature of sheep movements within and beyond our borders? Fears over the effect of the open borders in Europe were much publicised in the early 1990's, and the livestock dense regions of the EU were considered major risk areas for FMD; for the EU the highest sheep concentration is in the UK. Warnings regarding sheep have also been evident through the 1990's, following outbreaks with major sheep involvement in Greece, North Africa, and the Middle East, and research work on FMD in sheep, which indicated the problem of sub clinical infection. However during peacetime – before or between outbreaks, we had an opportunity to study the normal situation for livestock trading and also the possible events that occur every day at livestock farms which could result in transmission; we did not do this, whereas the authorities in the Netherlands did support such work for swine fever and used the results to run simulation models to determine the means by which transmission would be favoured and the outcomes of virus introduction. Our failure to do this can be attributed mainly to a lack of funding for farm level research in the UK, as well as perhaps a perceived lack of need in the funding agencies (including MAFF).

There is also a lack of socio-economic or farm-systems research applied to agriculture in the UK compared to say, developing countries; our livestock trade is both an agricultural and social phenomenon. For example what proportion of sheep transactions are "non-sale ring purchases" and what underlies this?

How do we measure efficiency in FMD control, and how have we performed?

The fundamental principles of epidemic control were established during practise of the slaughter policy during the period between 1865 and the 1950's, i.e. before the introduction of vaccination to control epidemics in other countries. Many of the principles were also honed in the control of rinderpest and pleuroneumonia by the slaughter method, but the critical aspects of speed and organisation have long been recognised as paramount because of the infectivity of the virus.

The fundamental principles are that part of the transmission of virus to establish new cases is controllable and part is uncontrollable; the former includes control of all aspects where man can establish effective control, that is of animal and human movement, of animal products, and of man's activities which might facilitate spread of infection. Uncontrollable spread is considered to be principally by wind, but also the possible involvement of (arguably) controllable wildlife; deer, rats, hedgehogs, and although this is debateable, birds.

Measurement of the efficiency of FMD control has been considered by Leech (1981) as the ratio of secondary cases to primary cases. Primary cases are usually considered those arising from a source

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outside of the country and secondary cases those arising from primary cases, and all subsequent cases might be considered for this reason secondary, since labelling them as tertiary etc becomes difficult to establish.
The efficiency of disease control by this calculation is highly efficient if the outbreaks are limited to those of the primary case and few others. Leech considered a high ratio of secondary cases to indicate great powers of herd-to-herd spread or poor performance in disease control in tracing and eliminating infection.

In the current outbreak tracing of infection has been critical to establishing the potential primary case at Heddon-on the wall during the first week, and the spread of infection from this source to nearby farms by the air, followed by spread via markets during the period up the imposition of national movement controls on 5 pm on the 23rd February.

Therefore our question is; how efficient was the control of secondary infections arising from each "seeded" infection that occurred prior to the imposition of movement controls on the 23rd Feb? To answer this question requires full access to the tracing data, and the timing and putative length of time each infection had been on the farms where infection was confirmed. However we can make some putative estimates of the level of efficiency, based on the ratio of the ratio of secondary infections, which occurred after movement control, was introduced to those that occurred before. Information provided by MAFF up to the 23rd March (Veterinary record, 31st march) indicates about 80 cases that result from the primary source or markets or other sources, which I assume to have occurred before the movement ban was introduced. Given that more data will emerge as eventually as many as possible of the early cases must be given some putative linkage to a source, this figure might be higher, say 120 seeded cases. If we consider these as primaries, and any subsequent cases occurring after movement restrictions were imposed as secondaries then the ratio is:
Cases by 11/6/01 = 1726; minus 120 primaries=1606 secondaries
The ratio of 1606 over 120 = 13.4 .

This ratio is very high compared to previous control, which was usually in the range of less than 5 secondaries per primary "except in years of severe epidemics in exceptional circumstances, such as 1942, when the ratio of primary to secondary outbreaks was in the region of 1:16, the ratio has seldom exceeded 1:5 and in any years has not exceeded 1:2" (MAFF, 1965; Animal health; A Centenary 1865-1965).

It might be argued and subsequently established that the number of seeded "primaries" were in fact much higher, but even doubling or tripling the number of primaries does not bring down the ratio of secondaries to that approaching "normal" levels of efficiency achieved in the UK in the past.

We can readily see from published tracing data that movement of infection before the movement control was introduced late on the 23rd has lead to widespread dissemination (seeding) of infection; but thereafter we must ask:

1. How much of the "seeding" of infection and subsequent difficult in control rose from the failure to impose a national movement control on the date that infection was a) fist suspected (19th) or b) confirmed as FMD (the 20th)
2. How much of the seeding arose from the imposition of an export ban on animals and animal products (22nd) before the imposition of a national movement ban, forcing hauliers/traders with animals destined for export to look for alternative accommodation with little if any pasture of their own?

How do we explain the apparently low efficiency in controlling infection – why so many secondaries?

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The high ratio of secondaries to "primaries" given above could be the result of:

a. A falsely low estimate of "primaries"; a much higher number of "seedings" of virus around the country before movement controls were introduced, each of which lead to several secondaries, but which were efficiently dealt with
b. An approximately accurate number of "seedings" around the country but a low efficiency at preventing onward transmission from these "seedings" of virus

The former explanation might be popular among some quarters as the responsibility would mainly be shifted to the period before infection was confirmed on the 20th, or less easily, before national movement control was introduced late on the 23rd. However had a high level of seeding been followed by efficient control of secondary spread then the duration of the epidemic would have been mainly contained to the period during which clinical evidence would appear either within the infected flock or in the neighbouring herds and flocks on contiguous farms. Instead spread seems to have been extended around infected premises and not confined to contiguous premises alone; more analysis o f the data is needed but the duration of the epidemic and the appearance of long distance hops would appear to indicate that secondary spread has not been effectively contained within the immediate neighbourhood of infected premises. However the location of the major centres of infection that were apparent at the end of the second week of the epidemic have not radically altered, indicating the overall, infection was contained by movement control to the major areas where seeding had occurred through the movement of sheep or from the initial primary source in pigs; this was at least the case until May, when the Settle rectangle became evident, and in late May with eastern movement towards Somerset.

Are the number of secondaries the result of a failure of controlled spread or uncontrollable spread?

The enquiry needs to focus on this issue, and analysis of the tracing data and the evolution of cases over distance and time is required.

Fear of uncontrollable spread, involving airborne transmission, has been dominant as a research theme since the 1967 outbreak; the 1981 outbreak in the Isle of Wight after spread from Brittany has occupied our minds but perhaps was an extreme example; as was perhaps also was epidemic in Taiwan provided much fuel to the fear of uncontrollable spread of infection involving pigs. Were the considerations on control affected by these extreme examples? The index case involved pigs, as did the proposed primary case at Heddon-on-the-Wall. However despite the finding of infection in pigs, the evolution of cases around Heddon on the wall over the first 2 weeks (i.e. by 7th march) perhaps should have sent a message to MAFF that airborne spread over distance was not of the level that occurred in previous outbreaks. At Heddon the disease was said to have been present for 2-3 weeks when discovered; the number of pigs concerned, given the extended opportunity to "emit" virus, would have sent a sufficient virus to infect cattle, and probably also other stock, over an extended area perhaps up to 60 or even 100km from Heddon, with a clear pattern of concentration of cases according to dispersal of the virus. This pattern was not observed, and only handful of the first cases in this area were attributed to airborne spread from the Heddon farm. Further, the low aerosol emission of virus by the pan-Asian topotype had been previously known (Paul Kitching, anecdote in the Veterinary Record, 24th March, 2001).

So once the pan-Asian strain was known to be involved, and the possible airborne spread from Heddon had not materialised, both of which were known by the 7th March, why did we appear to worry that the outbreak was "out of control"? and why introduce forms of disease control based on geographical proximity (for airborne spread is the main form of mechanism that observes a gradient over distance)?

The answers to these may include a lack of consultation with FMD expertise either within or outside of the UK, or a failure to communicate effectively the implications of these findings.

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So if the failure was not related to airborne spread, what mechanisms might have occurred?

Other forms of uncontrollable spread involve wildlife, such as rats, hedgehogs and deer, each of which can be biologically and mechanical transmitters of virus. Each may have played a role in some areas; there is some evidence that a plague of rats followed the cessation of rodent operative activities, and that lesions of FMD in deer were detected in Cumbria. With rats the difficulty has been to identify how an infected rats might lead to infection of a ruminant; but under stressful conditions entry of virus through abrasions might facilitate. Deer could give rise to aerosols or pasture contamination, but the low aerosol transmission makes the former less likely. Risk factor analysis of cases might indicate which farm characteristics increase risk of acquiring infection.

What about failure of "controllable" forms of spread?
This must be a major component of the investigation. Effective control prevents virus spreading within farms (high standards of internal bio-security and animal segregation) and also between farms.

Can the failure to prevent secondary spread be attributed to a failure to control one or many routes of transmission?
Should any one route predominate e.g. activities of milk collection activities, or feed lorries, or even lorries carrying carcasses to disposal sites, then regulations and policy in these areas could be tightened up and the lesson learnt. But if a wide range of activities are potentially incriminated, we must ask if there is any prospect of more efficient control on secondary spread in future epidemics?

It is hard to imagine that we can expect better bio-security arrangements to be in place at a higher proportion of livestock farms for an extended period, at present almost 4 months. Or that rural activities could have been effectively closed down to prevent spread by third parties. Or that those involved in servicing farms could be any more careful than they have been. However gaps may have existed. In the past (Pretyman report, 1925) it was recognised that the Police had an important role in preventing human activities which might result in spread by being stationed on farms 24 hrs a day where FMD had been diagnosed until animals were slaughtered, and thereafter during the day until disposal and disinfection had occurred. Did the authorities consider that police enforcement of FMD control was adequate in this outbreak? What was the view of the Police? Of farmers? Should we return to more active enforcement of these controls?

The 24hr/48hr rule for culling of animals on infected premises and contiguous premises was widely heralded as a major tool in achieving control of the epidemic –but we can ask how this actually worked.

If the infection did not spread significantly by aerosol routes (unless significant numbers, e.g. 100 cattle were infected at the same time), and effective control of human and animal activities occurred, why would we need to slaughter so quickly? This surely would only be required if we were failing to prevent infection passing via human or wildlife (or over the fence) during the period after clinical infection had been detected. Culling earlier would therefore give less opportunity for man-made (or wildlife) spread to occur.

Again we must ask; can we do better in future or do we need an alternative form of control (vaccination) that effectively does not rely so heavily on the motivation and effectiveness of farmers own activities (or lack of them) to be effective?

A third explanation is that the virus strain might be adapted to non-airborne spread; it appears to have spread more by importations/meat than other routes between countries, and to spread via indirect means even under movement control in the UK. Studies on the virus at Pirbright have focussed on aerosol production; what of virus loads in blood, vesicles, saliva, urine, faeces, milk? High and

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prolonged viraemias would support transmission in meat products, and also milk and other secretions, and perhaps increase the chance of sufficient contamination to occur that might be sufficient to infect another animal.

FMD control – more about human behaviour than virus behaviour?

The apparent failure to prevent secondary spread does ask questions about the understanding of farmers of the risk factors for entry and exit of the infection and of the relationship between the authorities and their epidemiologists with the intended benficiciaries, livestock farmers. From the earliest after the confirmation of the infection, ideas were put forward by farmers, which in hindsight were helpful in understanding the nature of sheep trade and of the risk of onward transmission from infected farms. The enquiry should ask how much farmers at grass roots were consulted, and also the many other operators who could provide insight. How much were farmers, auctioneers and traders -and the shadowy operators - actively involved in the early stages, or merely the subject of investigation?

The relationship of central and field staff of the SVS needs also to be examined; SVS staff in the regions have a good knowledge of markets and their operations and could be expected to give a high degree of insight into the behaviour of traders at the earliest stage of the epidemic. How much did information from the field shape the eventual policy of the 3 km cull, if at all?

The epidemic; 2 weeks after confirmation, should vaccination have been on the agenda?
The timing of decisions taken in the first two weeks, and the nature of the information gathering process, must be part of the review. In FMD epidemics, following extensive and intensive surveillance and tracing of links between cases, at the end of the second week a picture should have become evident of the locations involved, the probably primary, and the possible extent of the weight of existing infection which can be expected to be present as a result of spread from the primary source in the period before movement controls were imposed and before the cases identified in this period have been slaughtered. Two weeks into this epidemic the major foci were becoming evident and established; 73 cases had been reported, with Devon (15), Cumbria (13), Tyne and Wear (9), Dumfries &G (8), Essex (6) Durham (5), Herefordshire (5), Lancashire (3). The involvement of sheep was pronounced in each of these areas except Essex.

The review needs to ask:

a. what disease control options were reviewed at this stage?
b. Was the use of vaccination given adequate consideration, and if not, why not?
c. Whose decision was it to invite the independent epidemiologists to assist and who wrote the terms of reference for their involvement?
d.

The retrospective analysis needs to consider the feasibility and potential impact of vaccination if used from the third week of the epidemic, bearing in mind:

a. the impact with the limited doses availability at that stage and
b. the impact if not limited by considerations of doses

In retrospect had vaccination been introduced on the basis of likely level of onward transmission (ie risk of establishment in livestock dense areas) then Essex would probably not have been chosen /subject to vaccination but Devon and Cumbria/Dumfries and Galloway might have been.
The issue of vaccination was given little academic or as far as I can tell serious attention by MAFF at the early stage because of the European policy of non-vaccination and the history of non-vaccination in the UK; they had decided it was not a preferred option.

Yet it must be asked what their own forecasts on duration and extent of the epidemic would have been before the epidemiologists were asked to make predictions. Previous epidemics in the UK, or probably

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anywhere, involving non-vaccinated populations, have not used predictive modelling during the early days of an epidemic, but instead used other criteria, experience and international expertise to estimate both subsequent development of the disease and assist decision support. I spread was apparent, at end of the first week; vaccination deployment in the second week resulted in rapid reduction in case incidence in the third.

Experience from epidemics in non-vaccinated populations around the world indicates that where slaughter only is used, epidemics are prolonged, with half taking over 50 days from first to last case, often twice that; whereas slaughter plus ring vaccination results in much shorter epidemics, all being over in less than 42 days from first case. Evidence from experience of the control of epidemics in non-vaccinated populations should have been at least as powerful an indicator of future disease control as other methods more dependant on data available from the outbreak and relatively untried methods of computation. In short, the control policy chosen was not based on "evidence based medicine" approaches of systematic review of the past. Veterinary medicine is noticeably behind human medicine and allied professions in its use of evidence based approaches and this was evident in the somewhat biased reporting in the veterinary press on the subject of the FMD control policy.

The review must address how much the failure to have thought through and prepared the farming opinion and food processing and marketing chain for the use of vaccination impacted upon the subsequent difficulty in introducing even limited vaccination.

The review must also address the issue of negative publicity on control policies, which tends to polarise opinion at an early stage and makes difficult any adjustments or changes to policy at a later date. The apparent lack of a though through contingency plan involving vaccination requires explanation and practical suggestions for how FMD control strategies might be reviewed and updated with involvement of the major stakeholders.

Weeks 3 and 4; were we panicked – or just out of touch with the reality of FMD around the world?

The review must consider whether the press and public at large can afford to wait for the effects of any control policy which takes at least one incubation period (9 days) before any indicator of downturn in incidence (or at least in rate of increase) occurs, and which cannot give an indicator of how many months f cases, movement restrictions and trading are likely to occur.

It is well recognised that the harder one looks of disease the more likely it is to be found. Therefore we must review:

a. was there variation in surveillance by SVS and TVI's in the first 3 weeks and if so, why? What is the explanation for the few cases traced by SVS vets in the third week of the epidemic? Was it because the SVS was stretched to capacity, with over 100,000 sheep tracings to follow (Jim Scudamore, 5th March) as fell s a massively increased number of cases?
b. to what extent did the variation in veterinary surveillance and public information affect the numbers of diagnosed cases in the first 3 weeks?
c. If there was variation in surveillance, what effect did this have on the subsequent prediction of the severity of the epidemic? (i.e. if farmers identified more cases in week three because of better information available to assist them, then the rate of increase of cases might affect the subsequent analysis, which suggested an enormous epidemic requiring unprecedented measures).
d. Was there excessive panic over the rise in "incidence" (case numbers/day) in first 3 weeks?

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It must be recalled that the impact of movement controls would not have impacted until 14 days (10th March), but by this stage the public reaction to the much increased numbers of cases had become very strong and by 15th march a proposed "firebreak" or pre-emptive cull had been made.

The role of the independent scientists

The review must consider

a. who set the terms of reference for the indignant scientists?
b. What level of freedom were they given to explore alternative control options?
c. Why were they apparently requested to consider only limited versions of vaccination followed by culling?
d. To what extent were their findings not subjected to peer-review by other scientists with experience of FMD control?
e. Whether the statements made regarding the outbreak being "out of control" (in a scientific sense) were misleading and unhelpful to our attempt to win international recognition of our competence in the disease control

What evidence exists to support the use of the firebreak or pre-emptive cull?

Pre-emptive culls have never to my understanding been used in the UK in FMD control, or indeed elsewhere in FMD control, with the exception of limited use in Greece. On what basis was the firebreak and pre-emptive culls proposed?

Had any protocols been written to guide selection of this policy or assessing feasability? Or its economics? Or its environmental impact?
The difficulty of detection of infection in sheep by clinical surveillance alone is well recognised, so what were the alternatives? One alternative might have been increased use of screening tests for the detection of virus and antibodies to determine the extent of spread of infection in sheep; was this not feasible because of limited testing facilities, and if so, why?

Was it instead an admission that the there was a failure in control of animal or human activities leading to ongoing transmission between flocks? In other words was the alterative to trap infection within flocks by effective quarantine and segregation at farm boundaries?
Or was there the wrong hypothesis in place, that uncontrollable (i.e. airborne) transmission was occurring from these flocks, and therefore sheep were best culled? In other words the rationale for the pre-emptive cull was never made clear in rationale terms, and since the policy was not implemented until at least 2 weeks after announcement on the 15th, to what extent was the measure decide in haste and without adequate feasibility studies?

In retrospect, if we had known more the infectivity of this strain of virus would we have acted differently?
Would the 3km cull and application of policy on contiguous farms have been avoided? Or better targeted, by the use of better methods for identifying risk?

The International Impression

The reporting via the MAFF web site is in my view the most informative and instant information on a major epidemic ever –a lesson and a lesson in transparency to other nations. However good the information system to those in the UK in the know, and elsewhere with active web-searching facilities, does this explain why there is such limited official information released to the OIE via the OIE's weekly disease information? It would appear that MAFF released the minimum information via this route, consistent with the agreed reporting level of OIE member states. This can be compared to the information made available by Uruguay; Argentina, South Africa. In last month, reporting of MAFF to

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OIE dropped to once per month, again the minimum expected by OIE once a disease situation has stabilised. But what message does this send; no information is given on the extent of surveillance activities and on the results of serological tests, each of which are essential components of most countries efforts to convince the outside world that the authorities are actively engaged in hunting down disease and tackling the final pockets of infection.

The very terminology used by MAFF and OIE also differ significantly; the term "case" used by MAFF is different from common usage and that defined by the OIE (means an individual animal affected by an infectious or parasitic disease); what MAFF considers a case, the OIE and most epidemiologists and vets consider an outbreak of disease (= an occurrence of one of the diseases in List A or List B in an agricultural establishment, breeding establishment or premises, including all buildings and all adjoining premises, where animals are present. MAFF do not give figures for CASES (as defined by OIE) whereas many countries do attempt to; this can be a useful indicator of the proportion of individual animals in group showing signs)

Relationship between expertise in MAFF and the outside world; have we made best use of UK, European and worldwide expertise in FMD?

The review must consider both our preparedness for a major FMD outbreak and also the relationship between MAFF and outside expertise in FMD.

It seems to have been forgotten by British authorities that and the media that FMD is endemic in 70% of the world's nations and therefore that FMD is a common, major disease issue in most of the globe; and that significant expertise exists in most European countries as a result of their experience over 40 years of application of vaccination and then the non-vaccination policy. A limited pool of expertise exists in the UK on FMD; not all of it is based at the Institute for Animal health, Pirbright, although that is the only centre licensed to work with FMD virus. Other expertise exists that has experience of FMD control in developing countries, mainly working in economics, epidemiology and policy. However it is clear that UK expertise in veterinary schools on international issues of farm animal health is limited; few experts could be found for various reasons, one of which is the run-down in clinical epidemiology in research and teaching in UK veterinary schools in favour of other disciplines more likely to generate research wealth for Universities.

It is not surprising after 34 years of absence that few experts could be found; it is perhaps more surprising that after the run-down in funding and lack of recognition of this field even within veterinary schools, that any expertise exists at all.

Much has been made of the availability of the World Reference Laboratory at Pirbright and there is no doubt that the work of that Institute has been critical in the past to development of the understanding of the quantitative side of FMD transmission, which is central to the slaughter policy. But it is also a mystery how their voice in the first 2 months appeared to be part of MAFF and did not demonstrate a degree of independence; and also how senior staff without an economics background, or any expertise in the field in the Institute, were prepared to voice their opinion that vaccination of sheep would not be economic. It would appear that IAH considered itself to be true font of information and expertise on all aspects of FMD rather than a source of specific expertise on areas in which it has unparalleled experience. Possibly the title of World Reference laboratory has been misunderstood; the reference refers to the service it offers in comparison of virus isolates, rather than as an advice giving centre. Its reputation in the country does seem to have been reduced in the country through the apparent lack of backing up of statements made by its own staff concerning the new generation of vaccines and diagnostic tests, research conducted at IAH over the past 10 years. The published position of its experts was at odds with their apparent position taken in the first 1-2 months of this epidemic. Was their independence muzzled in order to maintain a consistent line of policy in the country?

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The European emergency vaccination strategy; why was it not implemented?

It was recognised in the development of the non-vaccination policy that member states should have recourse to use of emergency vaccination if the circumstances dictate, providing that community interests were not endangered. The fear of such a FMD epidemic has existed before and during the application of the non-vaccination policy and therefore a dedicated committee of European FMD experts was formed by the Animal Health and Welfare Committee of the European Union to develop a strategy on emergency vaccination against FMD. The Committee met through 1998 and reported in March 1999. Two scientific developments promoted the development of the strategy; the development of improved vaccines capable of inducing rapid protection and greatly reducing onward transmission; and the development of tests that distinguish vaccinated animals from infected animals. The Report was adopted by the EU in march 1999 and can be viewed on the Commissions web-site; it is clear that the committee called for the report to be followed up by changes to both European Union policy and also that changes at the level of international bodies (the OIE) should follow. The latter normally involves member states proposal of changes to the international animal health code. The report appears to have been field and not acted upon in Brussels; why? We can suppose that in the absence of major epidemics, then the need to review policy was not considered a priority; and also that the development of preparedness to use vaccination would be seen by major exporting nations and commercial interests as being a threat to their potential exports if vaccination would result in loss of FMD free status in the short or longer term. Possibly the lack of progress in implementing the report in Brussels reflects a fear that competition from imports from FMD free countries using vaccination would increase.

The inquiry into the UK epidemic must address the lack of implementation of the emergency vaccination strategy; t is clear that the committee clearly addressed the control on movement and slaughter of animals after vaccination, and the use of the new diagnostics to screen and eradicate infection where it remained after vaccination. In short the strategy could have been given on day 1 of the epidemic to a small working party in the UK to develop the vaccination contingency plan, and used the thinking in the European strategy, which mirrors internationally accepted principles in the safe handling of animal products from vaccinated animals, to work through the issues with the major stakeholders. Had this have happened then the “NFU’s 50 points” could have been addressed in week 1 or 2 of the epidemic, rather than in week 8.

It is also apparent that the epidemic of 2001 has been a catalyst for change; a raft of proposals has been made by the Scientific Committee on FMD of the OIE in April for changes to the animal health code and regarding the recognition of tests, which distinguish vaccinated and non-vaccinated animals. We can ask why these proposals were not made previously; no new data or discoveries are involved, rather the political will to change suddenly is there. So the inquiry should also ask if MAFF, representing the UK Government and people, have previously been happy with the status quo position of major dis-advantages for countries using vaccination. What we have learnt as a nation is that an invasion of FMD puts the countries animal health status on a par with many developing countries – regaining FMD freedom is enormously expensive (sliaghterpolicy followed by extensive surveillance) or long (penalties of at least 12 months with proposals to extend this to 24 months) if vaccination is also used to eradicate infection. We suddenly discovered that these international recommendations are unpalatable and expensive, with no proper justification and out of date of our own European science on FMD diagnostics; but did not have the will to change, for reasons that are unclear but could be considered to involve self-interest. Until, that is, we caught FMD.

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