Preparing for Disaster

Carcass Disposal Challenges During UK's FMD Outbreak

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As we pass the anniversary of the beginning of the foot and mouth disease (FMD) outbreak that devastated the United Kingdom (UK) and captured the world's attention, it's important to look at the lessons learned. These lessons are valuable to all countries as they make contingency plans to cope with a potential outbreak. Carcass disposal posed a monumental challenge.

FMD is a highly infectious, rapidly spreading viral infection that affects cloven-footed livestock including cattle, sheep, and pigs. The UK, like many developed countries with a large export market for animals and animal products, practiced the "stamping out" method of disease control. This strategy calls for the humane destruction of infected and exposed livestock as quickly as possible to stop the further spread of FMD. The goal is to eradicate the disease, and thus preserve the remaining, uninfected livestock. At the onset of an outbreak, it is difficult to foresee the overall magnitude. A critical factor contributing to the extent of the 2001 UK outbreak was that FMD had already spread across many parts of the country due to the movement of inapparently infected sheep prior to disease detection. From the outset, animal health officials were racing against time to control further spread (see Figure 1). An international call for assistance mobilized veterinarians and animal health technicians from around the world to assist in the control effort.

As a result of aggressive disease control measures, nearly four million animals were slaughtered and destroyed (see Chart 1), and another 2.5 million were taken for welfare reasons (i.e., they could not be marketed due to international trade restrictions or moved to other pastures because of national movement controls).

Infected and exposed animals were quickly killed, but disposal was more difficult. Decisions had to balance the interests of animal health officials whose primary goal was to quickly eradicate the disease with those charged with environmental protection and safeguarding public health. Officials then had to gain acceptance from the public for these complex decisions and policies.

Traditionally, animal health officials have been hesitant to remove carcasses from the farm for disposal for fear that it would spread infection, so they immediately began employing disposal options that had been used successfully during the 1967 FMD outbreak: on-farm burial and on-farm

Table 1. Weekly Statistics of FMD Outbreak, February 25-June 10, 2001

Week number	Week ending	Animals vets deployed	Military personnel deployed	Number of animals slaughtered	Number of animals disposed	Number of animals awaiting slaughter	Number of animals awaiting disposal
1	2/25/01	421	-	2,911	1,223	9,513	1,688
2	3/04/01	470	-	34,463	11,605	156,525	24,546
3	3/11/01	689	-	78,785	62,291	239,198	41,040
4	3/18/01	1,033	-	145,598	116,308	315,379	70,330
5	3/25/01	1,152	500	297,109	239,526	489,880	127,913
6	4/01/01	1,269	1,000	490,803	388,941	622,184	229,775
7	4/08/01	1,437	1,600	615,753	627,540	498,426	217,988
8	4/15/01	1,581	2,000	597,283	601,622	137,859	213,649
9	4/22/01	1,635	1,900	428,618	517,924	152,316	124,343
10	4/29/01	1,704	1,900	240,357	306,841	60,975	57,859
11	5/06/01	1,720	1,500	113,092	159,043	30,637	11,908
12	5/13/01	1,798	1,036	64,633	73,083	48,158	3,450
13	5/20/01	1,817	619	63,471	60,379	46,985	6,550
14	5/27/01	1,851	581	97,313	100,346	26,097	3,517
15	6/03/01	1,552	498	72,490	67,080	28,303	8,927
16	6/10/01	871	433	61,172	64,185	23,465	5,914

pyre burning. As the extent of the rapidly escalating outbreak became clear, the constraints on the two disposal methods also became apparent. The Environmental Agency and the Ministry for Agriculture, Foods, and Fisheries (MAFF) issued detailed guidance on steps to be taken prior to on-farm burning or burial of carcasses. Guidance highlighted the need to protect the environment, and, in particular, the ground water, and summarized environmental protection regulations. Many of the regulations had not been in place during the 1967 outbreak and placed major limitations to on-farm burial in many areas. Public health officials, the public, and the media raised concerns regarding the potential contamination of ground water from on-farm burial and air quality issues from pyres. While these concerns were being voiced, the outbreak continued to escalate. Carcass disposal could not keep pace with the rate that infected and exposed animals were being killed and farmers coped with the trauma of seeing the carcasses of their livestock for days, or in some cases weeks, prior to disposal (see Table 1). Officials needed to quickly develop alternative disposal options. These options included rendering, use of licensed commercial landfill sites, and the creation of mass burial sites – all new strategies for carcass disposal developed in the face of an escalating outbreak (see Figure 2).

Figure 1. Cumulative Number of Animals Condemned, Slaughtered, and Disposed of During the 2001 FMD Outbreak in the UK

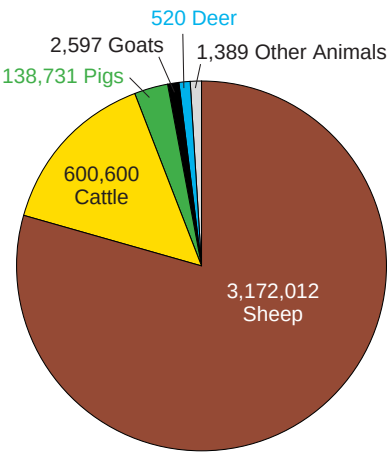
Rendering

As soon as the first outbreaks were confirmed, Alan Lawrence, director general of the United Kingdom Renderers Association (UKRA), wrote to MAFF and offered the industry's assistance. At that stage it seemed that burial or burning on open pyres were to be the methods of disposal, but MAFF indicated that rendering might be used as a contingency. However, as already described, it soon became clear that mass burial pits and open pyres were unacceptable to the public, for environmental and health reasons. In the latter case, concerns were raised about bovine spongiform encephalopathy (BSE), or "mad cow" disease, and the possibility of the prion agent entering the atmosphere or watercourses. As a result, procedures needed to be put in place urgently to utilize rendering capacity, but at the same time provide the necessary disease security to minimize the risk of disease spread through the collection and transport of carcasses to plants. With UKRA assistance, plans were developed and put in place to dedicate six of the UK's 20 rendering plants to processing FMD infected or potentially exposed livestock, with priority placed on rendering cattle. The potential weekly capacity was about 15,000 tons of carcasses.

To ensure that transportation would not spread disease, carcasses were sprayed with disinfectant and bags were placed over the head and feet of carcasses with FMD lesions. Carcasses were then loaded into certified, leakproof trucks, covered with a layer of heavy-duty polyethylene sheeting, and airtight vinyl tarps were secured over the top. Prior to leaving the farm, the truck was completely disinfected from top to bottom by power washing, with special attention paid to the undercarriage, wheels, and wheel wells. Disinfecting a rendering truck could easily take 30-60 minutes and was overseen by veterinary technicians and case managers. Trucks were then routed to the rendering plant with a separate escort vehicle to deal with any en route incidents. Farms along these routes were closely monitored for any possible spread of disease.

One of the unanticipated problems with moving animals to rendering did not involve disease containment, but the extremely narrow drives that made entrance of the large articulated trucks to the farms next to impossible. In some cases, this could be overcome by removing fencing or stone walls, but in other instances, smaller trucks or alternative disposal methods had to be used.

Chart 1. UK Animals Slaughted for Disease Control



Due to the use of other disposal options during the 2001 outbreak, and technical and logistical problems, overall, the dedicated rendering plants were only used at 50 percent capacity. Discussions are currently taking place to utilize maximal rendering capacity should the UK have the misfortune to experience a future outbreak of this magnitude.

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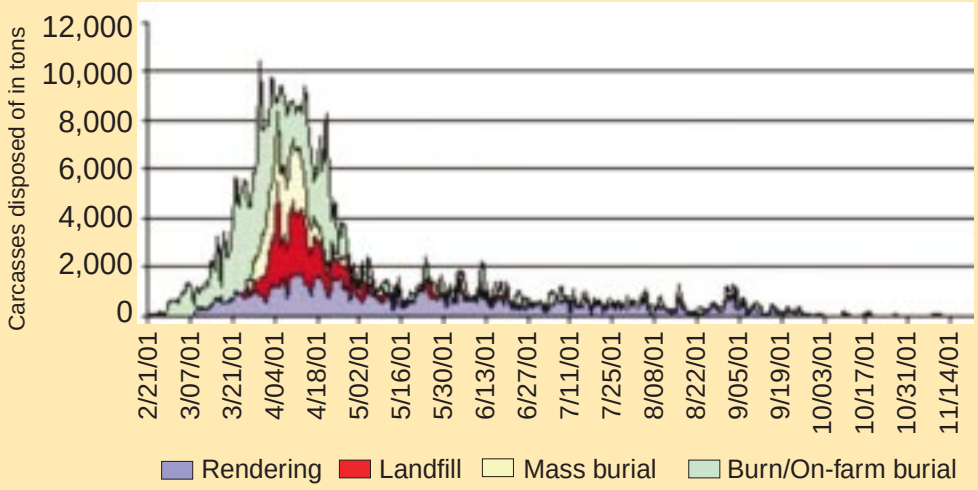
Licensed Commercial Landfill Sites

As part of ongoing contingency plans, the Environmental Agency identified potential landfill sites suitable for carcass disposal. Existing protocol limits carcass disposal usually to five percent of the currently permitted disposal inputs of waste. In theory, landfill capacity could have absorbed comfortably all the stock slaughtered both in the FMD outbreak and the concurrent welfare disposal scheme; however, few landfill operators were prepared to accept carcasses, and then only sheep and pigs. To develop sufficient capacity to meet the peak demands of the outbreak would have required the government to direct the licensed landfill holders to take carcasses. The regulations that enable directions to be issued could not be applied to cattle born before August 1996 because of the higher BSE risk. However, directions were not issued and the voluntary use of landfill sites for carcass disposal was met with considerable opposition from local public, local authorities, special-interest groups, and farmers located near the landfill site. Therefore, it proved difficult to fully utilize this disposal option.

Mass Burial Sites

Mass burial sites were developed in the UK as a novel option to cope with carcass disposal from an FMD outbreak. Large sites were procured (five in England, one in Wales, and one in Scotland) in which multiple pits each capable of holding between 10,000 and 60,000 carcasses were engineered. At the start, there were no proven designs for mass burial sites and the design features underwent rapid development and change over four to six weeks at the peak of the outbreak. Increasingly sophisticated liners and leachate collection systems were employed to minimize risk to groundwater. The extreme nature of the emergency with regards to delays in carcass disposal required that these sites be made operational with little advance consultation of stakeholders and environmental bodies if a public health or animal health disaster were to be avoided.

Figure 2. Quantity of Carcasses Disposed of Through Various Disposal Routes



These mass burial sites were used together with rendering and licensed landfills to meet the peak demands for disposal and are regarded as national assets. Plans are currently in place to restore these sites and remediate environmental impacts.

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Carcass Disposal Hierarchy

Early in the course of the outbreak, all stakeholders committed to developing a hierarchy of carcass disposal options that would balance the need to protect public health, protect the environment, and ensure FMD control and eradication. All agreed that rendering and incineration were the preferred disposal methods, but it was clear from the outset that these resources were not immediately available and even when fully exploited, could only partially meet the disposal needs. It cannot be stressed too highly that the disposal problem posed by the 2001 UK outbreak could not have been contained if on-farm burial and mass burial had not been available to the degree and at the time they were needed. That said, the agreed disposal hierarchy for carcasses, reflecting the input of all stakeholders, was published by the Department of Health on April 24, 2001, two months after the outbreak was first detected: 1) rendering; 2) incineration; 3) licensed landfill; 4) pyre burning; 5) mass burial or on-farm burial.

Conclusions

The valuable lessons learned during this outbreak include the serious public health and environmental impacts of the various carcass disposal options, the ability of the public to accept these options, and the substantial challenges faced by the government in implementing successful carcass disposal strategies in the face of a rapidly spreading outbreak of this magnitude. Unlike the 1967 FMD outbreak where virtually all carcasses were disposed of on-farm, in 2001 the majority of carcasses were disposed of off-farm under conditions of strict biosecurity.

The valuable role that rendering played in this outbreak should be a call to action for all renderers to work closely with animal health officials to develop and expand contingency plans. By working together, we can safeguard animal, public, and environmental health during an animal disease crisis. ❖