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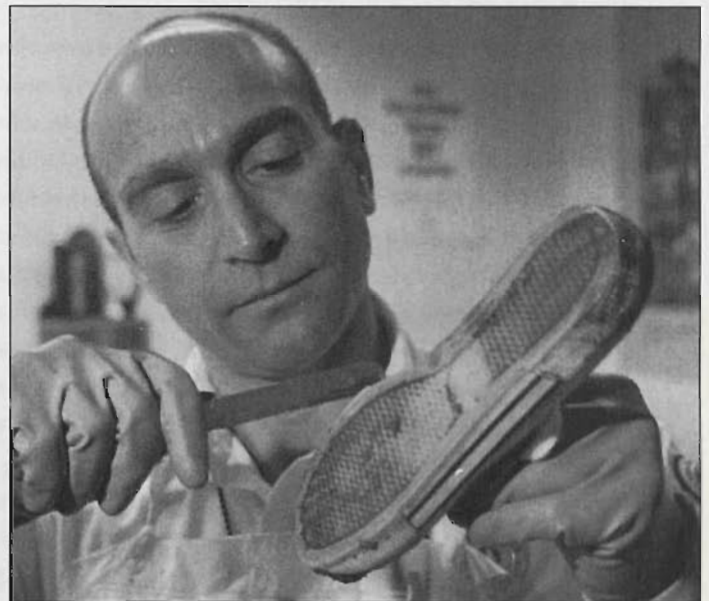
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Vaccination or Decimation?

The Foot-and-Mouth Disease Policy Dilemma

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VACCINATION OFFERS SOME PROTECTION FOR DOMESTIC HERDS AGAINST FOOT-AND-MOUTH DISEASE, YET ELIMINATES A COUNTRY'S FMD-FREE TRADE STATUS. THIS POSES A QUANDARY FOR POLICY-MAKERS.



Don't Say It Can't Happen Here. In order to prevent outbreaks of foot-and-mouth disease in the U.S., USDA and APHIS instituted a program of preventive measures designed to prevent the inadvertent introduction of the highly contagious and economically destructive malady. Shown at left is a cow exhibiting FMD symptoms. At right, a technician cleans muddy shoes at a travel checkpoint in order to prevent FMD transmission.

photos courtesy USDA

The first major foot-and-mouth disease (FMD) outbreak in the United Kingdom since 1967 was identified in February 2001. FMD, a significant threat to animal health and welfare, is not considered transmissible to humans, and poses no food safety threat. However, the new outbreak in the U.K., along with others in France and Holland, have raised concerns that a similar outbreak could occur in the United States. The potential economic costs of a U.S. outbreak, including animal health costs, production losses, and export restrictions, could reach into the billions of dollars.

FMD is currently a major constraint on international meat and livestock trade (EUFMD, 2001). Although the U.S. has

been free of FMD since 1929, the U.S. continually faces accidental introduction because FMD is widespread throughout much of the world (Figure 1). An outbreak here would compromise the U.S.'s FMD-free trade status, which is set by the Office International des Epizooties (OIE) and is based on the presence or absence of FMD in countries and zones, and on vaccination policies (OIE, 2001).

U.S. livestock are particularly susceptible to FMD because of a lack of antibodies and because U.S. veterinarians are prohibited from routine vaccination against FMD. Vaccination has a potential role in disease and epidemic management, at the risk of jeopardizing the trade status of a country. This arti-

cle explores the reasons for and against using FMD vaccination and discusses the policy dilemma countries face when new outbreaks occur.

FMD: Spreads Fast and Wide

FMD affects all cloven-hoofed animals as well as some other animal species. The disease is characterized by lameness, excessive salivation, loss of appetite, fever, and the appearance of blister-like lesions on the mouth, teats, nose, and feet. FMD is highly contagious — perhaps the most infectious disease known in medicine — with nearly 100 percent of exposed animals becoming infected. Signs generally appear within one to eight days after infection, but may go undetected in sheep and goats. This complicates the identification and control of outbreaks. Although there is no cure for FMD, it usually runs its course within two weeks in most animals. FMD is rarely fatal except in some young animals.

The virus can be destroyed by high heat, low humidity, or some disinfectants, but may remain viable on contaminated objects or in frozen or chilled carcasses and animal byproducts for up to two years (USDA, 1994; MAFF, 2001). The disease spreads by exposure to infected or “carrier” animals or contaminated equipment, facilities, vehicles, roads, and common materials used in animal husbandry. Humans and other non-susceptible animals may spread the disease. International travelers may spread the disease via contaminated clothing and shoes or by carrying contaminated food products across international borders. Long-distance spread can occur under certain conditions of topography, atmospheric conditions, high humidity, and wind (USDA, 1994; EUFMD, 2001).

High Consequences, High Anxiety

FMD can cause severe losses in meat and milk production. Meat animals may take months to recover their previous production capacity (EUFMD, 2001), and infected dairy cows seldom regain full milk production. It is often more economical for producers to slaughter affected animals than to nurse them back to productive health if compensation is available, as it has been in the U.K. (The Economist, 2001b). National policies often require all diseased and exposed animals to be slaughtered to contain outbreaks and to minimize economic damage. A 1979 study by McCauley et al. estimated the direct benefit to consumers of keeping FMD out of the United States during the period 1976 through 1990 at almost \$12 billion (\$1976, or \$37 billion in March 2001 dollars).

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As of May 25, 2001, the U.K. outbreak had resulted in 1,637 confirmed cases in the U.K., 26 in Holland, 2 in France, and 1 in Ireland (The Pigsite, 2001). Delayed reporting of the disease on the source farm in England was a major factor that contributed to the rapid spread during this outbreak (EUFMD, 2001). Infection spread through markets and through the movement of animals, primarily sheep, before the first infection was identified in swine. Some speculate that the original cause of the outbreak was that U.K. pigs were fed contaminated swill, a mixture of liquid and solid foods such as table scraps (MAFF, 2001).

The current U.K. control policy is to restrict animal movement, cull animals on infected farms within 24 hours of detection and on neighboring farms within 48 hours, dispose of carcasses by burning and burial with logistical support from the army, and cleaning and disinfecting all affected premises (MAFF, 2001). Over three million animals in the U.K. have been slaughtered or marked for slaughter, and over 1,500 British farms are infected. Neighboring farms affected by the cull exceed 5,000. As of May 23, 2001, six percent of sheep (2,435,000), five percent of cattle (469,000), and two percent of pigs (122,000) in Great Britain had been slaughtered (MAFF).

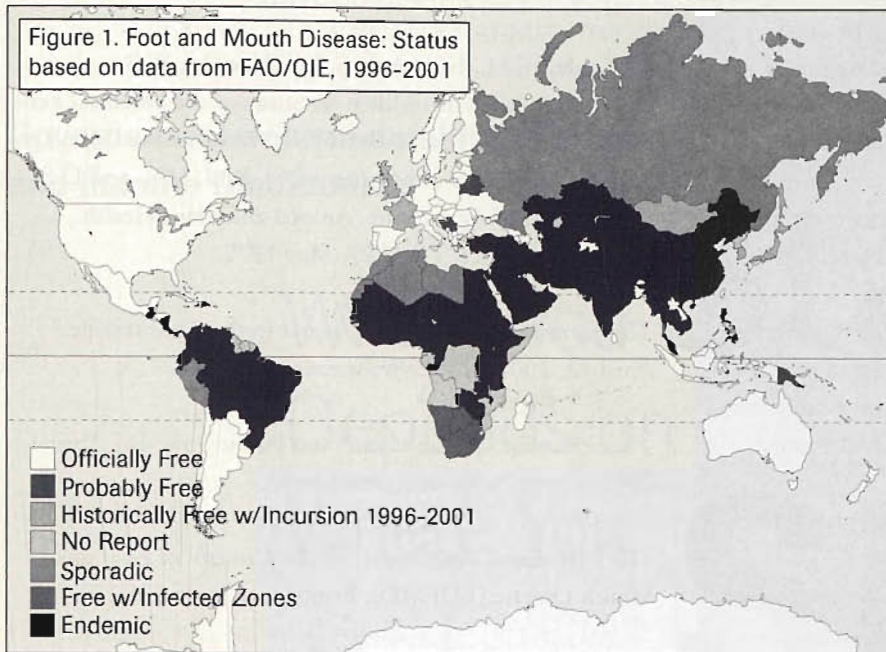
U.K. farmers are reimbursed the full market value of animals slaughtered within seven days (MAFF, 2001). As of April 3, 2001, estimated compensation costs were 205 million pounds sterling (U.S. \$296 million assuming 1 pound=\$1.444) (MAFF, 2001). PricewaterhouseCoopers (PWC) estimates that the U.K. agricultural industry will lose up to 1.6 billion pounds in 2001 (U.S. \$0.7 to \$2.3 billion) (The Economist, 2001b). PWC expects the loss to tourism to double this amount (1.0 to 3.4 billion pounds, or U.S. \$1.4 to \$4.9 billion). Overall economic impact could reach 2.5 to 8 billion pounds (U.S. \$3.6 to \$11.6 billion), or between 0.3 percent and 0.8 percent of U.K. GDP (The Economist, 2001b).

The Vaccinator's Dilemma

Whether or not to vaccinate susceptible animals against FMD is a key policy issue. Although vaccination has a role in disease and epidemic prevention and management, it has many disadvantages and is not a cure-all solution.

Recent simulations of an FMD outbreak in North America showed that emergency vaccination of animals may enhance other eradication activities and help prevent a more severe outbreak (APHIS, 2001). Emergency vaccination can help contain the disease quickly if it is used to create barriers between

Figure 1. Foot and Mouth Disease: Status based on data from FAO/OIE, 1996-2001



infected zones and disease-free zones. It can also reduce the number of cases in disease hot spots (MAFF, 2001).

Vaccination programs have several disadvantages as well. First, in order for animals to maintain immunity to FMD, a costly annual or biannual re-vaccination program is required. McCauley et al. estimated the costs of a one-year, seven-state, compulsory vaccination program at an amount equivalent to \$666 million in March 2001 dollars (1976). Second, there is always the risk of vaccination teams spreading the virus outside vaccination zones. Third, once a vaccination program is in place, it may create a false sense of security. Vaccination does not protect animals against infection — it protects animals from developing the clinical signs of the disease. Vaccinated animals could spread FMD to unvaccinated animals or wildlife. Fourth, there are seven FMD serotypes and over 80 subtypes of viruses, and there is no single vaccine that protects against all types. Finally, and perhaps most importantly, countries which vaccinate for the disease cannot claim FMD-free status, and their livestock exports still face many restrictions.

For countries that have lost their FMD-free status, such as the U.K., the decision whether or not to use an emergency vaccination program hinges on whether the program could shorten the epidemic's duration, reduce total costs, and hasten the return to disease-free status (Burrell and Mangen, 2001). Countries must wait at least 3-months after they have slaughtered their last infected or vaccinated animal before they can regain FMD-free status. If vaccinated animals are *not* slaughtered, the country must wait 12 months after the last vaccination to regain disease-free status (Burrell and Mangen, 2001). If vast numbers of animals are vaccinated or if re-vaccinations are needed, countries could wait many years to regain FMD-free status.

Outbreak in the U.S.: Thinking the Unthinkable

Well before the current U.K. outbreak, the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) imposed import prohibitions on live ruminants and swine and their products from all FMD-affected countries. Since the outbreak, these restrictions have tightened and have been supplemented by new or updated prevention and emergency response measures (see box on p. 14). If an outbreak were to occur in the U.S., USDA's first response would be swift action to contain and eradicate the disease. FMD vaccines are not used in this country because the U.S. has been free of

the disease since 1929. However, a supply of FMD antigens used to create vaccine is maintained by the North American Foot-and-Mouth Disease Vaccine Bank at the Plum Island Animal Disease Center in New York — the only place in the U.S. where scientists can research and diagnose the disease.

If an FMD vaccination program were implemented in the United States (or any other country with FMD-free trade status), its international trade status would be compromised and domestic production and sales would be impacted as well, potentially costing U.S. producers, processors, and retailers billions of dollars.

With estimated inventories of around 97 million cattle, 7 million sheep, and 60 million hogs, the number of animals potentially susceptible to an FMD outbreak in the United States is high. The trade impact from an outbreak here could potentially be high as well.

Concluding Thoughts

Given the disadvantages of FMD vaccines, the United States, the European Commission, and individual E.U. member states do not believe widespread vaccination is an appropriate first step against the disease. In particular, APHIS believes that there is no need to vaccinate against a disease when no animals are affected — especially when strict import restrictions and surveillance policies are in place.

The E.U. Standing Veterinary Committee has given the U.K. and Netherlands permission to vaccinate under certain circumstances. So far, Britain is holding off (The Economist, 2001b), but the Netherlands has elected to vaccinate. The livestock industry, most farms, and food producers oppose national vaccination policies (MAFF, 2001).

USDA response to the 2001 FMD outbreak in the U.K.

- Implemented a temporary import ban of live swine and ruminants and products from all European Union (EU) member states on March 13, 2001 (excludes cooked pork products), augmenting restrictions already in place due to the risk associated with BSE.
- Temporarily prohibited the importation of used farm equipment from all countries or regions under FMD import restrictions as of March 29, 2001.
- Increased personnel and surveillance at ports of entry. Officials are on heightened alert at U.S. land and maritime ports of entry to ensure that passengers, luggage, cargo, and mail are checked for prohibited agricultural products or other items that could carry FMD. Prohibited agricultural products are confiscated and destroyed.
- Heightened alert and coordination between federal and state government agencies and industry to monitor the situation.
- Accelerated research. For example, methods of carcass disposal are being explored, and APHIS is conducting a qualitative risk assessment to examine potential pathways of entry of FMD into the U.S. and the relative risk of each pathway. The assessment will also identify any additional steps APHIS should take based on the risks identified.
- Implemented education campaigns. Outreach materials are in production for dissemination to television stations, U.S. international airports, livestock owners, and Extension agents. APHIS is also working closely with the air transportation and travel industries to raise awareness among travelers and airline passengers and crew about the risk of inadvertently spreading FMD.
- Updated the FMD response plan to incorporate new information about communication and vaccination (USDA, March 30, 2001).
- Dispatched experts to Great Britain to monitor, evaluate, and assist containment efforts.
- Increased spending for existing protection programs. Additionally, the Bush administration is proposing significant increases for agricultural inspection and surveillance programs in FY 2002.

For More Information

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