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The Emergency Response to Foot and Mouth Disease in England

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From mid-May to mid-June of this spring (2001), I was in Cumbria, England, assisting the U.S. Department of Agriculture and the British Ministry of Agriculture, Food, and Fisheries (MAFF), which has since been renamed the Department of Environment and Rural Affairs, with the ongoing emergency response to Foot and Mouth Disease (FMD). My regular billet is as an Occupational Health and Safety Specialist in the Emergency Response Section of the Agency for Toxic Substances and Disease Registry, but my clinical specialty training was in Food Animal Medicine and Herd Health. So it has been from a background that blends the elements of production medicine and population medicine, as well as the compassionate stance of public health in America, that I observed and participated in the events in England.

The United Kingdom has been experiencing a classic 'virgin soil' disease epidemic that rapidly spread throughout the country in spite of heroic eradication efforts. FMD is a low mortality, high morbidity disease, which means that although virtually all (>90 percent) unvaccinated animals will become infected and show signs of illness, there is only about a 10 percent mortality rate (it may be considerably higher in newborns). Most untreated adult animals will recover in a matter of weeks, although the return to optimal production (milk, offspring, wool) will take longer. So there is a considerable economic impact from FMD, and eradication of the disease from a country is considered a highly desirable status to achieve and maintain (ideally without the use of vaccination).

As explained to me, the current disease eradication policy of FMD-free nations (including the United States) is driven by the economic cost-benefit analysis (rather than policy based on the severity or zoonotic potential of the disease) that weighs the potential dollars lost in access to unrestricted export markets (for example, $6 billion for the United States) against what can be afforded by governments in terms of animals killed, farmers indemnified, and farms restocked. Ancillary costs (recruitment of additional personnel, supplies, etc.) and long-term consequence management costs have been much harder to project, but are becoming apparent as the outbreak in the United Kingdom continues.

Disaster response: Effective disaster responses require preplanning and practice if the responders are to 'play well' together. During preplanning, roles are assigned and plans are made to ensure strategic deployment of human and material resources. Resources that may be needed under unusual circumstances, such as police and the military, are identified. The adoption of a centralized and familiar *command and control* structure (or 'incident command system') to clarify 'who is in charge' is absolutely essential to effective action.

Organizational response: Given how rapidly the FMD epidemic exceeded the planned-for 'surge capacity' of the system, the British organizational response was nothing short of awe-inspiring. The Cumbria field office geared up from 5 veterinary officers in January to approximately 130 when I arrived in May. Approximately 120 of these were short-term temporary veterinary inspectors (TVIs) like myself. TVIs received orientation and training, were allocated ID cards, rental cars, cell phones, global positioning satellite (GPS) units, maps, and disposable supplies within 24 hours of arrival on the scene, and were deployed to the field within 48 hours. We worked 6-7 days a week, as needed. In addition, there were temporary office trailers to rent and set up, office/administrative support staff to hire, disposable supplies to be ordered, computers and Geographic Information System/mapping specialists to install, and electronic databases to set up to handle the information flow. It was a truly stunning display of resources thrown at a problem, and quite sobering to consider the costs incurred.

Daily routine: We had daily 8 a.m. briefings on the progress of the battle against FMD, with newly identified infected premises added to the map. This was followed by administrative admonitions to be scrupulous in our disinfection precautions and pleas to avoid dropping sensitive cell phones and GPS units in our buckets of disinfectant. Then we would file out and wait for our cell phones to ring with assignments for the day.

Because the United Kingdom has no agency equivalent to the U.S. Federal Emergency Management Agency, many of the same tasks and roles were delegated to the Army. When premises were declared infected, the police were called upon to assist in diverting traffic around the premises and to prevent unauthorized persons from gaining access. The

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Army was placed in charge of most aspects of slaughter, carcass disposal and premise decontamination, and received universal acclaim for their competency and discipline. The most impressive briefings were those conducted by the Brigadier General around the huge map table in their command trailer. Mission and objectives were clearly spelled out, with progress reports and plans/tasks for the day clearly defined.

Environmental impacts of carcass disposal became an issue, with air quality concerns associated with burning as an early method of disposal, and later, groundwater contamination concerns associated with use of a landfill as a means of disposal. Acid sprayed on fields of infected premises killed off the vegetation, and all farm buildings had to undergo rigorous power-washing and disinfection procedures. Disinfectant mats on public roadways in controlled areas had to be maintained, and the responsible county or village authorities kept informed of policy updates.

Limitations to effective response: Problems with any system are inevitable and soon became apparent, beginning with bottlenecks in the system for allocation of TVI jobs. We learned that there were eight separate *non-linked* databases in use at the Cumbria field office; this unfortunately resulted in some TVIs being assigned six tasks for the day while others cooled their heels with nothing to do (at considerable expense to MAFF, since most were well-paid as private contractors). It also resulted in TVIs being assigned surveillance visits to farms that had been depopulated (slaughtered out) several days previously, or—more benignly—in several TVIs being assigned visits to one farm on the same day. Waiting until 9 a.m. or later each day for assignments also meant that most of the morning might be gone by the time TVIs contacted farmers and set up appointments. Finally, having gained a farmer's confidence and been admitted onto his farm, there was no way to ensure that particular TVI would be assigned the upcoming return visits.

Mental health, social disruption, and economic impacts: However, the greatest adverse impacts I observed were not due to actual disease, but had to do with the nearly universal mental health impacts on farm families and their rural communities, and economic impacts on the regional economy. Farm families had to deal with weeks and months of extreme social isolation on their farms—many told me that if it were not for the television and telephone they would have gone crazy—and daily uncertainty with regard to the effectiveness of the measures that they could take, and upon which their present and future livelihood depended. Some families were separated for months—adult siblings living nearby each other on separate farms couldn't visit their brothers or sisters, children were sent to live in town with grandparents or relatives, and, in at least one case I know of, a dairyman husband and his veterinarian wife (who was part of the outbreak response staff and assigned to the team dealing with infected premises) made do with only telephone contact for more than 3 months, for fear that contact with her might infect the family farm. Farm neighbors were unable to visit each other face to face at a time when a functioning social support network was critical to their mental and emotional well being. Church services and dances were canceled, and ministers who came out to offer counseling and support had to stand in the road and talk across locked gates to their farming parishioners.

Distrust of government: The farmers had only strict isolation and disinfection to use as tools to keep FMD off their farms. This set the scene for predictable conflicts with MAFF authorities, who were—also predictably—less than understanding when farmers, in the interest of maintaining strict farm biosecurity, refused entry to TVI inspection personnel. TVIs soon learned that nonjudgmental listening, tact, a sympathetic bedside manner, demonstration of clean gear, and scrupulous attention to disinfection procedures went a long way in gaining the farmers' confidence and being eventually allowed entry onto the farms for necessary disease surveillance inspections.

Long-term consequence management: Consider, if you will, the huge economic ripple effect from the cash-flow lost by shutting down airline traffic for only a few days following the World Trade Center Attack—tens of thousands of jobs lost, airlines going out of business, and ancillary service industries hit hard. Unless significant economic relief measures are implemented, certain aspects of the current FMD outbreak response are likely to have the effect of wiping out much of the agricultural sector that the federal ministry was created to protect, and in having similar ripple effects in the regional and national economy. Continuing inability to control the spread of FMD has necessarily caused further delays in certifying individual British farms (and whole regions of the country) as clean for restocking. This means that there will be no calf or lamb crop on thousands of farms next year, much less the level of cash-flow that they must have in order to survive in farming. It should be apparent that 6-12 months of being unable to pursue the basic business of farming—plowing, planting, harvesting feed, rotating animals among pastures, buying rams to breed the ewes, milking cows, sending fat stock to market—is almost certain to drive the affected members of the farming community from the properties their families have occupied, and to deprive them of the traditional occupations that have given their lives meaning and their families a common purpose for generations.

Clearly, there are mental health, environmental, humane, and economic impacts that should be recognized as of significant value. I sincerely hope these will be factored into the next round of cost-benefit analysis computations and exotic disease control policy revisions.

Lessons learned:

1. The scale of the FMD outbreak was greater, and moved much faster, than anticipated. It escaped from 'zones of control' and appeared in different regions of the country months after the initial disease outbreak.

2. Normal surge capacity to deal with the spread of disease was rapidly exceeded. Large numbers of technical/ professional staff had to be recruited from around the world and trained while permanent field staff were occupied with intense ongoing disease investigation and eradication activities.

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3. Command and control issues were critical to effective day-to-day field operations. Involving the military and police in appropriate delegated aspects of the eradication operation proved to be very successful.
4. The integration of modern tools for communication and logistics (cell phones, rental cars, GPS-based maps and real-time mapping services, data bases, etc.) dovetailed well with basic disease surveillance and eradication, adding tremendously to effectiveness in the field.
5. Long-term consequence management of mental health and ancillary economic impacts was not well anticipated, but over time came to be equal in importance to the disease surveillance and control activities that were the primary focus.

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Temporary structures at the Cumbria field office for end-of-the day disinfection of vehicles and equipment (rubber boots, rain suits, etc.).

Sheep having its foot examined for lesions.

Sheep having its mouth examined for lesions.

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Disinfectant-soaked carpeting at entrance to farm.

Regional map with affected farms marked on it.

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Wearing protective rubber rain suit and boots over two sets of Tyvek coveralls, and soaking down all exposed surfaces with disinfectant BEFORE going onto the farm.

Quarantine warning sign for premises under observation.