



A critical look at the world's preferred disease-eradication strategy.

by **Meghan Richey**

The trick to managing the outbreak of an infectious disease is “eradicating the disease without eradicating the entire industry,” says Jimmy Tickel, a veterinary specialist with the North Carolina Department of Agriculture and Consumer Services Division of Emergency Programs.

Such is the common criticism of “stamping out,” a widely successful and internationally accepted disease eradication strategy that calls for the depopulation and destruction of all infected animals as well as those that could become infected. It is the global go-to strategy for eradicating foot-and-mouth disease (FMD), a highly contagious vesicular disease affecting cloven-hoofed animals. Few question the strategy's effectiveness, yet a growing number of people are starting to question whether it would be the right choice for the United States should the U.S. cattle population become infected with FMD — naturally, accidentally or through bioterrorism.

The United States has been FMD-free since 1929, and our neighboring countries of Canada and Mexico do not pose a likely threat of natural or accidental introduction since they have been free of the disease since the early 1950s. Of great concern, however, is South America, which has been working to eradicate the disease for more than 50 years.

Here we'll look at what experts had to say about stamping out at the “Business Continuity and Disaster Recovery Planning” symposium at the National Institute for Animal Agriculture (NIAA) annual meeting April 3-6 in Louisville, Ky.

An ill fit for the U.S.

“The goal of stamping out is fast eradication so that damage to international trade is minimized. For slow-moving diseases, it is still no doubt the way to go,” says Barrett Slenning, leader of the Animal Biosecurity Risk Management Group in the Epidemiology, Public Health and Population Medicine Program at North Carolina State University. “This preemptive cull policy is the ideal system for ‘containable’ disease outbreak situations.”

However, he's quick to point out that even though stamping out has its place, it would be grossly inappropriate to apply it in all disease outbreak situations.

“The overarching goal of stamping out is wrong, at least for the U.S.,” Slenning says.

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“International trade [constitutes] maybe 10% of U.S. animal agriculture production. That means we are putting 90% at risk in order to protect 10%. Does that make sense?”

“It probably makes sense for Australia, where exports are the majority market for their animal agriculture, or even for Canada, where one-third of their income comes via international trade. But for the USA — I don’t think so,” he continues. “Why let the tail wag the dog in disease programs? Why not focus on ensuring domestic market survival?”

Not only is the goal of stamping out inappropriate for the U.S., but the strategy’s mechanics can be troublesome, Slenning says. If program arrangements are not made correctly and early, the strategy’s implementation will easily fall behind the epidemic, as it did in the United Kingdom’s (UK’s) outbreak of FMD in 2001.

Additionally, imposing stop movement orders (SMO) puts negative herds at risk because animals and feed can’t be transported. Quarantines put in place by SMOs force the eventual starvation of animals unless producers depopulate their herds for welfare reasons, he explains.

“In the UK, one-third of all the destroyed animals were killed for welfare reasons, with close to two-thirds of the pigs being put down for this reason,” Slenning says. “These are animals that died because of the disease program — not because of disease.”

“The longer the SMO, the more farms will go out of business, whether they are infected or not,” Slenning explains. “To date, USDA (U.S. Department of Agriculture) will not indemnify lost production, at least [not] for noninfected farms. This then becomes an incentive for farms that hit the wall to try and become infected — at least they will get some income for going down.”

Slenning says that such activities were often blamed as the reason that the UK’s FMD outbreak had such a maddeningly long tail. “As farms came close to failure, they infected themselves so they could get indemnities. Do we really want to promote that?” he questions.

Evaluating the current strategy

There are some positive aspects of the stamping out method, Slenning admits. It requires less knowledge about the disease to implement since all animals are simply destroyed if they are infected or are susceptible to becoming infected. Thus, the method is relatively easy to understand and monitor. Historically, it has been proven effective at eradicating diseases and is accepted worldwide as the standard method. Additionally, it’s a relatively low-cost option.

“Stamping out carries some good qualities, but it also carries bad qualities,” Slenning says. “I happen to think that in the U.S., when dealing with FMD, the bad outweighs the good.”

The program risks the majority for the minority and penalizes those farms that maintain disease-negative status since they aren’t able to maintain normal operation while under SMOs, he says. Animal mortality increases and income is eliminated for prolonged periods of time without relief from indemnity programs. Carcass disposal and environmental concerns rank high. Additionally, public revulsion to the practice is staggering.

“This strategy was formulated in a time when no one considered that we might be intentionally attacked with a virus designed to do maximum damage,” Slenning says. “Rather, the plan addresses the possibility of an accidental introduction and assumes accidental spread, usually with a single introduction to start the outbreak. Bioterrorism is definitely not that.

“We need to reevaluate our options,” he says.

A multi-method approach

Although the globally accepted FMD-eradication strategy is based primarily on the stamping out method, Slenning says that other support methods aren’t to be overlooked. For instance, he says a risk-based

targeted vaccination program could efficiently and effectively limit the outbreak in those oh-so-important early first days of an outbreak. Additionally, it could optimize the use of limited resources, including people, supplies and intelligence.

As further alternatives to a program primarily based on stamping out, Slenning offers three methods that could aid in the management of a disease outbreak: creating biosecurity incentives, identifying regional production centers and testing the operation of SMOs.

Biosecurity incentives. Finding a way to offer market-based incentives would encourage people to implement sound biosecurity practices that would prevent disease susceptibility, Slenning says. “These incentives could come in the form of insurance, finance, legal, taxation, *et cetera*,” he explains. “Incentives are accepted by the public and politicians better than are straight-out regulations, and they can be more flexible, too.”

Regional production centers. Densely concentrated animal populations are regionalized by species and are more vulnerable to biological attack. “We all need to protect these areas as the most valuable contributors to our state and federal economies,” Slenning explains. “If we identify national production centers, we can use geography as a tool by forward placing resources, targeting local training and

What is FMD?

Foot-and-mouth disease (FMD) is a highly contagious vesicular disease that affects cattle, pigs, sheep and many species of wildlife, explains Alfonso Torres, director of the Animal Health Diagnostic Laboratory at Cornell University. Vesicular diseases are caused by viruses and are manifested by fever and lameness with vesicles (blisters) and erosions of the mouth, feet and teats.

Vesicular diseases are clinically indistinguishable from each other, meaning that without laboratory test confirmation it would be impossible to say whether an affected cow had FMD or vesicular stomatitis, for example.

Epidemiology

FMD is the most contagious vesicular disease of domestic cloven-hoofed animals; however, it is not a zoonotic disease, so humans are not susceptible. The FMD virus has seven serotypes with more than 60 subtypes, none of which provide cross protection between the serotypes or subtypes, Torres says. This highly infectious virus is shed in all body fluids and secretions. Cattle, for example, will shed up to 10 billion infective doses per week.

Disease morbidity is near 100%, and mortality for infected young animals is extremely high, too. Torres explains that ruminants are carriers, and the disease can be transmitted through exhaled air, direct contact, meat products (except aged, deboned beef) and inanimate objects, such as vehicles and other equipment.

Control

The disease is controlled with quarantines and stop movement orders (SMOs) for animals, products and anything else that could transport the virus. Surveillance and tracebacks are key monitoring practices. Disinfecting vehicles, equipment and personnel can also help control the spread of the virus, Torres says, as will targeted vaccination.

strategically placing labs and other assets near to them.

“Distance is time, and time is our enemy during a FAD (foreign animal disease) outbreak,” he continues. Additionally, different treatment programs and expectations could be defined for concentrated production areas vs. less dense areas, he says.

Stop movement orders. “SMOs are the real difficult thing. We know, I mean we really know, that they work. But, they are an across-the-board tool that wipes out healthy farms, and they probably contribute to farms trying to go positive as the only economic way out during an outbreak,” Slenning explains. With testing, the technical kinks in this method could be worked out to limit the negative effects on noninfected herds to maintain domestic production, he says.

Rethinking our approach

“The point to be made is that we need to rethink our current 1929-dated, accidental-outbreak-assuming, eradication-at-all-costs strategy to consider that an outbreak of FMD might be large and take time to eradicate,” Slenning says. “Maintaining business continuity needs to be our main priority. We need to save farms to save agriculture.”

Slenning says that when developing an updated disease-eradication strategy, the following considerations should be included:

- ▶ Preserve homeland markets first;

- ▶ Regionalize and develop strategies based on production centers;
- ▶ Employ proof-of-status testing capabilities to allow movement and trade in negative areas;
- ▶ Use risk-based vaccination strategies; and
- ▶ Implement strict biosecurity programs at all levels, and reward them through incentives.

Gathering information

Before responding to a disease situation — whether by stamping out, an alternative strategy or a combination of methods — Harry Snelson, director of communication for the American Association of Swine Veterinarians, says that you need to be able to answer two questions: 1) Do we have all the information we need to make the best decision; and 2) What is our objective?

He explains that determining the required information often entails a thorough investigation into the current situation, as well as a look back to other historic disease situations. When deciding if you have enough information to make the best decision, Snelson says that you should consider three categories of information: the disease agent, epidemiology and available control options.

He says disease agent considerations should include pathology, transmission, virulence, potential effects, susceptible species and zoonotic status, while

epidemiology considerations should include location of the disease, diagnostic capabilities, surveillance tools and route of introduction.

“Understanding the disease agent and epidemiology is critical. Your control and eradication discussions will be drastically different if you know as much as possible about the disease,” Snelson says. “Funding needs to be targeted to allow for monitoring disease outbreaks worldwide; comprehensive surveillance sampling; and developing, maintaining and staffing facilities to research these diseases. We must have access to this information to make an informed decision.”

The third category, control option considerations, can be complicated, he says. Thought should be given to cost, effect on the industry, animal welfare, vaccine and treatment variables, and political considerations. Vaccine and treatment variables include information such as availability, efficacy, carrier states, limitation of infection, elimination of clinical signs and performance effects. Political considerations include topics such as public perception, trade implications, and effect on domestic and international markets.

Defining an action plan

After collecting enough information so the best decision can be made, Snelson says that you must focus the objective of your disease response efforts.

“There’s a wide variety of objectives you could have for disease response efforts, and all require placing emphasis in different areas. It’s important to know what you’re setting out to accomplish, so you know what to focus on and what steps to take,” he explains.

The objective of your response efforts will define the direction of the industry and the market during the outbreak, control period and through eradication. Because the effects may be realized for years to come, a focused objective is key.

“Is your objective to reestablish trade, or do you want to maintain domestic markets? Are you aiming for the quickest possible disease eradication so you can return to disease-free status?” he offers. “Do you want your efforts to support the future of as many farms as possible, or do you want to ensure the survivability of the entire livestock industry as a whole?”

Once you’re able to comfortably say you have enough information to make the best decision and you have defined your objective, Snelson concludes, action should be coordinated, swift and purposeful.

Eradication

Stamping out is the method used most commonly worldwide. This eradication strategy calls for the depopulation and destruction of all infected animals and those that have had contact with infected animals, Torres explains. Additionally, preemptive culling may be employed for at-risk populations and to euthanize animals for welfare reasons. This method is widely recognized as effective and easy to implement, yet it usually carries the highest mortality numbers, along with an extremely unfavorable reception by the public.

National vaccination campaigns are also used to eradicate the FMD virus. Injections are either administered through the ring vaccination strategy or by targeted risk-based selection. Stamping out is sometimes used in coordination with vaccination.

Consequences

The economical, political and social effects of an FMD outbreak can be far-reaching and long-lasting. The United Kingdom’s (UK’s) highly publicized outbreak in 2001 lasted for seven months, required the depopulation of 6.6 million animals and totaled \$4.6 billion in direct costs.

Common effects of an FMD outbreak include:

- ▶ Decreased international trade resulting from lack of trust in the nation’s surveillance systems;
- ▶ Public outcry and lack of confidence in the safety of the domestic food supply resulting in decreased meat consumption;
- ▶ Substantial loss of nonagricultural income such as tourism;
- ▶ Mental health effects resulting in posttraumatic stress disorders and increased rate of suicide;
- ▶ Environmental concerns from the disposal of carcasses and use of disinfectants; and
- ▶ Ethical concerns stemming from stamping out and welfare euthanasia practices.