

# Foot-and-Mouth Disease: *Not Your Grandfather's Plan*


With planning and foresight, industry could avoid mass depopulations in the case of a foreign-disease outbreak.

BY JOHN MADAY

**W**hen foot-and-mouth disease (FMD) broke out in the United Kingdom in 2001, authorities focused on a traditional “stamping out” approach, culling about 10 million animals at a direct cost of about \$9 billion. In contrast, Uruguay experienced a similar outbreak that same year but turned to vaccination as a primary control strategy. The country culled fewer than 7,000 animals and kept direct costs for the outbreak to around \$240 million.

That historical perspective, coupled with analysis accounting for the massive scale and economic value of the U.S. livestock sector, has influenced infectious-disease experts and the USDA to shift their thinking and re-order their priorities in FMD-response planning. Strategic depopulation remains a key component in plans for mitigating a FMD outbreak, along with recognition that with planning and quick response, including vaccinations and biosecurity, the cattle industry could protect business continuity while minimizing costly culling.

At Iowa State University's Center for Food Security and Public Health (CFSPH), director and distinguished professor Jim Roth, DVM, Ph.D., ACVM, and his team have worked at the

A photograph of four people standing in a barn aisle. From left to right: a woman in a blue button-down shirt and jeans, a man in a dark polo shirt and jeans, a woman in a blue button-down shirt and jeans, and a woman in a dark button-down shirt and jeans. They are all smiling and looking towards the camera. The background shows the wooden structure of a barn with hay on the floor.

**At Iowa State University's Center for Food Security and Public Health, veterinarians (left to right) René Dewell, Jim Roth, Danelle Bickett-Weddle and Molly Lee help develop the Secure Milk and Secure Beef plans for an FMD outbreak.**

forefront in developing FMD prevention and response plans for multiple livestock species. His team includes Danelle Bickett-Weddle DVM, MPH, Ph.D., DACVPM; René Dewell, DVM, MS; and Molly Lee, DVM. In cooperation with federal and state animal-health officials, industry veterinarians and veterinarians at Iowa State University (ISU), Kansas State University, University of Minnesota and University of California–Davis, the team has developed the Secure Milk Supply (SMS) and Secure Beef Supply (SBS) plans, which focus on maintaining business continuity while aggressively mitigating an FMD outbreak. The group also developed a Secure Egg Supply Plan for the poultry industry, as well as a Secure Pork Supply Plan. These Secure Food Supply plans were funded by USDA Animal and Plant Health Inspection Service Veterinary Services and are components of the USDA’s overall Foreign Animal Disease Preparedness and Response Plan (FAD PRoP).

## Experience in recent outbreaks in other countries shows that a well-managed, strategic vaccination program can reduce economic losses.

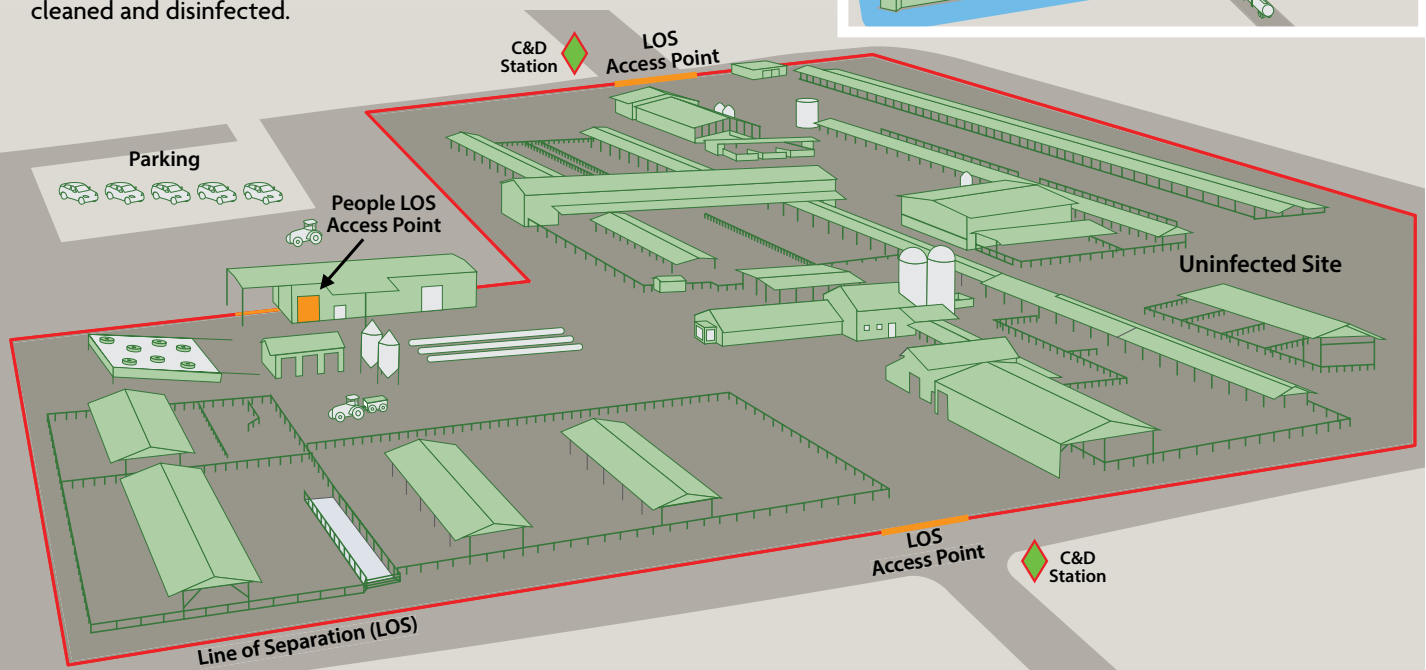
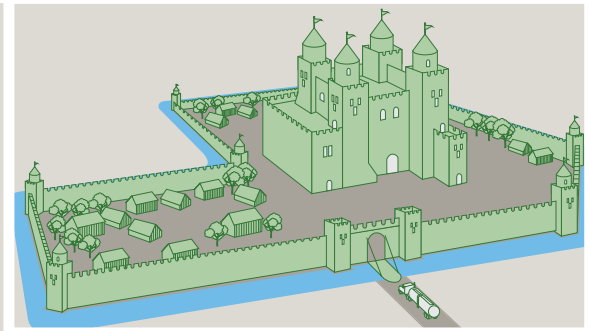
The ISU team notes the new approach better reflects the needs of the U.S. livestock industry, based on its size, structure and extensive movement of animals in commerce—recognizing that all cattle, even uninfected animals in a regulatory control area, might be subject to movement controls, including movement of live animals to slaughter or to other production phases. Other control strategies in the new approach include vaccination and managing cattle through the disease to recovery and strategic depopulation. The Secure Food Supply’s continuity of business provisions allow for the ability to move milk to processing and cattle to harvest from operations with cattle that

have no evidence of FMD infection.

Scientists developing the beef and dairy plans say the poultry industry’s response to the highly pathogenic avian influenza (HPAI) outbreaks in 2014 and 2015 provided valuable experience for maintaining business continuity. Lee notes a paper published by the Agriculture and Applied Economics Association after the HPAI outbreaks documented the value of permitted movement to business continuity. “Most importantly for producers, permitted movement allowed essential movement to reduce business disruption and loss of revenue. Also, there was reduced egg disposal which lessened the burden on affected

### Line of Separation

Biosecurity is one component of the SMS and SBS plans. The line of separation is a clearly identified boundary around or within a premises to separate off-farm from on-farm movements. Think of it as a moat around your castle and the drawbridge is the access point—controlled by the operation. You decide when to lower the drawbridge and let in the milk truck, livestock truck or any other vehicle after it has been cleaned and disinfected.



**Veterinarians and producers should watch for signs of FMD such as these lesions to the foot and mouth.**



PHOTO: UNIVERSITY OF CALIFORNIA – DAVIS

producers as well as waste-management facility capabilities, and fewer egg shortages, thus benefitting processors and allowing them to better meet consumer demand.” The 2016 article, by J.M. Thompson and D.L. Pendell, is titled “Proactive Risk Assessments to Improve Business Continuity.”

The HPAI outbreak caused some additional costs as a result of maintaining a certain level of biosecurity to meet the requirements for movement permits to maintain business continuity, Lee adds. However, the authors note, “premises that incorporated the Secure Egg Supply Plan changes were allowed to apply for permits to move either product or essential material in and out of the control area. By implementing additional biosecurity measures as outlined in the Secure Egg Supply plans, this ensured that the best disease-management practices were in place, reducing the risk for disease spread and better controlling movement. State animal-health authorities issued approximately 7,800 movement permits. The majority of these permits were issued to move feed onto farms or to move products out of the control area. By allowing movement, there was likely a reduction in the price increase to consumers, foregone revenue to producers and potential indemnity payments by the USDA.”

## **PLANNED RESPONSE**

In the event of an outbreak, federal and state regulatory officials will work

together to manage the response, with a goal of detecting, controlling and containing FMD as quickly as possible, and the ultimate goal of eradication. According to the ISU team, authorities will quickly establish a control area around infected premises. The minimum radius of the control area will be 10 km, or 6.2 miles, but it could be much larger, depending on specific circumstances.

Producers likely will need permits to move livestock within, into, out of and through control areas. Controlled, risk-based movement of animals, supported by robust biosecurity measures and ongoing surveillance, will be critical for maintaining business continuity and the agricultural economy while suppressing and eradicating an outbreak. The SMS and SBS plans reflect this approach by providing detailed recommended steps, procedures and responsibilities for regulatory officials, producers, packers and processors related to managed movement of animals and animal products in an FMD response.

The SMS and SBS plan summaries are available online. They provide a succinct overview of the respective plans and related resources for industry stakeholders and government officials.

### **Key pieces include:**

- Brief descriptions and links to FMD Response Guidance Documents.
- Considerations and responsibilities of stakeholder groups related to managed movement of animals in an

FMD response.

- Guidelines for participation in the SMS and SBS plans, including what to prepare prior to an outbreak and what should be done once FMD is diagnosed in the U.S.
- Guidance for requesting a Secure Food Supply Movement Permit during an outbreak.
- Links to additional resources and contact information for the opportunity to contribute comments or suggested edits for improvement.

## **MULTI-FACETED BIOSECURITY PLANNING**

The ISU team emphasizes that veterinarians will undoubtedly play a critical role in facilitating preparedness of individual producers. As a first step, a veterinarian can encourage clients to request a National Premises Identification Number (PremID or PIN) from the office of their state’s animal-health agency to facilitate movement requests during an outbreak. A PIN requires a valid 911 address and a set of matching coordinates reflecting the actual location of the animals on the premises. A PIN will be necessary to request a movement permit. Having a PIN before the outbreak will speed up the ability to move feed, manure and animals.

To obtain a permit to move cattle during an outbreak, producers will need to provide regulatory officials with evidence they will not contribute to the spread of disease nor put their own animals at risk of exposure.

This will require a biosecurity plan, including enhanced measures to account for known exposure routes for FMD.

A toolkit included in the SMS and SBS plans can help veterinarians educate clients and prepare their operation-specific biosecurity plans. This includes an 11-point self-assessment checklist, templates and an information manual to facilitate creation of a written operation-specific biosecurity plan, with emphasis on three key points:

1. A biosecurity manager responsible for developing an enhanced biosecurity plan and ensuring training and compliance on biosecurity protocols.
2. A written operation-specific biosecurity plan.
3. A line of separation (LOS)—an outer control boundary around, or within, the premises to limit movement

of virus into areas where susceptible animals can be exposed.

The CFSPH team also encourages producers to develop contingency plans to maintain animal welfare during periods of no animal movement. This planning should, for example, include processes for delivering feed to animals in a control area while maintaining biosecurity using a defined LOS. An operation could identify a location where an auger truck remains outside the LOS, with the clean auger delivering feed over the fence line, while the crew inside the LOS collects the feed for delivery to animals. Inputs and outputs to consider in this planning include incoming and outgoing cattle; feed inputs and delivery; harvest; bedding, fuel and propane deliveries; veterinary care; and garbage, manure and mortality removal.

## SURVEILLANCE

Ongoing surveillance during an outbreak will help the industry manage animal movement while minimizing the risk of exposing non-infected cattle to FMD. Roth and his team note that current sampling and diagnostic tools have significant limitations. These surveillance methods cannot prove freedom from infection; they can only establish lack of evidence of infection. Serum antibodies are not detectable until several days after infection and typically after cattle develop clinical signs. Virological-surveillance diagnostic tests are available but involve challenges with practical sample collection for herd-level surveillance, laboratory capacity, test validation and proficiency testing.

Authors of the SBS and SMS plans say accredited veterinarians could be designated by regulatory officials to

## Secure Milk and Secure Beef Supply Plans—The Role of the Veterinarian



BY MOLLY LEE, DVM, CENTER FOR FOOD SECURITY AND PUBLIC HEALTH, IOWA STATE UNIVERSITY

**V**eterinarians have a tremendous responsibility—and opportunity—to help their clients prepare for a potential foot-and-mouth disease (FMD) outbreak. While eradication of FMD, should it occur in the U.S., is the ultimate goal, the old approach to FMD response—massive depopulation—is no longer workable except in a small outbreak. The size, structure, efficiency and extensive movement in cattle production will likely require alternative response options to manage disease spread, such as vaccination and allowing animals to recover.

In an FMD outbreak, beef and dairy operations—regardless of their infection status—are likely to be subject to movement controls. Producers should be prepared to manage potential disruptions in animal and product movement.

The Secure Milk Supply (SMS) and Secure Beef Supply (SBS) plans were established to help producers, and their veterinarians, prepare for and ultimately survive an FMD outbreak by providing guidance for cattle operations, even those with no evidence of FMD infection, to maintain animal and product movement. SMS and SBS are science- and risk-based business-continuity plans funded by the USDA and developed in collaboration with industry, government

officials and veterinarians at Iowa State University, Kansas State University, University of Minnesota and University of California–Davis.

Poultry-specific business-continuity plans provided a valuable resource and mechanism for mitigating negative impacts to the poultry industry during the 2014-15 highly pathogenic avian influenza outbreaks. The voluntary SMS and SBS plans give veterinarians the tools they need to help their clients implement key business-continuity strategies. Using the resources provided in the SMS and SBS plans, veterinarians can teach on-farm observers to recognize abnormal production parameters or clinical signs that may indicate early FMD infection and encourage them to promptly report concerns.

Herd veterinarians are also a critical resource in educating on-farm biosecurity managers, helping them to determine their line of separation to keep disease off the operation, and developing whole-farm enhanced biosecurity plans based on the known exposure routes for FMD. To learn more about this important responsibility, and the opportunities available to assist your clients with business-continuity planning, attend the General Session presentation at the 2017 Annual American Association of Bovine Practitioners Conference in Omaha in September, “The planned response to an FMD outbreak is not what it used to be.” For more information about the SMS and SBS plans, and to find resources, visit [securemilksupply.org](http://securemilksupply.org) and [securebeef.org](http://securebeef.org).

periodically inspect cattle for evidence of FMD infection. This process could be supplemented by daily observations by trained on-farm cattle health monitors using a process termed Active Observational Surveillance.

Herd veterinarians can assist with education of cattle health monitors and can access educational tools on the SMS and SBS websites, including handouts, narrated PowerPoint lessons, posters, pocket guide, wall charts and forms to assist with daily observations. Cattle health monitors would need training for early recognition of abnormal production parameters and clinical signs of FMD infection, which may look like other diseases in its early stages. Signs of FMD can include: drooling, fever, (103°F to 106°F; 39.4°C to 41.1°C), reluctance or inability to eat, lameness, reluctance to move, redness or blanching of coronary bands, nasal discharge, depression and sudden death in young calves due to myocarditis.

## VACCINATION

Current thinking on FMD response in the U.S. places much more emphasis on vaccination, rather than reliance on culling or “stamping out,” as a primary control measure. Some culling of infected or exposed cattle will remain necessary, with actual numbers depending on the scope of the outbreak. Experience in recent FMD outbreaks in other countries shows that a well-managed, strategic vaccination

program can reduce economic losses while helping a country eradicate the disease, achieve FMD-free status and resume normal trade in beef and dairy products.

A successful vaccination program will depend, though, on the industry’s ability to produce, distribute and administer large quantities of vaccine, containing the appropriate antigens for the circulating viral strain, in a short amount of time. Scientists involved in FMD-response planning agree that we currently lack that capability. The USDA currently operates a small North American FMD vaccine bank for use by the U.S., Canada and Mexico at the USDA and Department of Homeland Security facility at the Plum Island Animal Disease Center in New York. The World Reference Laboratory for FMD recommends that vaccine banks maintain 23 different vaccines to cover the more than 60 known strains of the FMD virus. The North American FMD bank has only about 14 strains with only a few million doses of each strain. “Surge capacity” remains limited, as finished vaccines must be manufactured overseas, and there is very limited worldwide capacity to produce the hundreds of thousands of doses that the U.S. would need quickly in a large outbreak. With today’s system, Roth says, it likely would take weeks for the USDA to provide adequate vaccine doses to deal with a small FMD outbreak, and months for a large outbreak. The USDA has

recognized this deficiency but does not have the funds to acquire an adequate FMD vaccine stockpile.

The National Pork Producers Council (NPPC) recently released an issue paper calling for Congress to provide the funds so that USDA can upgrade the vaccine bank and build a system for rapid deployment of the right vaccines to the right animals at the right time, in response to an outbreak.

NPPC cites research from ISU estimating the economic impact of a significant outbreak of FMD to the U.S. beef and pork sectors at \$128 billion over 10 years, or an average of \$12.8 billion per year. Corn and soybean farmers would lose around \$44 billion and \$25 billion, respectively, over 10 years. Combined losses to the beef, pork, corn and soybean sectors would reach nearly \$200 billion over 10 years. Direct job losses attributed to a FMD outbreak could exceed 58,000 per year, with total annual job losses near 154,000.

Considering the risk and potential economic impact of an outbreak, the required investment in vaccine capacity looks relatively small. In January 2014, the CFSPH at ISU issued a draft white paper titled “FMD Vaccine Surge Capacity for Emergency Use in the United States,” with Roth as the lead author. They estimated the cost of funding adequate surge capacity at \$150 million per year for five years—an investment that could save the industry billions in the event of an outbreak. ☺

## FMD Response Resources

Scientists with the USDA, states, industry and universities involved in FMD-response planning have developed a wealth of detailed information on the disease and contingencies for dealing with an outbreak. These include:

- The Secure Beef Supply Plan: [www.securebeef.org](http://www.securebeef.org)
- The Secure Milk Supply Plan: [www.securemilksupply.org](http://www.securemilksupply.org)
- USDA’s FAD PReP manual, including information on Secure Food Supply permits and permitted movements: [www.aphis.usda.gov/fadprep](http://www.aphis.usda.gov/fadprep)
- USDA strategic guidance for responding to FMD in the United States: [www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/fmd\\_responseplan.pdf](http://www.aphis.usda.gov/animal_health/emergency_management/downloads/fmd_responseplan.pdf)
- Ready Reference Guides, for quick summaries of information for training and educational purposes: [www.aphis.usda.gov/aphis/ourfocus/animalhealth/emergency-management/ct\\_fadprep\\_readyreferenceguides](http://www.aphis.usda.gov/aphis/ourfocus/animalhealth/emergency-management/ct_fadprep_readyreferenceguides)
- Pre-defined phases and types of an FMD outbreak: [www.cfsph.iastate.edu/pdf/phases-and-types-of-an-fmd-outbreak](http://www.cfsph.iastate.edu/pdf/phases-and-types-of-an-fmd-outbreak)
- USDA’s FAD PReP/NAHEMS Continuity of Business Guidelines: [www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/nahems\\_guidelines/cob\\_nahems.pdf](http://www.aphis.usda.gov/animal_health/emergency_management/downloads/nahems_guidelines/cob_nahems.pdf)
- Video from the University of California–Davis, “FMD Vaccination: What Livestock Producers Need to Know”: [www.youtube.com/watch?v=MKf-aMgb-y0](http://www.youtube.com/watch?v=MKf-aMgb-y0)
- FMD Pocket Guide: [www.cfsph.iastate.edu/pdf/foot-and-mouth-disease-pocket-guide-cattle](http://www.cfsph.iastate.edu/pdf/foot-and-mouth-disease-pocket-guide-cattle)
- Basic FMD info for consumers, livestock producers and the media: [www.footandmouthdiseaseinfo.org](http://www.footandmouthdiseaseinfo.org)
- More technical overview of FMD: [www.cfsph.iastate.edu/Factsheets/pdfs/foot\\_and\\_mouth\\_disease.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/foot_and_mouth_disease.pdf)