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“Impact of an Outbreak of Foot and Mouth Disease (FMD) in the United States and the Urgent
Need for an Adequate Stockpile of FMD Vaccine”

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Chairman Rouzer, Ranking Member Costa, and Members of the House Committee on Agriculture, Subcommittee on Livestock and Foreign Agriculture, my name is Jim Roth and I am the Director of the Center for Food Security and Public Health at the Iowa State University College of Veterinary Medicine. Thank you for the opportunity to speak to you about preparedness for the potential introduction of foot and mouth disease (FMD) in the United States. I will first highlight challenges for control of FMD and some of the significant progress that has been made, then focus on the urgent need for a sufficient stockpile of FMD vaccine to protect U.S. agriculture and an approach to begin to build that stockpile.

Challenges for Control of FMD in the U.S.

Foot and mouth disease is the most important animal disease in the world capable of crossing national boundaries and devastating animal agriculture (a transboundary disease). FMD affects cattle, pigs, sheep, goats, deer, elk and other wildlife. Ninety-six countries are either endemically or sporadically infected with the disease, therefore there is a constant threat that it will be introduced into the U.S. either accidentally or intentionally. FMD is extremely contagious and can spread rapidly with devastating consequences. You probably remember the outbreak in the United Kingdom in 2001 which is estimated to have cost approximately \$6 billion. The number of livestock and the agriculture economy is much smaller in the U.K. than the U.S. We learned from their outbreak that we cannot depend on stamping out the disease by killing all infected and exposed animals.

The size, structure, efficiency, and extensive movement inherent in the United States livestock industry will present unprecedented challenges in the event of an FMD outbreak. No country with a livestock industry comparable to that of the U.S. has had to deal with an outbreak of FMD, and the impact would extend far beyond animal agriculture.

Herd Size

The U.S. has some very large herds including feedlots with greater than 50,000 head of cattle, dairies with greater than 5,000 lactating cows, dairy calf ranches with greater than 70,000 head of calves, and swine farms with greater than 20,000 sows. *These premises are too large to rapidly depopulate to stamp out the disease. If it were possible to depopulate them, carcass disposal would present enormous environmental problems.*

Animal Movement

Once FMD is detected, an essential tool for control is to stop all animal movement in the affected area. Livestock production in the U.S. depends on extensive movement of animals.

Approximately 400,000 cattle and one million swine are estimated to be on the road in trucks each day, either being delivered to packing plants or to other stages of production.

Approximately 40 million swine are shipped into a new state each year (~110,000 each day). Many of those cross multiple state lines. In an FMD outbreak, State Animal Health Officials may prohibit animals from an FMD positive area from entering their state. Modern swine production

depends on extensive animal movement on a regular basis. If animal movement is stopped, animals will need to be euthanized for welfare reasons because facilities will rapidly become overcrowded.

There is also extensive movement of people, feed, manure, and equipment on livestock premises each day. Wildlife, including birds, can spread disease. There are estimated to be more than 5 million feral swine and 30 million deer in the U.S.; these animals are susceptible to FMD and can often move freely between herds of livestock. *If FMD infection is not detected quickly, it is likely to spread rapidly due to extensive animal and related movements.*

Diversity of Operations

The diversity of herd size also presents problems in FMD control. In the U.S., 49% of hog operations have fewer than 100 head, whereas 62% of the inventory of swine is on operations with more than 5,000 head. Similarly, 18,800 dairy farms have less than 30 cows; however, 1,800 dairy farms with more than 1000 animals account for nearly 50% of the U.S. dairy cow population. *An FMD control program will need to include operations of all sizes. Federal and state resources will be quickly overwhelmed.*

Economic Impact of FMD

An outbreak of FMD will shut down exports of fresh beef, pork or dairy products. In 2014, beef exports totaled \$7.1 billion, pork exports \$6.7 billion and dairy exports totaled \$7.1 billion. Approximately 11% of U.S. beef production and 22% of U.S. pork production are exported. In 2003, beef exports dropped due to a single case of mad cow disease (BSE); the cumulative loss in U.S. beef trade is estimated to have been \$16 billion. The increasing export of beef and pork products in recent years significantly contributes to the value of cattle and swine. As exports increase, the industry becomes more vulnerable to the sudden and extended loss of exports that would result from an FMD outbreak. The price for pork and beef will drop dramatically due to the excess product on the domestic market. That will also impact the price of poultry products and the price of grain.

In 2011, Dr. Dermot Hayes and colleagues at the Center for Agricultural and Rural Development at Iowa State University published “Economy Wide Impacts of a Foreign Animal Disease in the United States” which had been funded by the National Pork Board. **They estimated that over 10 years, the cumulative loss due to an uncontrolled FMD outbreak would be \$199.8 billion. Losses estimated include:**

Pork – \$57 billion

Beef – \$71 billion

Poultry - \$1 billion;

Corn - \$44 billion

Soybeans – \$25 billion

Wheat – \$1.8 billion.

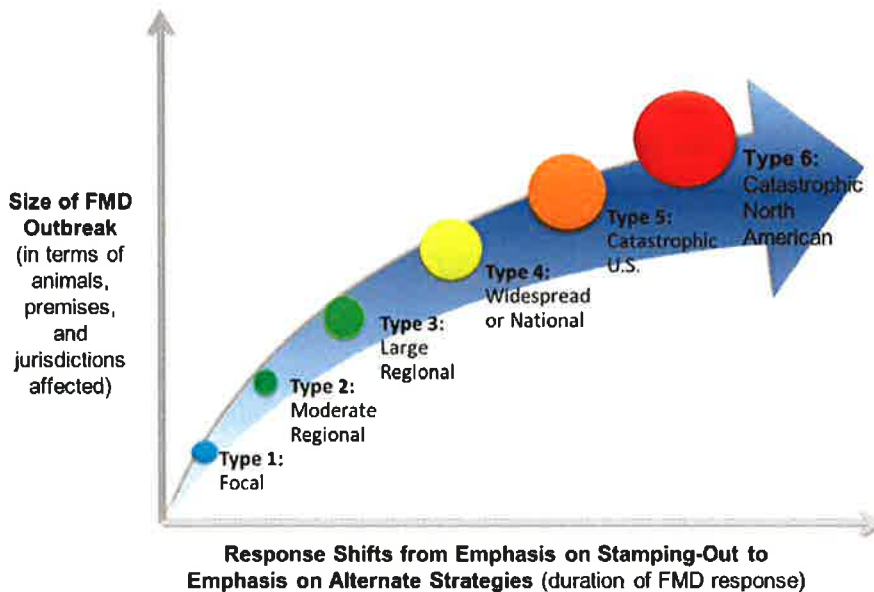
The impact would likely be larger now because of the increase in the value of exports since 2011. Agriculture is a critical infrastructure in the U.S. and is severely threatened by the potential of an FMD outbreak.

Progress that has been made

Because of the challenges outlined above, it became apparent that an FMD outbreak could rapidly get out of control. As a consequence, the USDA has been working with states, industry and academia to address these challenges. Significant progress has been made in developing Secure Food Supply plans to help ensure business continuity for non-infected poultry and livestock premises and affiliated industries in a foreign animal disease outbreak and provide a continuous supply of safe and wholesome food to consumers. The Secure Egg Supply and Secure Turkey Supply plans are credited with enabling premises in Highly Pathogenic Avian Influenza (HPAI) control areas to demonstrate that they are not infected so they could continue to move product to market in the 2015 outbreak in the Upper Midwest. The Secure Pork, Beef and Milk Supply plans are intended to help producers whose farms are not infected with FMD stay in business. However, without adequate FMD vaccine, it will be nearly impossible to keep farms, especially beef and dairy farms, from becoming infected.

The USDA working with states, industry and academia, developed “**Guidelines for Classification of Phases and Types of An FMD Outbreak and Response**”.

Six Types of FMD Outbreak



These guidelines were developed to aid rapid decision making as an FMD outbreak unfolds. Strategies for the response to, and management of, an FMD outbreak will change as the outbreak progresses and will depend upon the magnitude, location, and other characteristics of the outbreak. The response will shift from an emphasis on stamping out in a small outbreak to alternative strategies in larger longer duration outbreaks. Vaccine will be an essential tool to control any outbreak larger than a small focal outbreak. **Without an adequate supply of rapidly available FMD vaccine, it will be very difficult to prevent the outbreak from progressing to a catastrophic North American outbreak** (see: FAD PReP Strategy Document: Classification of Phases and Types of a Foot-and-Mouth Disease Outbreak and Response available at: www.cfsph.iastate.edu/pdf/phases-and-types-of-an-fmd-outbreak).

Lessons learned from Recent Foreign Animal Disease Outbreaks

The U.S. has experienced two recent introductions of devastating transboundary animal diseases: Porcine epidemic diarrhea virus (PEDV or Swine Enteric Coronavirus Disease (SECD)) in 2013 and highly pathogenic avian influenza (HPAI) in 2015. Both viruses apparently had origins in Asia; FMD is endemic in most countries in Asia. PEDV spread to 27 states and killed at least 8 million baby pigs in the first year. HPAI caused the death of 31.5 million poultry in two months in Iowa alone (including approximately 40% of the laying hens in the state) and cost the economy of the state approximately \$1.2 billion; the USDA spent nearly \$1 billion to assist in controlling HPAI. Disposal of the poultry carcasses became a serious problem.

These outbreaks occurred in industries with much more robust biosecurity practices than the beef and dairy industries. An FMD outbreak would dwarf the PEDV and HPAI outbreaks. No one anticipated the introduction of PEDV, so there was no vaccine available. It was more than 15 months before vaccine became available. It is not possible to have an HPAI vaccine available ahead of a new outbreak because of rapid unpredictable changes in HPAI viruses. However, it is possible and essential to have vaccine available at the beginning of an FMD outbreak. Having an adequate supply of FMD vaccine quickly available could greatly limit the extent and duration of an FMD outbreak.

In summary, the size, structure, efficiency, and extensive movement inherent in the United States livestock industry will present unprecedented challenges in the event of an FMD outbreak. It will be nearly impossible to control an FMD outbreak in livestock dense areas without the rapid use of tens of millions of doses of FMD vaccine. At this time, those doses are not available for U.S. use and it would take many months to obtain the volume of vaccine needed. Without sufficient vaccine to aid in the response, FMD could rapidly spread across the U.S., resulting in the destruction and need to dispose of potentially millions of animals. It would become an endemic disease in livestock with spread potentially facilitated by deer, feral swine or

other free-living animals. A long term, very expensive and extensive control program would be needed and it could take many years to eradicate.

Requirements for an FMD Vaccine Bank

The need for FMD vaccine for the US has been recognized for decades. The US has shared an FMD vaccine bank with Canada and Mexico since 1982 (The North American Foot and Mouth Disease Vaccine Bank). The USDA has stated that the amount of FMD vaccine available in the Bank (which is controlled and shared by the U.S., Canada, and Mexico) is far below what would be required for an outbreak in a single livestock dense state. Since the need for vaccine in the U.S. is likely to be much greater than for Canada or Mexico, additional sources of FMD vaccines independent of the North American FMD Vaccine Bank are needed to adequately protect U.S. agriculture.

This was recognized in 2004 in Homeland Security Presidential Directive 9. HPSD 9 directed that a National Veterinary Stockpile be created. The Stockpile was to contain sufficient amounts of animal vaccine, antiviral, or therapeutic products to appropriately respond to the most damaging animal diseases affecting human health and the economy. **The USDA established the National Veterinary Stockpile, however the stockpile has never received sufficient funding to stockpile FMD vaccines; consequently there are no FMD vaccines in the Stockpile.**

The USDA, along with many state and industry officials, recognized that the approach of stamping out and stop movement of animals is simply not possible given the realities of animal agriculture in the US. The USDA document “Foot-and-Mouth Disease Vaccination Policy in the United States” (September 2014) illustrates the current capacity of the U.S. to effectively implement vaccination strategy for control of different types of FMD outbreaks (available upon request). It clearly indicates that there is not sufficient vaccine capacity to assist in controlling an FMD outbreak.

A plan to ensure that adequate supplies of FMD vaccine with multiple strains of FMD virus are available in the event of an accidental or intentional introduction of FMD virus into the U.S. is urgently needed.

At the request of the National Pork Board, National Cattlemen’s Beef Association, and National Milk Producers Federation I produced a white paper entitled “FMD Vaccine Surge Capacity for Emergency Use in the United States” outlining a potential plan to develop a National Veterinary Stockpile (NVS) with sufficient quantities of FMD vaccine to protect U.S. agriculture, food systems, and the economy. The whitepaper is available at: www.cfsph.iastate.edu/pdf/fmd-vaccine-surge-capacity-for-emergency-use-in-the-US.

It is possible to have an FMD vaccine stockpile available for immediate use. However, establishing and maintaining an FMD vaccine bank is complex. There are seven distinct serotypes of the virus that are not cross protective and approximately 65 subtypes. Cross-

protection varies between strains within a serotype. The World Reference Laboratory for FMD recommends that FMD vaccine banks maintain 23 strains of FMD virus in the vaccine bank. Once the virus in the outbreak is isolated, the serotype can be identified and the correct vaccine selected for use. (See: NAHEMS Guidelines: Vaccination for Contagious Diseases. Appendix A: Foot-And-Mouth Disease available at: www.cfsph.iastate.edu/pdf/fad-prep-nahems-appendix-a-vaccination-for-foot-and-mouth-disease).

Costs

The white paper contains recommendations that I hope can be considered for implementation and funding to better prepare the U.S to avoid the worst case scenario which is likely to occur if FMD is introduced into the U.S. without adequate emergency vaccine supplies.

I estimated in the white paper that development of a robust FMD vaccine stockpile could require an investment of up to \$150 million per year for five years. This number could likely be reduced with additional planning, the development of new technology vaccines, and negotiation with vaccine companies. The vaccine capability could gradually increase during the five years, initially focusing on the most common strains of FMD virus. By the end of five years we could have the capability to respond quickly to any strain of FMD virus introduced into the U.S. The stockpile could use a rotating inventory strategy so that vaccine would not expire and need to be destroyed.

Conclusion

I urge Congress to provide sufficient funding to enable USDA to work with state officials and livestock industry representatives to develop and implement a plan for establishing an effective FMD vaccine stockpile to protect American agriculture.

For additional information on FMD see:

http://www.cfsph.iastate.edu/Factsheets/pdfs/foot_and_mouth_disease.pdf

www.cfsph.iastate.edu/pdf/fmd-vaccine-surge-capacity-for-emergency-use-in-the-US

www.cfsph.iastate.edu/pdf/fad-prep-nahems-appendix-a-vaccination-for-foot-and-mouth-disease