DRAFT

Factors to Consider in Implementing Controlled Movement of Swine in the U.S. to Reduce the Transmission and Impact of a Foot and Mouth Disease Outbreak

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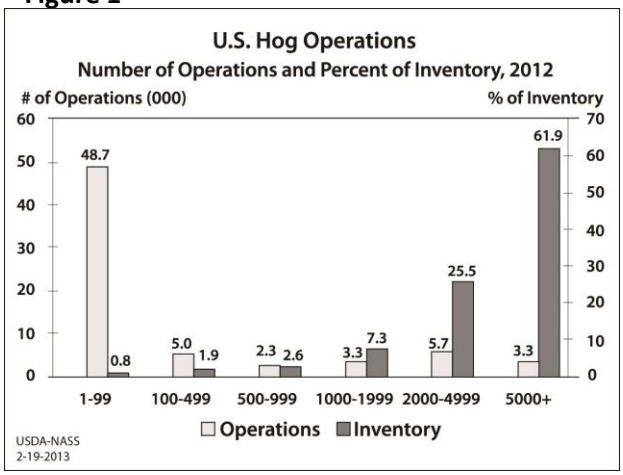
Purpose

The purpose of this document is to provide guidance to Incident Command officials who must make decisions on controlled movement of swine to implement a standstill order at the beginning of an FMD outbreak and on re-starting swine movement during the outbreak. Many factors influence the decisions related to swine movement. This is an attempt to describe the factors to be considered and to get consensus on the optimal approach to managing swine movement in an FMD outbreak. This document provides guidance only. In an actual outbreak, decisions will need to be made by the federal and state Incident Command officials based on the unique characteristics of each outbreak. The Incident Command officials will simultaneously be making many other decisions as they set up the Incident Command Post (ICP), including controlling movement of milk, cattle, sheep, and goats, as well as inputs needed to enable producers to feed and care for their animals. They will also be managing surveillance, stamping out, cleaning and disinfection, trace back and trace forward operations.

Introduction

Figure 1



There are approximately 65 million head of hogs on 68,000 operations in the United States. The size of the hog operations and management practices vary widely (Figure 1). The Secure Pork Supply Plan must take into consideration all sizes and types of hog operations. Extensive movement of pigs, estimated at 1,000,000 animals per day, occurs between different stages of production, and to slaughter. 39.8 million swine are shipped into a new state each year (often across multiple state lines). This includes approximately 6 million swine from Canada. Slaughter facilities process approximately 400,000 to 500,000 hogs, sows and boars each weekday, which equates to an average of 32.7 billion pounds of pork products produced each year. It is not possible, and it is not the best approach to controlling FMD transmission, to instantaneously stop all movement of animals that are in transit, or of animals moving through slaughter facilities. A plan is needed for controlled movement of swine rather than a complete "Standstill" in the event of a foot and mouth disease outbreak. A successful plan will help protect animal welfare, preserve business continuity, conserve animal resources, reduce the need to dispose of animal carcasses, and reduce the spread of FMD virus. State Animal Health Officials have the authority to approve movement of swine entering their state and within their state, and the disposition of animals in transit.

Agreement on an approach to controlled swine movement ahead of the outbreak will decrease confusion and inconsistent approaches to "Standstill" implementation in the first hours and days of an outbreak.

The recommendations for controlled movement of swine and for re-starting movement should be consistent with the USDA FAD PReP FMD Response Plan "The Red Book": http://www.aphis.usda.gov/animal_health/emergency_management/downloads/fmd_responseplan.pdf. The Red Book states that in the first 24 hours after FMD detection, a critical activity will be to "Initiate quarantine, hold orders, movement restrictions, and standstill notices". It also states that a critical activity between 24 and 48 hours after FMD detection will be to "Initiate continuity of business plans". This draft document describes an approach to implementing a standstill order and controlled movement of swine as part of the Secure Pork Supply continuity of business plan. The approach to controlled movement of swine needs to be science and risk based and consistent with the approach to controlled movement of other FMD susceptible species. This document addresses controlled movement of swine during an FMD outbreak, however, the same principles and approach would apply to an outbreak of classical swine fever or African swine fever.

The approach to, and need for, re-starting movement of swine during the outbreak will depend on the phase and type of FMD outbreak. The Center for Food Security and Public Health (CFSPH) at Iowa State University, with input from the swine industry, dairy industry, state animal health officials, USDA officials, and academic partners has developed the FAD PReP Strategy Document "Classification of Phases and Types of a Foot-and-Mouth Disease Outbreak and Response." This document can be found on the CFSPH website: http://www.cfsph.iastate.edu/pdf/phases-and-types-of-an-FMD-outbreak

All FMD outbreaks in the U.S. will start at either the Heightened Alert Phase or Phase 1:

> ***Heightened Alert Phase*** *- FMD outbreak in either Canada or Mexico, but not the U.S.: FMD in either Canada or Mexico threatens to spread to the U.S. (Control Areas are near or cross over the U.S. border)*
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> ***Phase 1****: The period of time from the confirmation of the first FMD case in the United States until there is reasonable evidence to estimate the extent of the outbreak. The transition to Phase 2 should be accomplished as soon as possible, with a goal of less than 4 days (96 hours).*
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> ***Phase 2:*** *Surveillance and epidemiology provides timely evidence of the extent of the outbreak (characterized as one of six types) to support planning and decision making by incident/area command.*

During Phase 1 of an FMD outbreak the FMD Red Book calls for movement restrictions and standstill notices for all susceptible animals in the Control Area. The first task is to plan for how the standstill notices could feasibly be communicated to and implemented by the swine industry. As the outbreak continues, it could rapidly be designated as a Phase 2, Type 3 outbreak or greater. If this occurs, there will be a need to re-start movement of swine within a few days.

> ***Phase 2 Type 1 - Focal FMD outbreak:*** *Focal area of infection limited to one state or small region with low to moderate livestock numbers on relatively small premises. Epidemiologic investigation and surveillance indicates that it has not spread beyond the initial few premises. The Infected Premises have not had extensive animal movement and are not too large to depopulate quickly. Rapid stamping-out without vaccination is feasible.*
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> ***Phase 2 Type 2 – Moderate Regional FMD outbreak:*** *A few focal areas of infection limited to a region with low to moderate livestock numbers on small to medium size premises. Epidemiologic investigation and surveillance indicate FMDV has not spread beyond the region. The Infected Premises have not had extensive animal movement out of the Control Area and are not too large to depopulate quickly.*

Phase 2 Type 3- Large Regional FMD outbreak: *Multiple areas of infection are detected in a region, or the type, number and/or size of infected and contact herds are too great to depopulate quickly enough to suppress disease spread. Depending on the epidemiological situation, there may not be sufficient vaccine and resources available to vaccinate designated susceptible domestic animals to reduce virus transmission. The number of susceptible animals may be too great to consider only a vaccinate-to-kill strategy—a vaccinate-to-slaughter and/or vaccinate-to-live strategy may also be needed. There is a reasonable likelihood that the response strategy, including vaccination, will bring the outbreak under control.*

Phase 2 Type 4 – Widespread or National FMD outbreak*: Widespread areas of infection are detected involving too many herds or herds that are too large to depopulate quickly enough to suppress disease spread. Sufficient vaccine and resources are not available to vaccinate all designated susceptible domestic animals in the affected regions (Control Areas). The number of vaccinated animals is too great to consider a vaccinate-to-kill or slaughter (only) policy. Implement a vaccinate-to-live policy with continued vaccination after the last case to ensure suppression of virus transmission.*

Phase 2 Type 5 – Catastrophic FMD outbreak*: Widespread areas of infection are detected involving a large portion of the United States. Sufficient vaccine and resources are not available to quickly vaccinate all designated susceptible animals in the affected regions. The number of animals is too great to consider only a vaccinate-to-kill or vaccinate-to-slaughter strategy in isolation. Vaccinate-to-kill, vaccinate-to-slaughter, and vaccinate-to-live policies may need to be implemented for regions and species, as vaccine availability dictates. It becomes apparent that FMD is widespread, and will not be eradicated within a year. Transition to a program for long-term eradication and control, including vaccinate-to-live.*

Phase 2 Type 6 - North American FMD outbreak: *Widespread areas of infection are detected involving a large portion of the United States., Canada, and/or Mexico. Sufficient vaccine and resources are not available to quickly vaccinate all designated susceptible animals in the affected regions/countries. The number of vaccinated animals is too great to consider a vaccinate-to-kill policy. It becomes apparent that FMD is widespread, and will not be eradicated within a year.*

Approach to Initial Management of Swine movements at the beginning of an FMD Outbreak

- Standstill and controlled movement orders will be issued by Incident Command officials. It will take some time for the Incident Command Post to become established and to begin issuing controlled movement orders and permits. Advice to swine producers, slaughter plant operators, and truck drivers should be made available prior to an outbreak and also communicated rapidly in the event of an outbreak so that they may make informed decisions regarding animals that are in transit while waiting for the Incident Command officials to issue controlled movement orders and to issue movement permits.
- The **initiation** of new movement of any swine in the Control Area should be immediately stopped.
- Pigs originating outside of the Control Area should be allowed to move outside the Control Area as normal, with a recommendation for enhanced biosecurity. Pigs outside of the Control Area should not be allowed to enter the Control Area unless moving directly to slaughter.
- The following options should be considered for pigs in transit originating from within the Control Area and still in the Control Area:
    - Return the pigs to the most recent premises of origin if possible. They will likely have the same health status as the herd of origin.
    - Deliver the pigs to a premises within the Control Area if the pigs are free of clinical signs of FMD.
    - Safely euthanize and dispose of the pigs rapidly.
    - Swine in transit to a packing plant in the Control Area should proceed to the packing plant and be processed on schedule.

- **Pigs in transit which have left the Control Area** present a risk of transmitting disease outside of the Control Area. A decision must be made quickly on the disposition of these animals. The decision should be based on what is possible to accomplish and which course of action presents the least risk of further spread of disease. For welfare and humane reasons, pigs are allowed to stay on trucks for a maximum of 28 hours before they must be unloaded, rested and provided water and food. Cooperation of all SAHOs in allowing animals in transit to cross state lines during the first 24 hours of an outbreak will be important to avoid having animals stranded on trucks at state lines.
  - For swine in transit to a packing plant:
    - The swine should proceed to the packing plant and be processed on schedule.
  - For swine moving between premises for different stages of production one of the following options may be used:
    - Return the animals to the most recent premises of origin, if possible, with the agreement of the owner of the premises of origin.
      - The animals are likely to have the same health status as the herd of origin. If they are incubating the virus, the herd of origin is also likely to be infected. This option may depend on the relative distance of the pigs from the premises of origin and the premises of destination.
    - Allow the animals to proceed to their intended destination with the agreement of the owner of the premises of destination (assuming the pigs on the conveyance have a certificate of veterinary inspection certifying that they are free of clinical signs of disease). The animals should be placed in quarantine after arrival until released by the ICP. Swine should not be allowed to proceed to an exhibition, fair or auction market. As a result of the movement, the intended destination may be designated as a contact premises, suspect premises, or infected premises, depending on the epidemiologic investigation and results of surveillance. This may cause a new Control Area to be established. Often, the intended destination may have received animals from the same source in recent days. If they received pigs from a known infected premises in the previous 28 days, they will likely be designated as a contact premises.
    - If the first two options are not possible, humanely euthanize and safely dispose of the animals while in transit. This may not be feasible in many instances for the following reasons:
      - In order for the owner of the pigs to be eligible to receive indemnity the pigs must be appraised by a representative of the ICP and the owner must agree to the appraisal prior to euthanizing the pigs. This may not be an option until there has been time for the ICP to begin operation.
      - This must be rapidly accomplished in a biosecure manner. Holding the pigs in a temporary facility outside of the Control Area for an extended period presents a risk that if the animals are incubating the virus, they can cause a new focus of infection.

- Packing plants should continue to process all swine in the plant and in transit to the plant.
  - Modern packing facilities process thousands of swine daily (a total of approximately 400,000 to 500,000 market hogs, sows, and boars slaughtered per day in the U.S.). At any point in time, there may be thousands of live animals in lairage awaiting slaughter. If any animals are incubating the virus, and the processing of swine is stopped, the virus will rapidly multiply in the swine in lairage.

In addition, the thousands of animals that are in transit to packing plants will not be able to be unloaded if the processing of swine at the plant is not continued. **FMD is not a public health or food safety problem. Animals which pass ante-mortem and post-mortem inspection by USDA Food Safety Inspection Service (FSIS) are safe for human consumption**, even if they may be in the pre-clinical stage of FMD infection. Many packing plants have on-site rendering capacity for non-edible products, so any virus in those products would be destroyed. Processing of all healthy animals in the slaughter facility and in transit to the facility is the fastest way to dispose of those animals and presents the lowest risk of spreading FMD infection. It also reduces the need for carcass disposal and preserves high quality protein for human consumption. **Processing of healthy animals should continue, even if FMD infected animals are suspected or proven to already be in the packing plant. The processed product has passed FSIS inspection, is safe for human consumption, and should be released into commerce.**

- Since no new movements of swine will be initiated from the Control Area during phase 1 of the outbreak, the plant will not receive additional swine from the Control Area for processing after the first 24 hours. If it becomes apparent that the outbreak is extensive, the response should be quickly shifted to phase 2 so that swine movement from the Control Area to slaughter can be restarted. Packing plants could continue to receive swine from outside of the Control Area.
- Packing plant employees, service personnel, and truck drivers must observe proper biosecurity protocols to avoid transmitting the FMD virus when they leave the plant. All potential fomites leaving the plant must be cleaned and disinfected. This will be very difficult for slaughter facilities to effectively implement on an emergency basis. All personnel must be instructed on biosecurity steps and to avoid contact with susceptible animals after leaving the plant. Ideally, an emergency plan for implementing biosecurity will be in place and tested at the packing plant before an outbreak. The biosecurity measures will be needed whether the plant receiving FMD infected animals continues or halts processing of healthy animals.

Approach to Restarting Swine Movement and Processing

A standstill order within the Control Area involving a swine dense area during Phase 1 that lasts more than a few days may necessitate extensive killing and disposal of swine based on overcrowding, lack of housing, and welfare concerns. **If it becomes apparent that the outbreak is extensive, the response should be quickly shifted to Phase 2 so that swine movement from the Control Area can be restarted.** In a Phase 2, Type 3 or greater outbreak, the decision has been made that the type, number and/or size of infected and contact herds are too great to depopulate by stamping-out quickly enough to suppress disease spread. In this case, it will be very important to get market ready hogs, sows and boars intended for slaughter, from herds with no evidence of infection, transported to a packing plant and processed as quickly as possible to reduce their chances of becoming infected and spreading disease. All movements will need to be accompanied by a permit from the Incident Command Post. Permitted movements should be in trucks sealed with an official seal. If vaccine is used, all FMD-vaccinated swine must be tracked and their movements recorded.

Establishing lack of evidence for FMD infection:

- Premises wishing to move swine must request a permit from the Incident Command Post.

- It is not possible to prove freedom from FMD infection in a herd, or in an individual animal. It is only possible to establish that there is lack of evidence of infection. Pigs can be infected with FMD virus before they test positive by PCR or virus isolation and before they show clinical signs.
- Lack of evidence of infection with FMDV should be established before a movement permit will be issued.
- In a small outbreak where sufficient resources are available, the following methods could be used to establish lack of evidence of infection:
    - A Federal or State Official or an accredited veterinarian will inspect every load of swine from the FMD Control Area within 48 hours prior to loading for transportation and certify that they are not suspected to be infected with FMD virus (an SOP should be developed for the inspection process).
    - Every load of swine must be sampled within 48 hours prior to loading and test negative for FMD virus by RRT-PCR (SOPs should be in place for sampling, testing, and reporting of results).
    - A trained Herd Health Monitor must inspect the animals immediately prior to loading and certify that the animals do not show evidence of FMD infection (see FMD Active Observational Surveillance document).
- In a large FMD outbreak, where there are not sufficient resources for the above procedures to be conducted for all needed movement permits, a trained Herd Health Monitor will conduct Active Observational Surveillance (AOS) daily of all swine on the premises and will certify that there is no evidence of FMD infection in the herd. The Herd Health Monitor should be a person who has extensive experience with the herd and can detect when unusual clinical signs that may be associated with FMD may be present. Qualifications to be a Herd Health Monitor and training necessary to conduct Active Observational Surveillance should be defined prior to an outbreak. The training will emphasize that it is not possible to suppress evidence of FMD infection in swine. Clinical signs of FMD in the herd will rapidly become apparent to anyone inspecting the herd, or receiving animals from the herd. Active observational surveillance should be initiated on all premises in the Control Area at the beginning of the outbreak and conducted daily. Incident command officials may also inspect swine herds and/or request to review the daily log of AOS kept by the Herd Health Monitor.

Restarting processing of market hogs, sows, and boars for slaughter from the Control Area:

- Phase 1 of the FMD outbreak, during which time no new movements of swine will be allowed, is likely to last a few days. During this time the ICP, producers, transporters, and packing plants can prepare to meet the requirements to restart movement.
- Biosecurity performance standards of the Secure Pork Supply plan should be implemented on premises within the Control Area and for trucks and drivers.
- Packing plants receiving pigs from the Control Area should implement biosecurity performance standards to avoid spreading FMD on fomites leaving the plant. The lairage area and truck unloading area should be cleaned and disinfected each night. Voluntary compliance with developing a biosecurity protocol to be implemented in the event of an FMD outbreak should be a pre-requisite for a packing plant to be permitted to begin receiving swine from a control area when movement is re-started.
- Pork products from all swine that pass ante-mortem and post-mortem inspection by USDA FSIS will be considered to be safe for human consumption.
- Swine may be infected with FMD virus before showing any clinical signs or testing positive by RRT-PCR. Therefore, all pork from a processing facility that has received swine from the FMD Control Area will

be considered to potentially contain low levels of FMD virus (unless they exclusively receive swine from either a USDA recognized FMD free compartment and/or an FMD free area). **FMD is not a public health concern, or food safety concern, so product is safe for human consumption.** However, uncooked pork and ruminant products fed to swine may initiate an infection. Regulations regarding proper heat treatment of garbage prior to feeding to swine must be strictly enforced. States which currently allow garbage feeding should be encouraged to prohibit garbage feeding until the U.S. regains FMD free status.

- Pork products that have been processed to OIE standards for destroying FMD virus in meat can be offered for export (OIE TAHC 2012, Section 8.5.34; http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.8.5.htm).

Restarting movement of swine between production facilities:

- The ability to move swine between production facilities (premises) will depend on the phase and type of outbreak, and on whether the premises are located inside or outside of the Control Area. In a Phase 2, Type 1 or Type 2 outbreak, any movement will likely be very closely scrutinized because there is still a chance that stamping out may control the outbreak.
- In a Type 3 or higher level outbreak it will be necessary to permit movement of swine between production stages at different premises to avoid the need to euthanize animals for humane purposes.
- SOPs which meet the biosecurity performance standards of the Secure Pork Supply plan should be implemented on premises within the Control Area and for trucks and drivers. Premises that meet the standards and that have no evidence of FMD infection should be designated as Monitored Premises and be permitted to move swine to different premises for continued production. If the outbreak occurs before the biosecurity performance standards are developed, officials in Incident Command will need to determine the biosecurity criteria for monitored premises.
- Surveillance protocols developed for the SPS plan will need to be implemented before swine can be approved for movement. If the outbreak occurs before surveillance protocols can be developed or implemented, officials in the surveillance and monitoring section of the incident command will need to determine criteria for surveillance.
- Movement of swine to sites outside of the Control Area will likely have more stringent requirements than movement of swine within the Control Area.

Disposition of Vaccinated herds

- Vaccination with an appropriately matched vaccine will begin to reduce susceptibility to FMD infection by approximately 4 to 7 days after vaccination. By 14 days after vaccination, the vaccinated herd should be considered to be relatively resistant to replicating and shedding the virus (not totally resistant).
- Currently available oil adjuvanted vaccines have a 60 day withdrawal time before the animals can be slaughtered. This withdrawal time has been determined by the USDA Center for Veterinary Biologics. It may be possible to reduce this time by conducting tissue residue studies on the adjuvant.

Disposition of FMD infected herds

- During Phase 1 and Phase 2, types 1 or 2 outbreaks all infected herds will be stamped out and disposed of.

- During a phase 2, type 3 or larger outbreak, infected herds may not be stamped out. Policies and procedures will be needed regarding how to handle herds undergoing infection and recovery from infection. When hogs recover and are capable of passing FSIS inspection, they could be sent to slaughter.

Management of FMD After an Outbreak is Designated as a Type 5 or Type 6 Outbreak

If Federal and State authorities determine that an FMD outbreak has progressed to a Type 5 or Type 6 outbreak, the emergency response for control of FMD will transition to a program for long term eradication and control, including vaccinate-to-live.

Communication Regarding Controlled Movement

The proposed approach to continued processing of swine with the sale of fresh pork will require extensive discussion and education, as it is a departure from the previously assumed approach of stamping out with euthanasia and disposal.

- All federal and state regulatory agencies and officials need the opportunity to consider the implications of continued processing of swine vs. extensive stamping-out in a type 3 outbreak or larger.
- Packing plant operators need to consider the terms under which they are willing to continue to process swine at the beginning of an outbreak and to re-start processing of swine as the outbreak progresses.
- The pork consuming public needs to be assured that the pork is wholesome and safe, even if it is acknowledged that there may be low levels of FMD virus in the meat, and/or if the animals have been vaccinated.
- Wholesale and retail pork suppliers and restaurants also need to be assured that the pork is wholesome and safe and to help provide that message to their customers. There is a danger that early in the outbreak, some may make statements that their products are from FMD free areas. However, this could quickly change in a type 5 outbreak so that no areas of the U.S. are considered to be FMD free, then they would need to change their messaging. This would cause confusion and loss of credibility with the public.

Please send comments and suggestions to:

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