Please note: This information may be revised or updated at any time.

INTRODUCTION

Vaccination during an FMD outbreak is an inherently complex activity. There are many tenets that dictate the rational application of FMD vaccine. This document provides guidance on how States and APHIS officials may elect to implement emergency vaccination.

BASIC INFORMATION

In order to understand how emergency vaccination will impact an FMD response effort, it is critical to know the following:

- How the virus behaves in each species that may be vaccinated;
- The epidemiology of the situation (to the best knowledge available);
- Risk of exposure to the virus;
- Age of animals and how the production sector works;
- Amount of vaccine that is available to use (both in the short and, if available, longer-term).

GUIDANCE

In general, APHIS recommends a **protective emergency vaccination strategy** to protect susceptible animals from infection.

This will require the establishment of one or more Vaccination Zones, to ensure that infected animals are not comingled, in close proximity, or in-contact with vaccinated animals. Testing to differentiate infected animals from vaccinated animals (DIVA), once available, may be required for interstate commerce and international trade. Additionally, vaccinated animal identification must be applied, with movement controls.

States should focus on animals in close proximity to the incident, but not those in-contact with, or with any known or suspected epidemiological links to the incident. When considering what premises are good candidates for vaccination, review the “specific information” below, and weigh the following:

- How likely it is that the premises has already been exposed (if high, vaccination may not be appropriate);
- Environmental conditions (wind, humidity), that may increase probability of introduction;
- Husbandry conditions and health of the animals;
- Biosecurity on the premises (guarding against the risk of introduction prior to protection); and
- Ability to physically vaccinate (logistics, personnel, identification) in a safe and effective manner.

SPECIFIC INFORMATION

In order to use the extremely limited quantity of vaccine most effectively, the following priorities are recommended.

Cattle

- Vaccinate cattle preferentially – *they are very easily infected due to low viral threshold of infection. If the number of infected cattle can be minimized through preventative measures and/or lower the viral shed if exposed, then other at-risk species can be spared from vaccination and protected through biosecurity. This approach is especially recommended when supplies of vaccine are limited.*
- Vaccinate calves preferentially – *calves are particularly vulnerable and less likely to survive infection, while adult cattle typically do not experience severe clinical signs. This is especially crucial in situations such as calf ranches housing dairy-heifer replacement and bull dairy calves for beef production.*
- Prioritize dairy operations – *feedlots and cow-calf operations are more likely to recover from FMD infection. Additionally, dairy cattle that do recover rarely achieve pre-infection levels of milk production. Dumping milk from infected dairies is incredibly challenging and not an efficient use of resources. With the narrow profit margins in the dairy industry, this is paramount to financial disaster. Infected dairies also complicate the job of the responders because not only do the cattle have to be managed through depopulation and disposal, but the milk has to be dumped which is especially challenging in states like California that have strict EPA regulations.*

Swine

In the event that there is sufficient vaccine to effectively protect dairy operations, particularly calves, swine can be considered for vaccination. Swine have a higher threshold of infection and might be protected through increase biosecurity. The swine sector should be prioritized as follows (again, assuming limited vaccine doses are available):

- Farrow operations and Genetic Founder Stock:
    - Farrow operations and genetic founder stock should be prioritized, as it ensures that weaned pigs will have adequate maternal immunity when initially moved into transit.
    - These sows and boars in farrow operations should receive one full dose, followed by a booster in 10 to 14 days and then every 6 months thereafter. This protects this multiplier stock and ensures that the weaned pigs will have adequate maternal immunity when they are moved into transit or grow-out.
    - Genetic operations may want to be vaccinated; these producers need to carefully consider long-term export consequences of implementing emergency vaccination. Vaccinated animals may not be eligible for export of their germplasm or offspring if zoning agreements can be achieved during an outbreak, or export resumes after recovery. If vaccination is elected, then these animals should be vaccinated in the same manner as farrowing operations.

- Feeder pigs:
    - Feeder pigs may be considered, but only should receive a single dose which should provide adequate protection for 3 months. Before immunity wanes, the animal will hopefully be slaughtered. This is an especially relevant recommendation if vaccine supplies are limited.

Sheep and Goats

At this time, implementation of emergency vaccination for FMD is not recommended in sheep and goats, however they are considered the silent spreaders of FMD for their sub-clinical infections. If additional doses of vaccine become available, or the epidemiology of the outbreak changes significantly, this recommendation will be reconsidered:

- The sheep industry is largely concentrated in the west, and while these animals respond to FMD vaccination well, their economic contribution to the economy may not warrant the use of precious vaccine. So if exposed, a managed outbreak followed by harvest (sheep demonstrate minimal clinical signs and clear the infection quickly) may be the best option. However if vaccination is elected, a single dose of 1ml is sufficient to protect for 6 months
- Goats are more problematic. They widely distributed and are found virtually in every state and while there is some large scale goat farming for milk, cheese, and meat, they are largely a cottage industry and found with hobbyists. They have the same response to infection by FMD and the same vaccine dosing regimen as sheep, but whether it is really cost effective to vaccinate goats would depend on the epidemiology of the situation and may be better to allow to recover and harvest as with sheep.

Zoological Species

Zoological species, at this time, are not recommended for vaccination. In particularly extraordinary circumstances, this may be reconsidered. However, these animals should be protected by biosecurity and other appropriate precautions.

SUMMARY

Tools that may inform vaccine application or even wholesale distribution to States would include this guidance and measures such as national modeling of the outbreak, Such an approach could expose pathways that could result in expansion of the outbreak and suggest where vaccines could be preferentially applied to block further spread. Modeling on a region or State can help inform local responders but may be insufficient for national responders seeking to prevent outbreak expansion. Therefore, it is important to have as much information as possible prior to modeling including age, production sector, movement networks (including feed commodities), dangerous contacts, and other factors influencing spread.

ADDITIONAL INFORMATION

In the event that there is new epidemiological information or other new data, this guidance will be reviewed and revised accordingly. States should carefully consider this information in formulating their vaccine requests that are submitted to APHIS.