USDA
United States Department of Agriculture

CLASSICAL SWINE FEVER RESPONSE PLAN

THE RED BOOK

DRAFT March 2016

This *Classical Swine Fever (CSF) Response Plan: The Red Book* (2013) incorporates comments received on the *CSF Response Plan: The Red Book (2012)* as well as updates to other current Foreign Animal Disease Preparedness and Response Plan (FAD PReP) materials.

This plan does not replace existing regional, State, Tribal, local, or industry preparedness and response plans relating to CSF.

In particular, States should develop response plans focused on the specific characteristics of the State and its swine industry.

Outline

- Introduction and Information
- Framework for Preparedness and Response
- Preparedness and Response
- Response Goals and Strategy
- Specific Response Critical Activities and Tools
- Recovery after an Outbreak




CSF RESPONSE PLAN

Introduction and Information

Objectives of this Plan

- Identify the capabilities needed to respond to an CSF outbreak, and
- Identify critical activities that are involved in responding to that outbreak and the time-frames for these activities.

In an outbreak situation, these critical activities are under the authority of an Incident Command (IC) per the National Incident Management System (NIMS).

History

- CSF was first recognized in the United States in 1833.
- During the last two decades, more than 60 countries have experienced CSF outbreaks.
- In the last 2 years, the World Organization for Animal Health (OIE) reports that CSF has been present in
  - Bhutan, Bolivia, Cambodia, China, Cuba, Ecuador, Guatemala, Haiti, Hungary, India, Indonesia, Latvia, Lithuania, Madagascar, Mongolia, Nepal, Peru, Philippines, Russia, Serbia, Thailand, and Vietnam.
- Although the United States has been CSF-free since 1978, there is a risk of CSF introduction into the United States through international travel and trade.

Etiology

- The classical swine fever virus (CSFV) is a *Pestivirus* in the family *Flaviviridae*.
- CSF is a highly contagious viral disease of swine, including wild (feral) swine.
- CSF is also known as hog cholera, peste du porc, cólera porcina, and virusschweinepest.

CSF Virus Subtypes

- There is only one serotype of CSFV, but this serotype has been separated into three genotypes and ten subtypes.
- This RNA virus is closely related to the ruminant pestiviruses that cause bovine viral diarrhea and border disease in sheep.

Current CSF Virus Circulation

Source: Paton, D.J. and Greiser-Wilke, I. (2008). Classical Swine Fever–An Update. *Research in Veterinary Science*, 75: 169–178.

Susceptible Species

- Only wild and domestic swine are susceptible to CSF.
- European wild boards, peccaries (also known as javelinas), and feral swine are susceptible, but it is unclear what epidemiological role these animals play in CSF transmission.

CSF Forms

- CSF may present in a variety of forms, typically described as acute, chronic, and late onset forms of the disease.
  - Acute form: typically observed in swine less than 12 weeks, and results in death in 1–2 weeks.
  - Chronic Form: usually follows the acute form, followed by an appearance of brief recovery, with death in 1–3 months.
  - Late onset form: observed in piglets born to infected sows; piglets typically die within 11 months.
- Over time, CSF often evolves into lower virulent forms and circulates within the pig population alongside other common porcine infectious diseases.

Carriers

- Swine can become chronically infected and shed virus for several months while not showing clinical signs of the disease.
- If sows are infected with a mild CSFV strain, they may shed the virus when giving birth.
  - These “carrier-sows” are likely to have offspring which are carriers of CSFV, but may not show symptoms for 4–6 months.
  - These piglets shed significant amounts of CSFV from birth until death and can be a source of infection to the rest of the herd.

Feral Swine

- CSFV is found regularly among feral swine populations in Europe.
- Domestic pigs can become infected if they come into contact with infected feral swine.
- Feral swine themselves most likely become infected though contaminated garbage or through contact with a sick domestic pig (continuing the cycle of infection between domestic and wild pigs).
- When feral swine populations are small, infectious tend to be self-limiting. When densities are higher, large outbreaks can occur and persist.

Reservoirs

- The only natural reservoir of CSFV is infected domestic and wild swine.
- The extent of wild boar's role in disease transmission is not fully understood, and they may perpetuate infection.

Introduction and Transmission

- Animal to animal contact
- Air/Windborne
- Fomites
- Feed
- Personnel
- Wildlife

Incubation Period

- Incubation period for CSF is typically 2–14 days, as defined in the OIE *Terrestrial Animal Health Code* (2015).
- Experimental data also suggests that the incubation period will depend on the dose of the virus and the route of infection.

Infectious Period

- Swine, whether acutely or chronically infected, may shed the virus before the appearance of clinical signs.
- Piglets congenitally infected may shed CSFV for 6–12 months before dying. Clinical signs may not appear obvious during stages of chronic infection.
- Experimental data has also suggested that in late stages of the disease, secretions and excretions may continue to be infectious, potentially resulting in indirect transmission of CSF via mechanical vectors.
- In wild herds, disease signs may not be present for 2–4 weeks or more. The amount of virus excreted by infected swine is also significantly affected by the virulence of the strain.
  - More virulent strains will result in higher levels of virus in secretions and excretions.

Morbidity and Mortality

- The severity of CSF will vary depending on the strain of the virus.
- Acute infection will result in high morbidity and mortality rates, while chronic infection or other strains may cause only subclinical disease.
- A case fatality rate with acute infections may approach 100 percent; young swine are particularly susceptible.
- Chronic infections are always fatal, but morbidity is significantly lower.
- Death typically occurs 5–25 days after onset of illness.

Zoonotic Potential

- There is no zoonotic potential of CSF—humans are not susceptible to CSFV.

Economic Impact

- The 1997–1998 outbreak in the Netherlands resulted in the loss of more than 11 million swine and cost over $2 billion dollars to eradicate.
- A U.S. outbreak would have a significant economic impact on the pork export market, with many exports of pork and pork products being halted for a significant period of time.
- Any CSF outbreak in the United States would have a sizeable and lingering economic impact.

Persistence in the Environment

- CSFV is moderately fragile in the environment and does not spread far via airborne route.
- Experimental evidence suggests CSFV can survive for 70 days at 17°C and for 84 days at 4°C (other experiments have showed significantly less survivability).
  - In feces: 42 or longer, depending on the strain.
  - In urine: up to 18 days.
- CSFV is likely to be infectious in pen housing for no more than a few days.

Persistence in Animal Products

- CSFV persists in moist, protein-rich environments like pork tissues and body fluids and has been known to survive for months in chilled and cured pork meats.

Diagnosis

- Producers as well as veterinarians should be familiar with signs of the disease, as they may be the initial detectors of a CSF outbreak.
- The incubation period is typically 2–14 days, as defined in the OIE *Terrestrial Animal Health Code (2015)*, though experimental data provides evidence that the incubation period will depend on the dose of the virus and the route of infection.
- Clinical presentation and pathological findings vary depending on the form of the CSF infection.

Acute Form Clinical Signs

- Pyrexia
- Anorexia
- Severe leucopenia
- Multifocal hyperemia and/or hemorrhagic lesions of the skin
- Conjunctivitis
- Cyanosis of extremities
- Ataxia, paresis, and convulsions
- Huddling.

Death typically occurs 5–25 days after onset of illness. Mortality in young swine can reach 100 percent.

Pig, kidney. The cortex contains disseminated petechiae. Calyces are moderately dilated (hydronephrosis) and also contain hemorrhages.

Acute Pathological Findings

- Some common pathological findings observed in acute forms of CSF disease in necropsy include the following:
  - severe tonsillitis,
  - hemorrhagic lymph nodes,
  - petechia, and
  - multifocal infarction of the margin of the spleen.

Pig, tonsil. The epiglottis and the bisected palatine tonsil contain multiple tan foci of necrosis

Chronic Form Clinical Signs

- Pyrexia
- Weight loss
- Periods of constipation or diarrhea
- Stunted growth.

Animals typically appear to recover and then relapse, typically dying within 1–3 months. The death rate varies but can be low.

Chronic Pathological Findings

- Button ulcers
- Depletion of lymphoid tissue
- Possible bone lesions in growing swine

Porcine, colon. The mucosa is reddened and contains multiple discrete ("button") ulcers surrounded by zones of hemorrhage

Congenital Clinical Signs

- Reduced reproductive performance
- Abortions
- Congenital tremors
- Stillbirths
- Resorption
- Mummification
- Weak piglets

Differential Diagnosis

- African swine fever, salmonellosis, erysipelas, acute pasteurellosis, streptococcosis, leptospirosis, and coumarin poisoning all are clinically indistinguishable from CSF, depending on the stage of the disease.
- Other viruses that may be considered in a differential diagnosis include pseudorabies, parvovirus, porcine dermatitis and nephropathy syndrome, porcine circovirus-associated disease, post-weaning multisystemic wasting syndrome, and thrombocytopenic purpura.

Immunity

Natural Infection

- Uninfected swine are completely susceptible to CSF.
- CSFV significantly compromises the immune system and as a consequence, immune response is delayed and virus neutralizing antibodies usually do not develop until after the third week of illness.
- Swine that have recovered from CSF may become carriers of the virus for a sustained period of time.
- Sows that are seropositive do transmit antibodies to their offspring.
- While this passive immunity does protect piglets against mortality, offspring sometimes become carriers and shed CSFV.

Immunity

Vaccination

- Live-attenuated vaccines are the most widely-used vaccines for the control of CSF in countries where the disease is endemic.
- Bait versions have also been developed for wild swine.
- Problematically, these vaccines result in immunized swine that produce the same antibodies as CSF field-infected animals, making it not possible to differentiate infected and vaccinated animals (also known as DIVA).
- Subsequently, marker vaccines have been developed; these vaccines permit the diagnostic DIVA.
- Marker vaccines are not as effective at preventing CSF transmission, and more than one injection is necessary for sufficient immunity.

CSF RESPONSE PLAN

Framework for Preparedness and Response

Foundation of Preparedness and Response

- Successful emergency preparedness for and response to CSF is based on the principles found in the National Response Framework (NRF) and National Incident Management System (NIMS).
- APHIS Veterinary Services (VS) established FAD PReP to provide guidance for preparing and responding to a foreign animal disease (FAD) emergency.

National Response Framework

- The NRF is a guide to how the Nation conducts all-hazards response, through a whole community approach.
- It describes core capabilities for response, defines specific authorities, and establishes a comprehensive approach for responding to domestic incidents that range from serious but purely local events to large-scale terrorist attacks or catastrophic natural disasters.
- The NRF is available at www.fema.gov/national-response-framework.

National Incident Management System

- NIMS is a companion document to the NRF.
- It provides a systematic, nationwide, proactive approach guiding departments and agencies at all levels of government, the private sector, and non-governmental organizations.
- Its goal is to help these organizations work seamlessly to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents, "…regardless of cause, size, location, or complexity—in order to reduce the loss of life, liberty, property, and harm to the environment."
- NIMS information is available at www.fema.gov/national-incident-management-system.

NIMS Key Components

- Preparedness
- Communications and information management
- Resource management
- Command and management
- Ongoing management and maintenance

FAD PReP

- The precursor to FAD PReP was the National Animal Health Emergency Management System (NAHEMS), which offered a functional veterinary framework for responding to FADs like CSF.
- Now incorporated into FAD PReP, the NAHEMS Guidelines join strategic concept of operations documents, disease response plans (such as this CSF-specific plan), SOPs, and other materials to create a comprehensive approach to FADs that is consistent with NRF and NIMS.

FAD PReP offers…

- competent veterinary guidance on cleaning and disinfection, disposal, mass depopulation, and other activities;
- information on disease control and eradication strategies and principles;
- guidance on health, safety, and personal protective equipment issues;
- biosecurity information and site-specific management strategies; and
- training and educational resources.

USDA Roles and Responsibilities

As the primary Federal agency for incident management during an FAD event of livestock or poultry, USDA APHIS

- deploys Incident Management Teams (IMTs),
- coordinates the incident response,
- manages public messages, and
- takes measures to control and eradicate CSF.

Measures to Control and Eradicate CSF

- Surveillance and diagnostics
- Quarantine and movement control
- Biosecurity measures
- Epidemiological investigations
- Appraisal and compensation
- Depopulation (euthanasia) of affected livestock
- Carcass disposal
- Cleaning and disinfection
- Emergency vaccination (may be used in some cases)

Requesting Support

- During the course of a CSF outbreak response, USDA may request support as necessary from other Federal agencies.
- If the President declares an emergency or major disaster, or if the Secretary of Agriculture requests the Department of Homeland Security (DHS) lead coordination, the Secretary of Homeland Security and DHS assume the lead for coordinating Federal resources.
- USDA maintains the lead of overall incident management.

CSF RESPONSE PLAN

Preparedness and Response

Domestic Activities

USDA has a variety of ongoing preparedness and response activities with respect to CSF. Domestically, the USDA prevents the introduction of CSF into the country, conducts proactive surveillance for CSF, and also performs FAD investigations as needed for suspected cases. The following list details a selection of USDA activities:

- National Import Export Services (NIES)
- Smuggling Interdiction and Trade Compliance (SITC)
- CSF surveillance
- Other preparedness and disease models
- Emergency veterinary assistance.

USDA APHIS Organizational Strategy

- APHIS employs NIMS and the Incident Command System (ICS) organizational structures to manage response to a CSF outbreak.
- ICS is designed to enable efficient and effective domestic incident management by integrating facilities, equipment, personnel, procedures, and communications operating within a common organizational structure

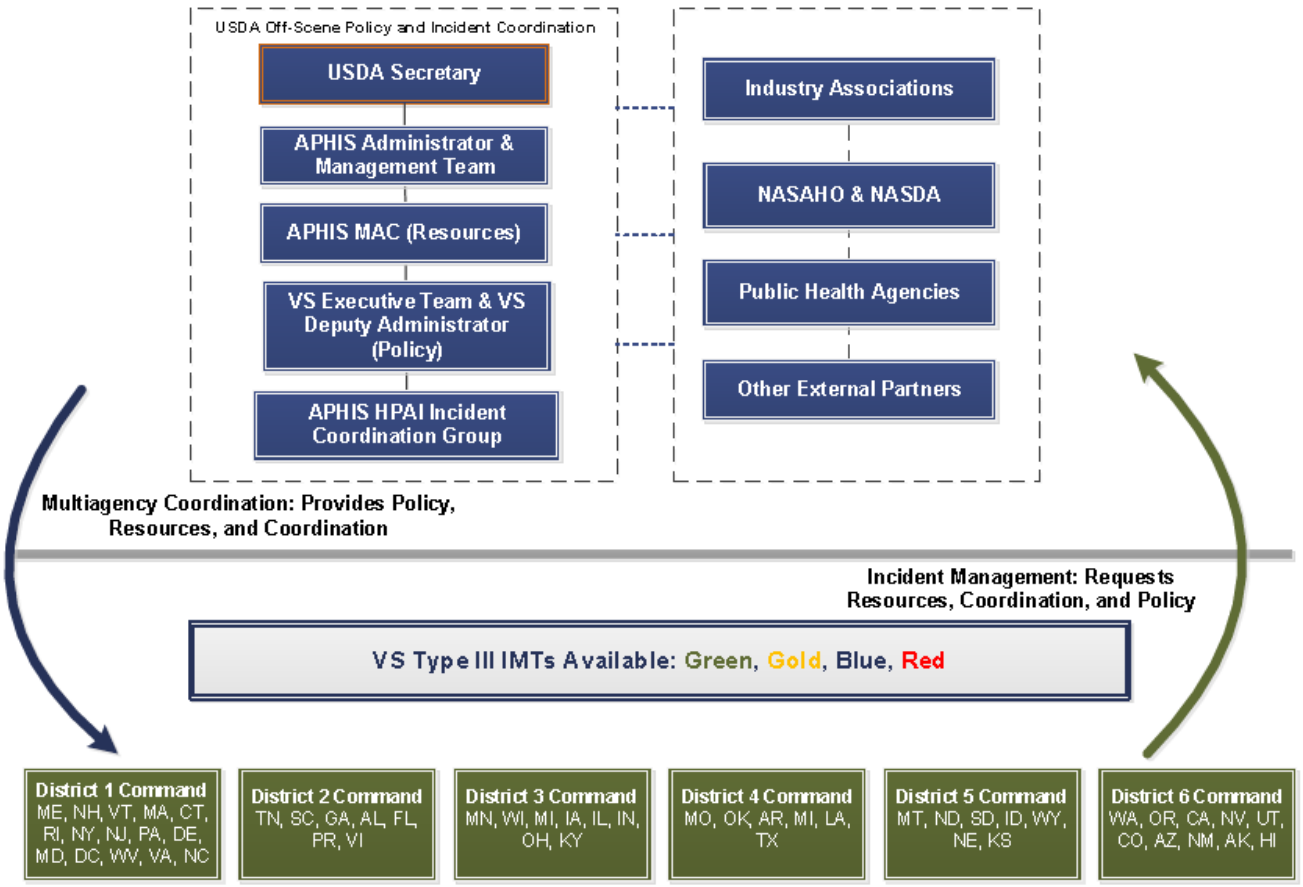
APHIS Incident Management Structure

- The APHIS Administrator is the Federal executive responsible for implementing APHIS policy during an CSF outbreak.
  - The Administrator is supported by the APHIS Management Team (AMT).
- Depending on the size of the outbreak, the APHIS Administrator and AMT may establish an APHIS-level Multiagency Coordination (MAC) Group to coordinate resources.
  - Many MAC functions may be delegated to the VS Deputy Administrator, who is the Chief Veterinary Officer of the United States.
- The VS Deputy Administrator is supported by the VS Executive Team (VSET) to coordinate policy.

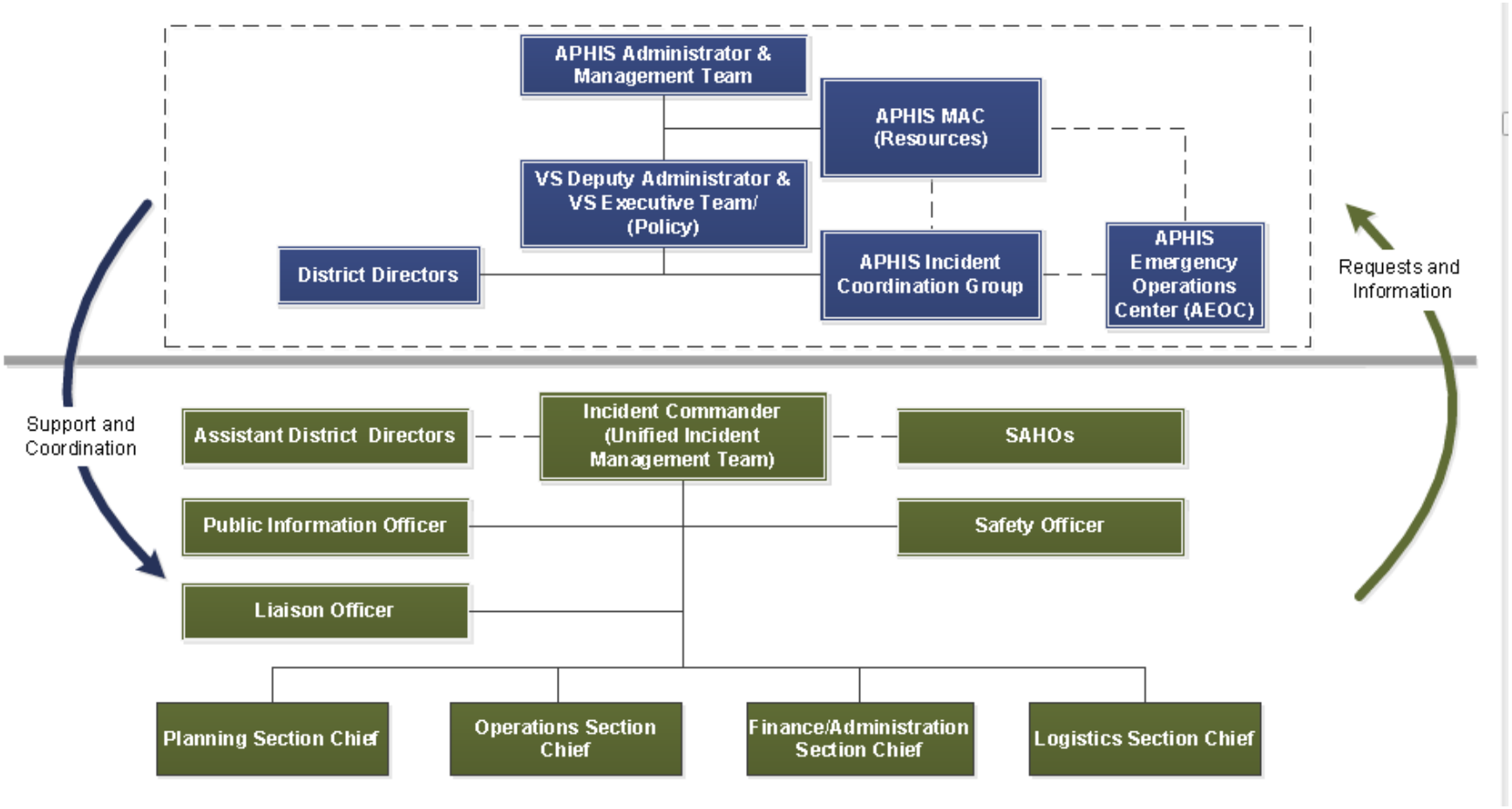
APHIS Incident Management Structure, continued

- An APHIS Incident Coordination Group (ICG), with an Incident Coordinator, is immediately established to oversee the functions and response activities associated with the incident.
  - This ICG is flexible and scalable to the size and scope of the incident, and works closely with IC personnel in the field, in one or more Incident Management Teams (IMTs).
- The ICG also coordinates with any MAC Group that is established at the APHIS or USDA level, based on the specific incident.

Overview of USDA APHIS Multiagency Coordination, Incident Coordination Group, Field Personnel (Incident Management Teams and Districts), and Stakeholder Relationships for an CSF Incident



Details of USDA APHIS Multiagency Coordination, Incident Coordination Group, and an Incident Management Teams for an CSF Incident



Multiagency Coordination

- MAC functions are executed at various levels, and typically include:
  - the coordination of policy,
  - incident priorities,
  - resource allocation and acquisition, and
  - resolution of issues common to all parties.
- The size and scope of the CSF incident dictates what levels and types of MAC Groups and MAC functions are required.

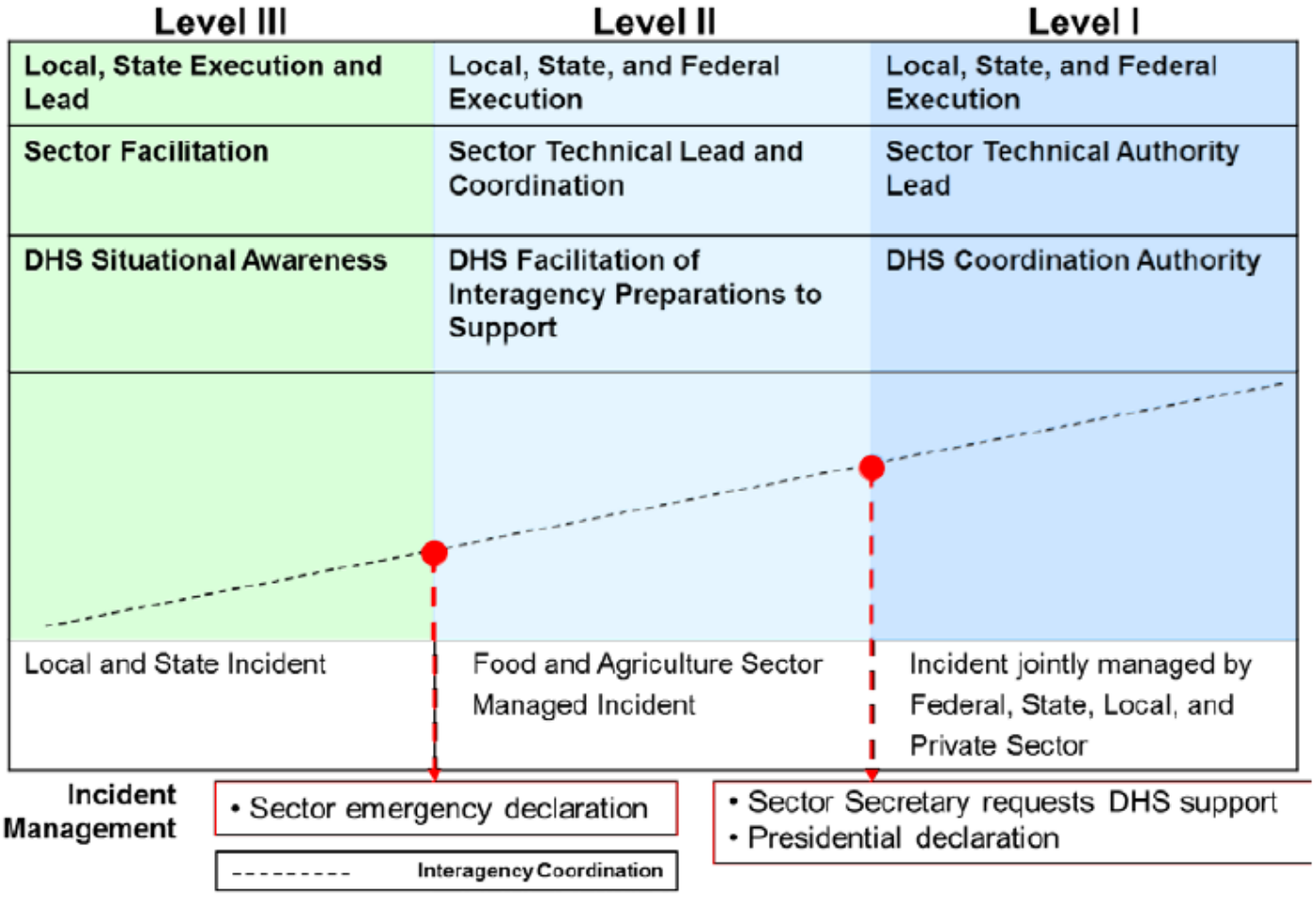
APHIS Incident Coordination Group

- APHIS ICG responsibilities in an CSF outbreak include:
  - providing policy guidance for response activities,
  - providing information and coordination with health and safety personnel,
  - to ensure responder and public health and safety,
  - supporting IMTs and their requirements,
  - assisting in coordinating resources and integrating other organizations into the ICS, and
  - providing information to the Joint Information Center (JIC) for use in media and stakeholder briefings.

APHIS Incident Management Levels

- APHIS uses a three-level system of emergency response/incident management types.
- The levels range from Level III, which has the lowest significance, to Level I, which is an event of national significance.
- The levels are used both within APHIS and externally to communicate the resource requirements for an event or incident.

Incident Management Levels



National Animal Health Emergency Response Corps

- NAHERC assists and augments Federal and State response to domestic and international animal disease outbreaks, threats, or natural disasters.
- NAHERC is composed of veterinary medical officers and animal health technicians who volunteer to become temporary Federal employees in the event of a national animal health emergency.
- After appropriate training, NAHERC members can be deployed to the field for response activities.

Diagnostic Resources and Laboratory Support

National Veterinary Services Laboratories

- The National Veterinary Services Laboratories (NVSL) is the official reference laboratory for FAD diagnostic testing and study in the United States.
  - The NVSL provides *all* confirmatory testing for CSF on all specimens, including those found presumptively positive at a National Animal Health Laboratory Network (NAHLN) laboratory or other USDA-approved laboratory.
  - The NVSL has two locations for FAD diagnostic testing:
    - Ames, IA (NVSL-Ames).
    - Foreign Animal Disease Diagnostic Laboratory (FADDL), Plum Island, NY (NVSL-FADDL).

Diagnostic Resources and Laboratory Support

National Animal Health Laboratory Network

- NAHLN consists of more than 60 laboratories and coordinates the veterinary diagnostic laboratory capacity of State animal health laboratories and their extensive infrastructure, including facilities, equipment, and professional expertise.
- Of these laboratories, approximately 40 are currently approved to perform CSF testing diagnostics.
  - The NAHLN provides a means for early detection of CSF, rapid response through surge capacity to test outbreak samples, and recovery by the capability to test large numbers of samples to show freedom from CSF.

CSF RESPONSE PLAN

Response Goals and Strategy

Response Goals

- The goals of an CSF response are to:
  - detect, control, and contain CSF in domestic swine as quickly as possible;
  - eradicate CSF using strategies that seek to protect public health and the environment, and stabilize animal agriculture, the food supply, and the economy; and
  - provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products.

Critical Activities

- Public communication and messaging campaign
- Swift imposition of effective quarantine and movement controls
- Stringent and effective biosecurity measures
- Rapid diagnosis and reporting
- Epidemiological investigation and tracing
- Increased surveillance
- Continuity of business measures for non-infected premises and non-contaminated animal products
  - Secure Pork Supply Plan
- Rapid mass depopulation and euthanasia, potentially including preemptive depopulation
- Effective and appropriate disposal procedures
- Cleaning and disinfection measures
- Emergency vaccination (as the response strategy indicates)

Epidemiological Principles

- Three basic epidemiological principles form the foundation to contain, control, and eradicate CSF in the U.S. domestic swine population:
  - Prevent contact between the CSFV virus and susceptible swine.
  - Stop the production of CSFV by infected or exposed swine.
  - Increase the disease resistance of susceptible swine to CSFV or reduce the shedding of CSDFV in infected or exposed swine.

Critical Activities in the First 72 Hours of U.S. CSF Response

Response Strategy for Control and Eradiation of CSF in Domestic Swine

- There are four strategies for the control and eradication of CSF in domestic swine following an outbreak.
  - Stamping-out.
  - Stamping-out modified with emergency vaccination to kill.
  - Stamping-out modified with emergency vaccination to slaughter.
  - Stamping-out modified with emergency vaccination to live.

Stamping-Out
Definition

"Stamping-out" is defined in the OIE *Terrestrial Animal Health Code* as the,

> "killing of animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact with the causal pathogen; this includes all susceptible animals, vaccinated or unvaccinated, on infected establishments."

Stamping-Out

Critical Goals

- The goal is that, within 24 hours of (or as soon as possible after) a presumptive positive classification, infected livestock are depopulated in the quickest, safest, and most humane way possible.
- Where resources are limited, premises are prioritized so that those with the highest potential for active CSF spread are 'stamped-out' first.
- Public concerns about stamping-out require a well-planned and proactive public relations and liaison campaign (stakeholders, the public, and the international community must be involved).

Example of Zones and Areas in Relation to Stamping-Out (Infected Premises would be Depopulated)

Note: Figure is not to scale.

Stamping-Out Modified with Emergency Vaccination to Kill

Definition

Depopulation of clinically affected and in-contact susceptible animals and vaccination of at-risk animals, with subsequent depopulation and disposal of vaccinated animals. Depopulation and disposal of vaccinated animals may be delayed until logistically feasible, as determined by IC and the VS Deputy Administrator (U.S. Chief Veterinary Officer [CVO]).

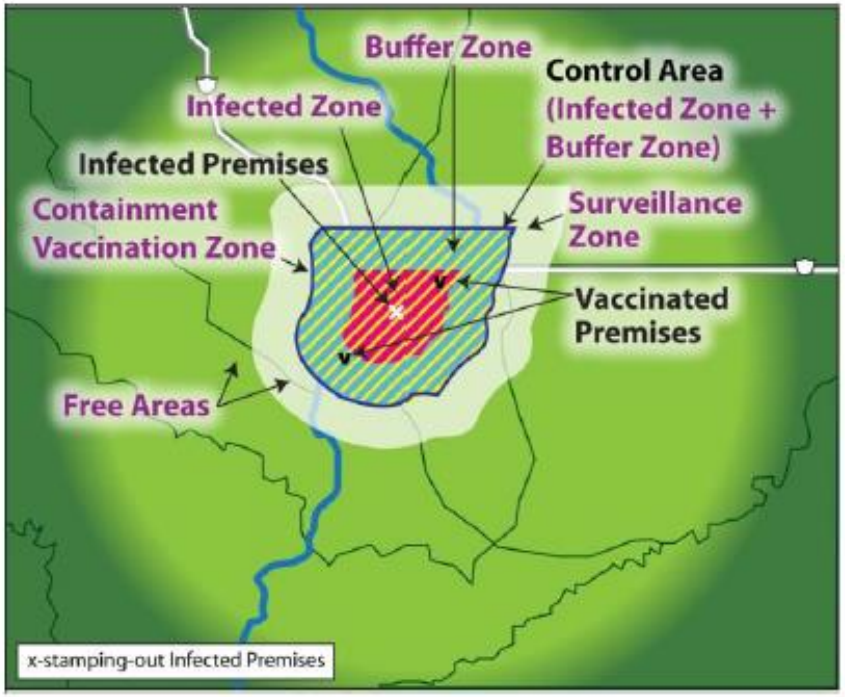
Examples of Zones and Areas in Relation to Stamping-Out Modified with Emergency Vaccination to Kill (Infected Premises would be Depopulated)

Emergency Vaccination in Infected Zone

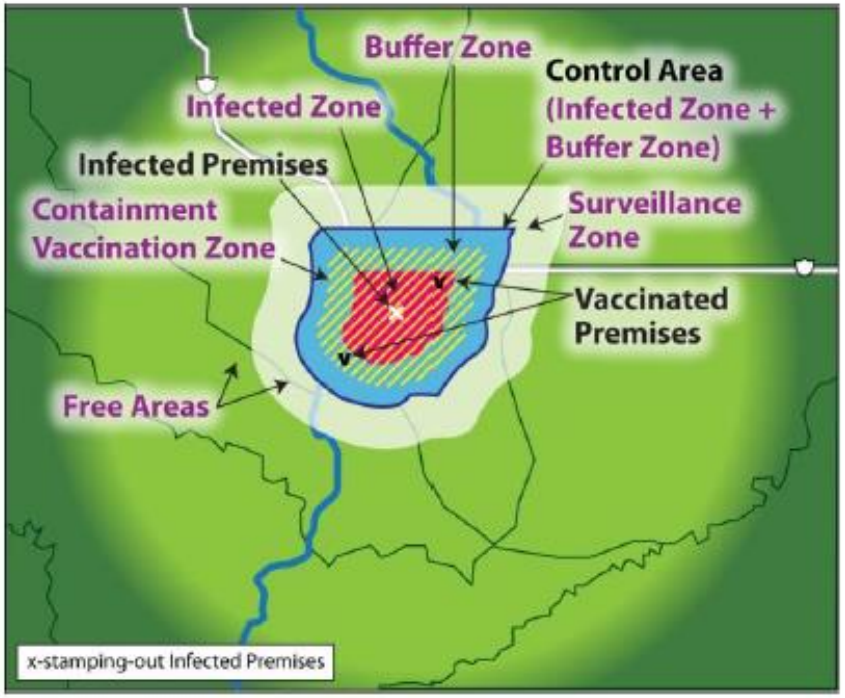
Emergency Vaccination in Buffer Zone

Examples of Zones and Areas in Relation to Stamping-Out Modified with Emergency Vaccination to Kill (Infected Premises would be Depopulated)

Emergency Vaccination in Control Area



Emergency Vaccination in Infected Zone and Partial Buffer Zone



Note: Figures are not to scale.

Stamping-Out Modified with Emergency Vaccination to Slaughter

Definition

Depopulation of clinically affected and in-contact susceptible animals and vaccination of at-risk animals, without subsequent depopulation of vaccinated animals. Vaccinated animals intended for breeding, slaughter, milking, or other purposes live out their useful lives.

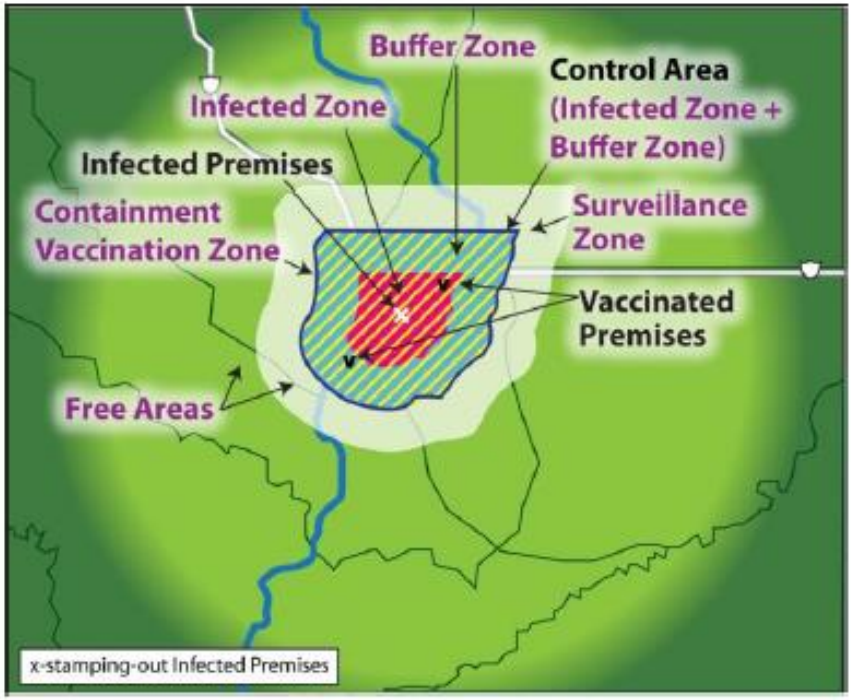
Examples of Zones and Areas in Relation to Stamping-Out Modified with Emergency Vaccination to Slaughter (Infected Premises would be Depopulated)

Emergency Vaccination in Infected Zone

Emergency Vaccination in Buffer Zone

Examples of Zones and Areas in Relation to Stamping-Out Modified with Emergency Vaccination to Slaughter (Infected Premises would be Depopulated)

Emergency Vaccination in Control Area



Emergency Vaccination in Infected Zone and Partial Buffer Zone

Note: Figures are not to scale.

Stamping-Out Modified with Emergency Vaccination to Live

Definition

Depopulation of clinically affected and in-contact susceptible animals and vaccination of at-risk animals, with subsequent slaughter and processing of vaccinated animals, if animals are eligible for slaughter under USDA Food Safety and Inspection Service (FSIS) authority and rules and/or State and Tribal authority and rules.

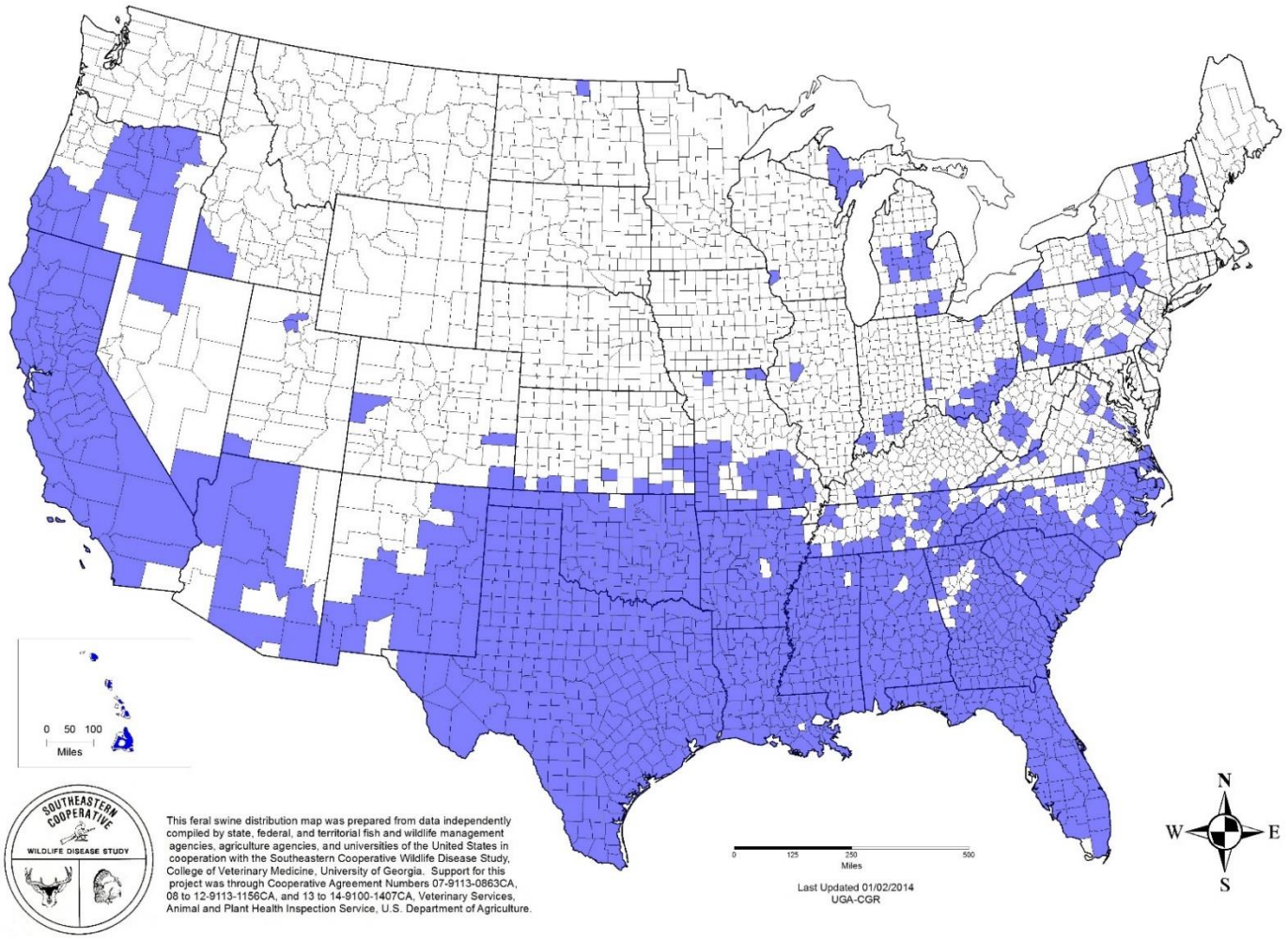
Example of Zones and Areas in Relation to Stamping-Out Modified with Emergency Vaccination to Live (Infected Premises would be Depopulated)

Note: Figure is not to scale.

Control and Eradication Strategy for Other Animals

- Feral swine are an important risk factor in the dissemination or persistence of CSF.
- Biosecurity measures, particularly around known or suspected infected premises, must include strict measures to prevent contact with feral swine populations.
- The preferred strategy for CSF in feral swine is stamping-out, though vaccination is a possibility.

2014 Feral Swine Populations



Summary of CSF Vaccination

- There are many challenges to using emergency vaccination in a CSF response, but also many benefits.
- A CSF response may use one strategy or a variety of strategies in order to detect, control, contain, and ultimately eradicate CSF in domestic swine. The use of emergency vaccination will be determined by the Unified IC, the SAHOs, and the U.S. CVO.

Management of Incident

- The outbreak response effort should be implemented through ICS with an appropriate span of control and delegation of authority.
- As soon as possible, an Incident Coordinator and Incident Commander should be identified, an IMT may be deployed, and a unified State-Federal ICP established.
- In-State resources (whether Federal, State, Tribal, local, or privately owned) should be used to manage the response.
- If the response requires, out-of-State resources may be used to support the State impacted by the outbreak.

Factors Influencing the Selection of Response Strategy/Strategies

- Consequences of the outbreak
- Acceptance
- Scale of the outbreak
- Rate of outbreak spread
- Veterinary countermeasures available
- Resources available to implement response strategies

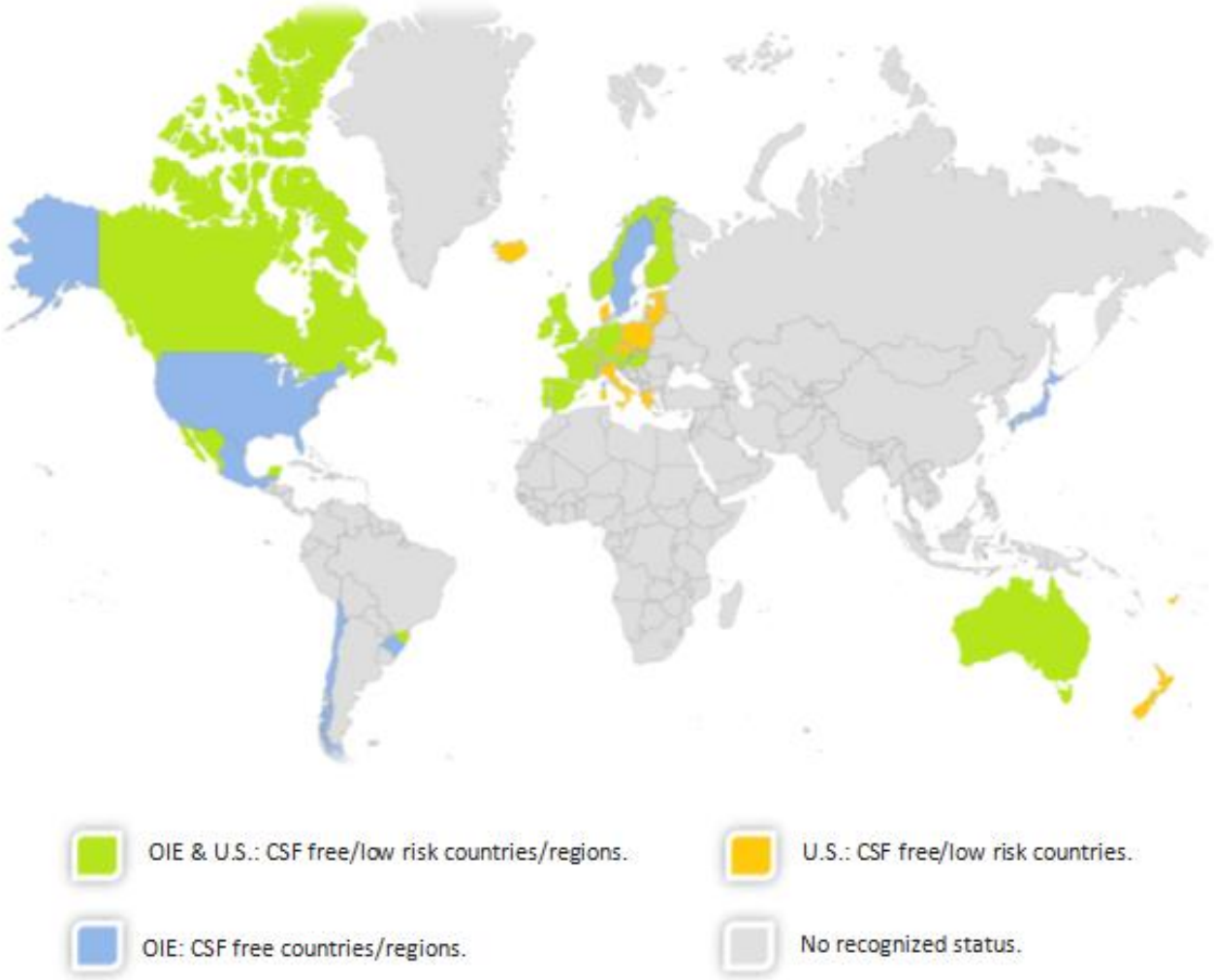
Desired CSF-Status Post-Outbreak

- As a member of the OIE, the United States has agreed to abide by standards drafted and approved by member countries.
- The OIE does not grant official recognition for CSF-freedom, but OIE members can self-declare a compartment, zone, or country free from certain OIE-listed diseases such as CSF.

CSF-Free Designation

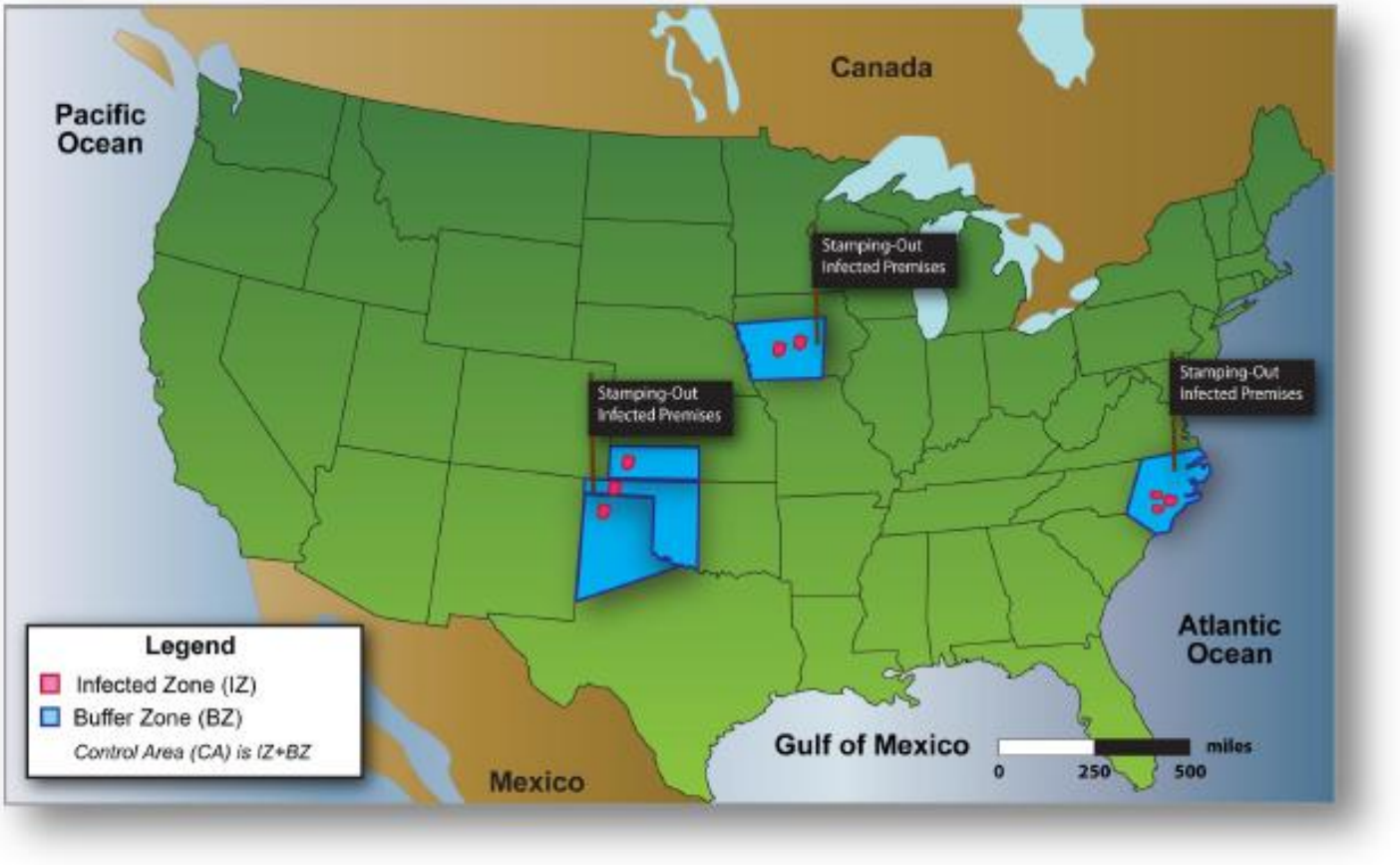
- The OIE defines a CSF-free country, zone or compartment as follows:
  - A country, zone or compartment may be considered free from CSF when surveillance in accordance with Articles 15.2.23 to 15.2.28 has been in place for at least 12 months, and when:
    - there has been no outbreak of CSF in domestic pigs during the past 12 months;
    - no evidence of CSFV infection has been found in domestic pigs during the past 12 months;
    - no vaccination against CSF has been carried out in domestic pigs during the past 12 months unless there are means, validated to OIE standards (Chapter 2.8.3 of the *Terrestrial Manual*), of distinguishing between vaccinated and infected pigs;
    - imported domestic pigs comply with the requirements in Article 15.2.5 or Article 15.2.6.

CSF Status Map



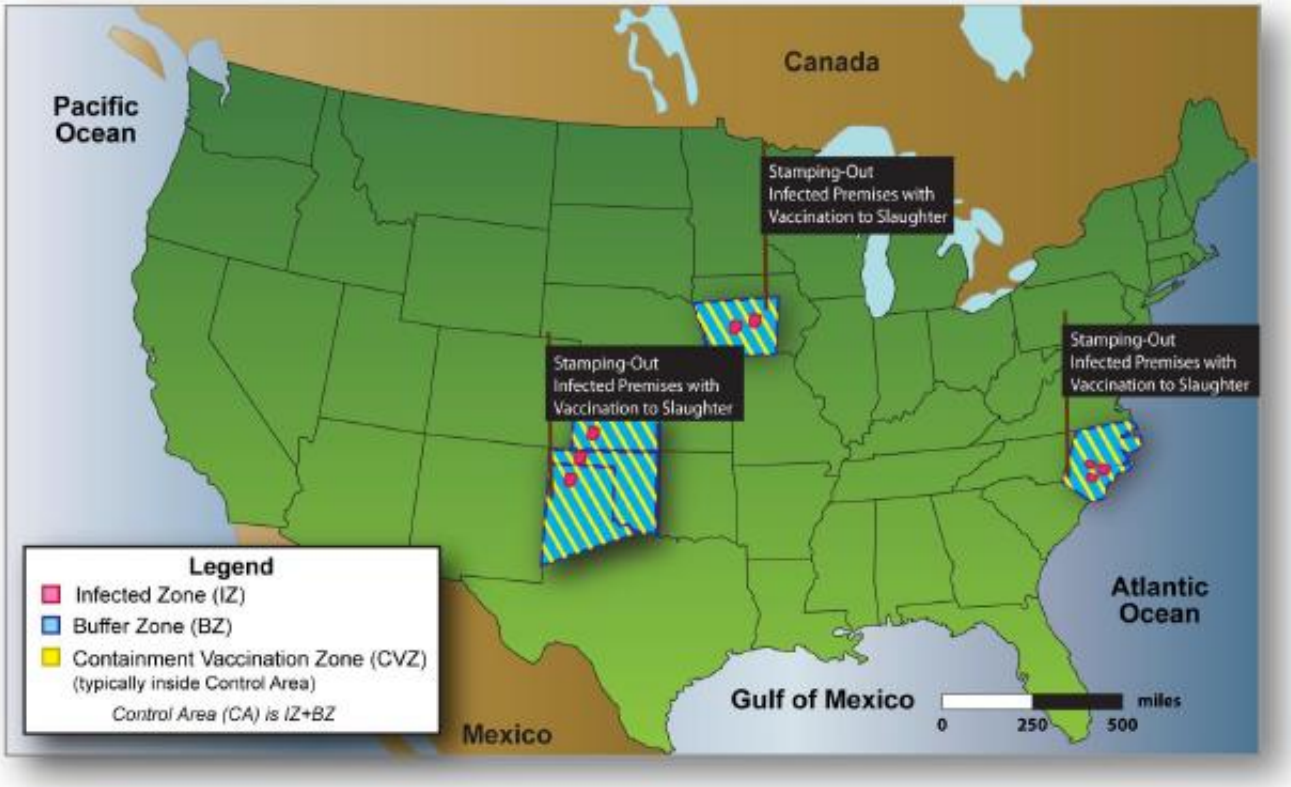
Example of Stamping-Out

FMD Outbreak Type 3:
Large Regional FMD Outbreak



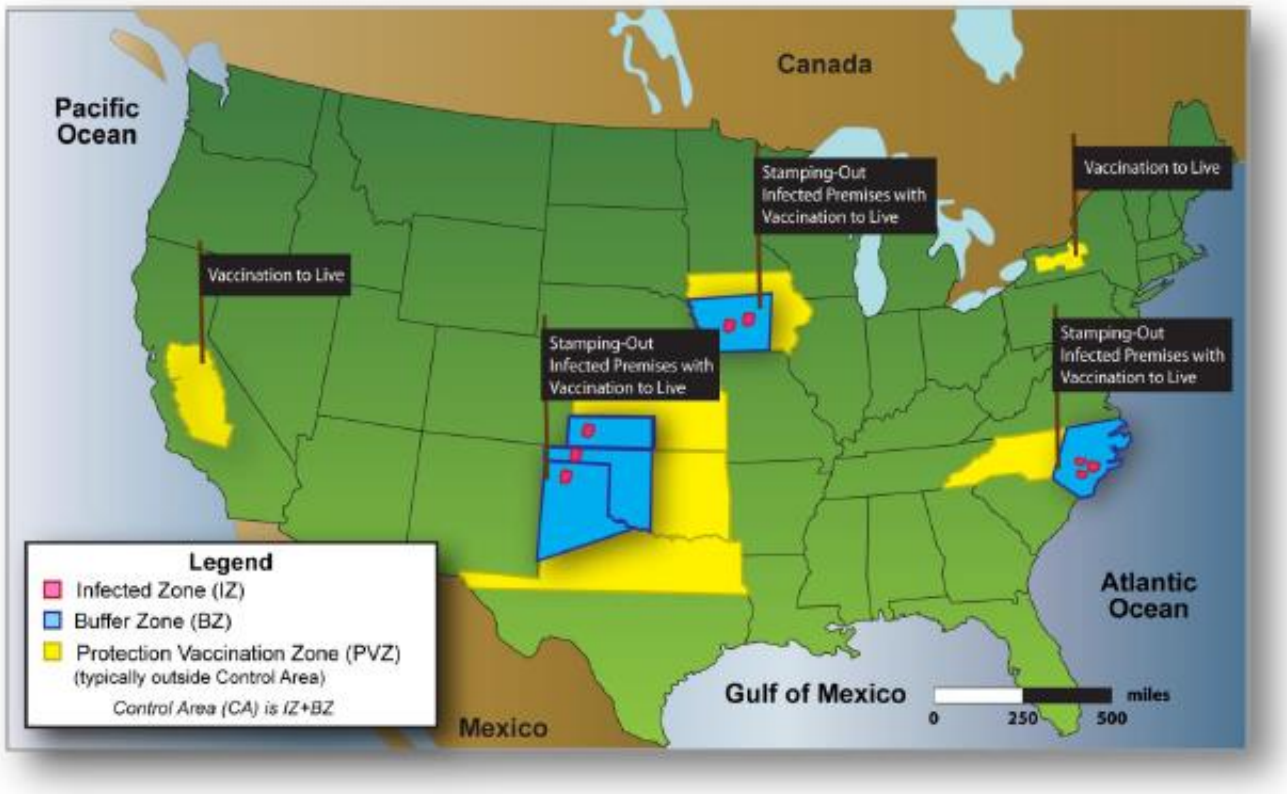
Examples of Stamping-Out Modified with Emergency Vaccination to Kill or Emergency Vaccination to Slaughter

FMD Outbreak Type 3:
Large Regional FMD Outbreak

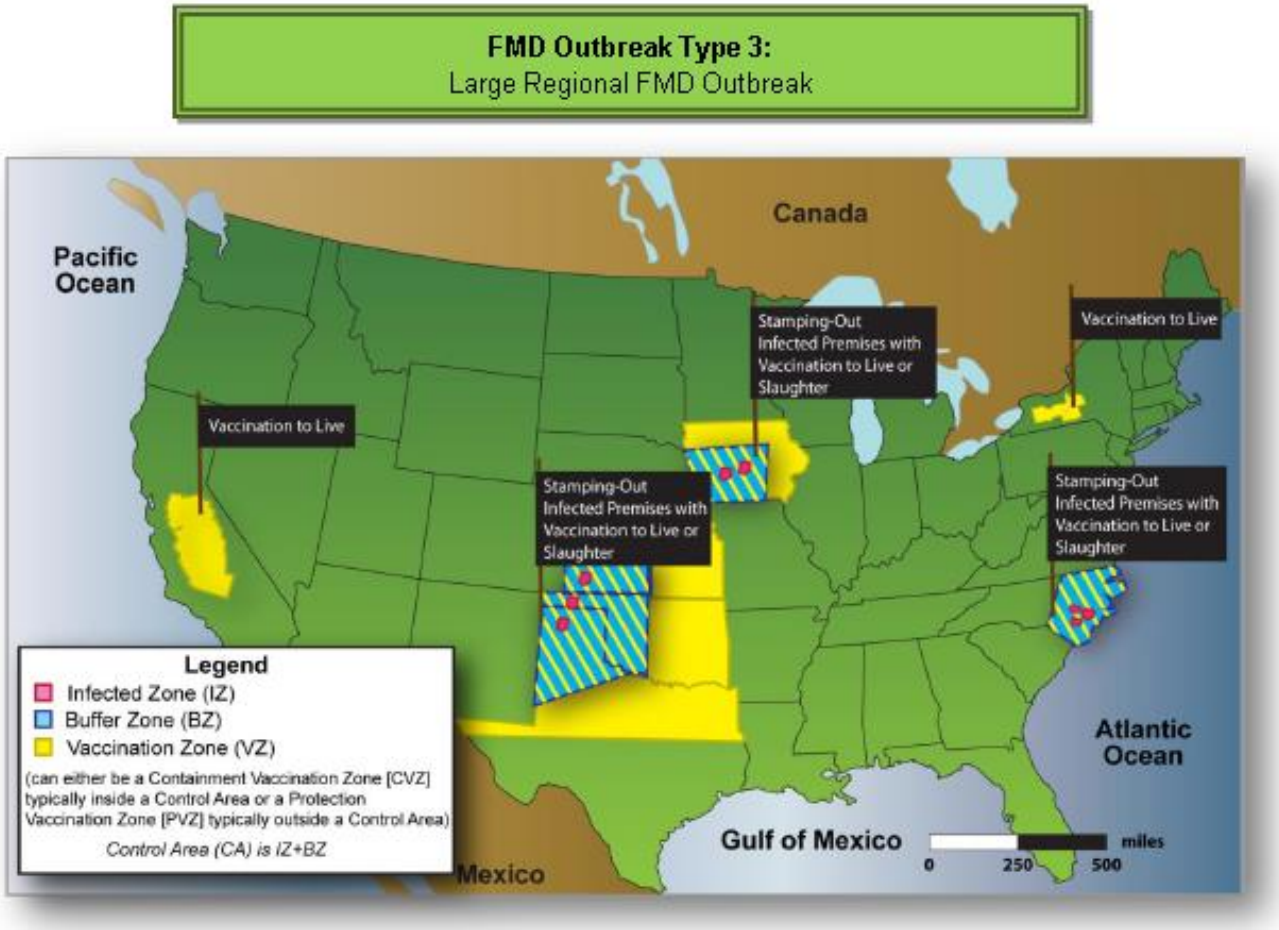


Example of Stamping-Out Modified with Emergency Vaccination to Live

FMD Outbreak Type 3:
Large Regional FMD Outbreak



Example of Stamping-Out Modified with Emergency Vaccination to Slaughter and Emergency Vaccination to Live



CSF RESPONSE PLAN

Critical Activities and Tools

Suspect Case
Definition

- A pig or herd that has:
  - Clinical signs consistent with CSF; OR
  - Inconclusive or positive RT-PCR/rRT-PCR performed on a sample taken during routine surveillance, without the presence of clinical criteria, for which either additional laboratory diagnostics (sequencing information or confirmatory testing) or epidemiological investigation results are pending; OR
  - A positive antibody ELISA with subsequent positive results to IP and IPVN tests with neither epidemiological information nor known clinical sings consistent with CSF.

Presumptive Positive Case

Definition

- A suspect case with positive RT-PCR/rRT-PCR or genomic sequencing consistent with CSFV conducted at FADDL after an initial positive RTPCR/ rRT-PCR on a sample from a pig with or without clinical signs and/or epidemiological evidence of CSF conducted; OR
- A pig or herd with epidemiological information and/or clinical criteria consistent with CSF; AND
  - Positive rRT-PCR or RT-PCR; OR
    - Positive ABC test on tissue samples; OR
    - Positive IP-VN test.

Confirmed Positive Case
Definition

- A pig from which CSFV has been *isolated* with *sequence confirmation* at the NVSL, FADDL, or a laboratory designated by the Secretary of Agriculture.

Surveillance

- The following are goals in an CSF outbreak:
  - To implement surveillance plans within 48 hours of the confirmation of an outbreak.
  - To implement a surveillance plan that (1) defines the present extent of CSF and (2) detects unknown IP quickly.
  - To have the surveillance plan consider the susceptible wildlife population in the area, to coordinate with APHIS, DOI, State wildlife agencies, and State agriculture departments to perform appropriate CSF surveillance in relevant populations.
  - To provide complete surveillance data summaries and analysis at intervals as specified by IC.
  - To develop effective surveillance plans that can achieve desired outcomes by leveraging available resources, satisfying jurisdictional requirements, and implementing continuity of business measures.

Surveillance Objectives

- Detect CSF IP during an outbreak.
- Determine the size and extent of an CSF outbreak.
- Supply information to evaluate outbreak control activities.
- Provide information for animal and product movement within the CA.
- Provide information for animal and product movement out of the CA.
- Prove disease freedom (DF) and regain disease-free status after eradication of the outbreak.

Surveillance Planning for CSF Outbreak

- A surveillance plan indicates the frequency, number, and distribution of animals and premises to be sampled. This requires tradeoffs be made among six surveillance parameters:
  - design (threshold) prevalence,
  - confidence level,
  - types of tests,
  - sampling frequency,
  - risk-based sampling, and
  - sampling scheme.

Surveillance Objectives by Time Period

- *The initial 72 hours post-CSF outbreak declaration.*

  Detect existing infected herds and premises as quickly as possible.

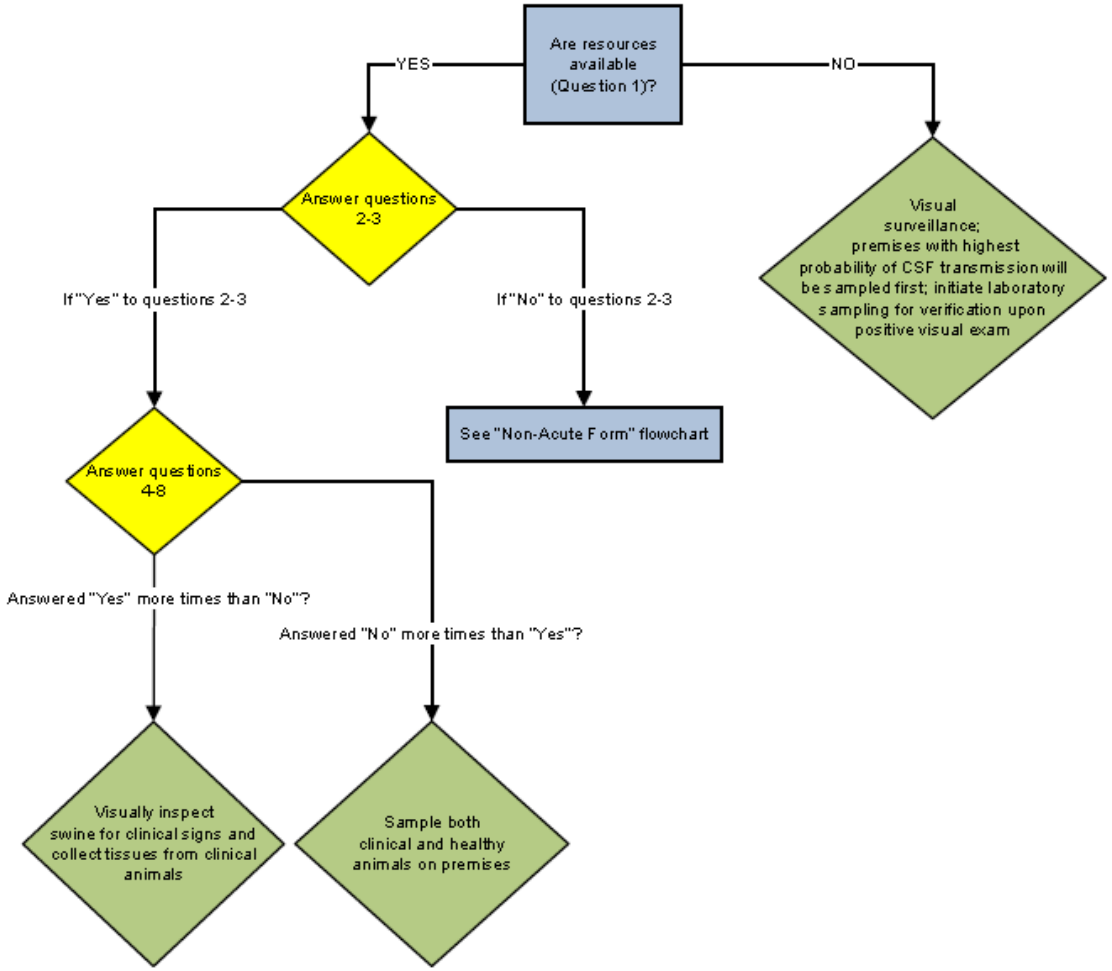
- *The control and eradication period (from initial 72-hour period until last case is detected and depopulated).*

- *Eradication to freedom.*

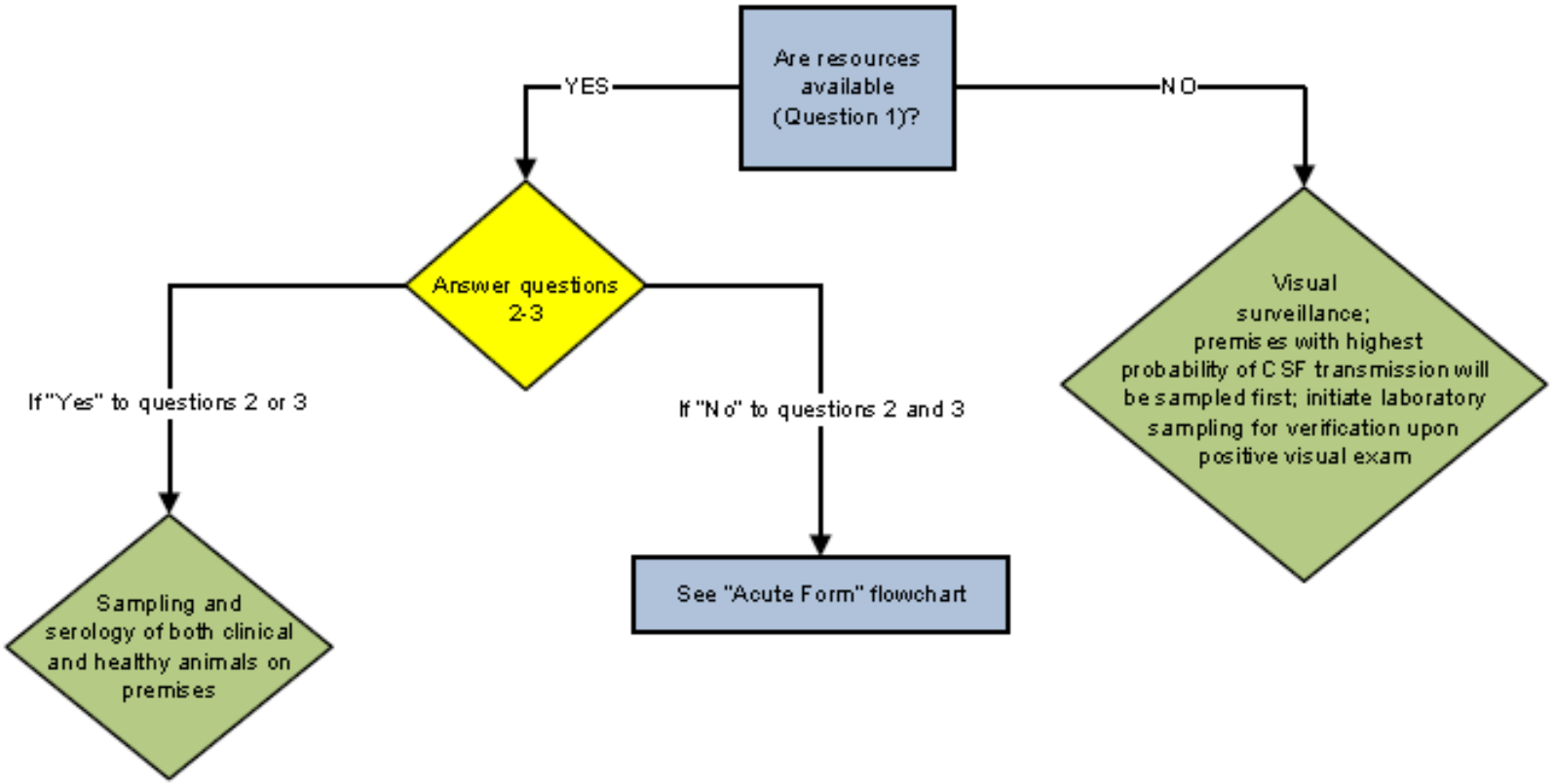
  When new detections cease, the objective is to provide evidence that the control area (CA) and free area (FA) are free of disease.

  – Consistent with OIE recommendations and requirements on surveillance.

Developing a CSF Outbreak Surveillance Sample Scheme: Acute Form



Developing a CSF Outbreak Surveillance Sample Scheme: Non-Acute Form



Diagnostics

- During a suspected or actual CSF outbreak, the key goals of response are to:
  - meet the surge requirements for diagnostic testing at specific intervals, starting at time zero and at 24-hour intervals as the response escalates, and
  - report all diagnostic test results to appropriate personnel *and* information management systems as soon as possible and within 12 hours of diagnostic test completion.

The *FAD Investigation Manual* (FAD PReP Manual 4-0) offers detailed information on diagnostic sample collection, diagnostic testing, and reporting.

Surge Capacity

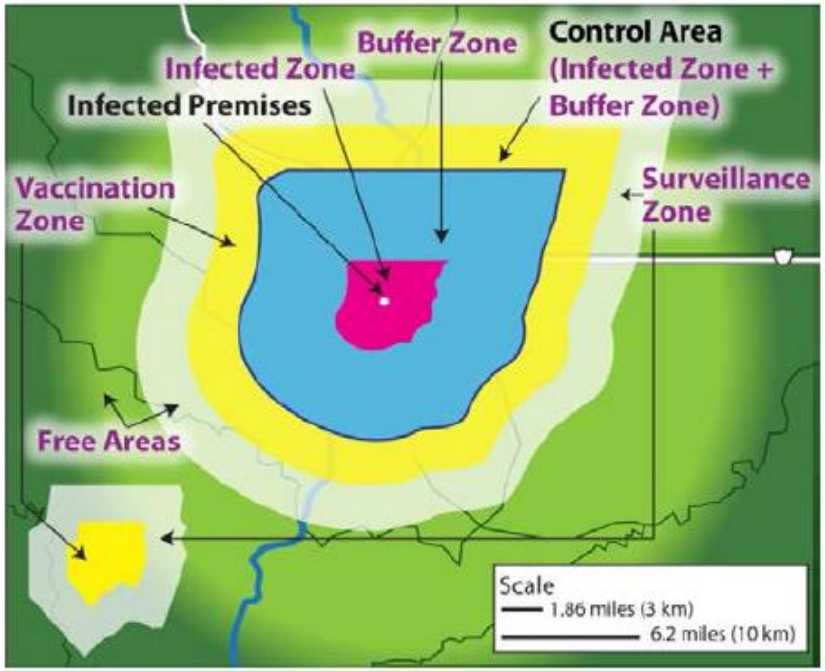
- Surge capacity may be needed in an CSF outbreak. Additional resources, such as personnel and materials, will be needed for sample collection.
  - Additional capacity may also be required for laboratory sample testing.
- Surge capacity can help facilitate a rapid response and continuity of business for non-infected premises.
- In the event that the affected State(s) NAHLN lab(s) and NVSL-FADDL are overwhelmed by the diagnostic testing requirements, NAHLN laboratories from across the country may provide surge capacity for diagnostic testing.

Reporting and Notification

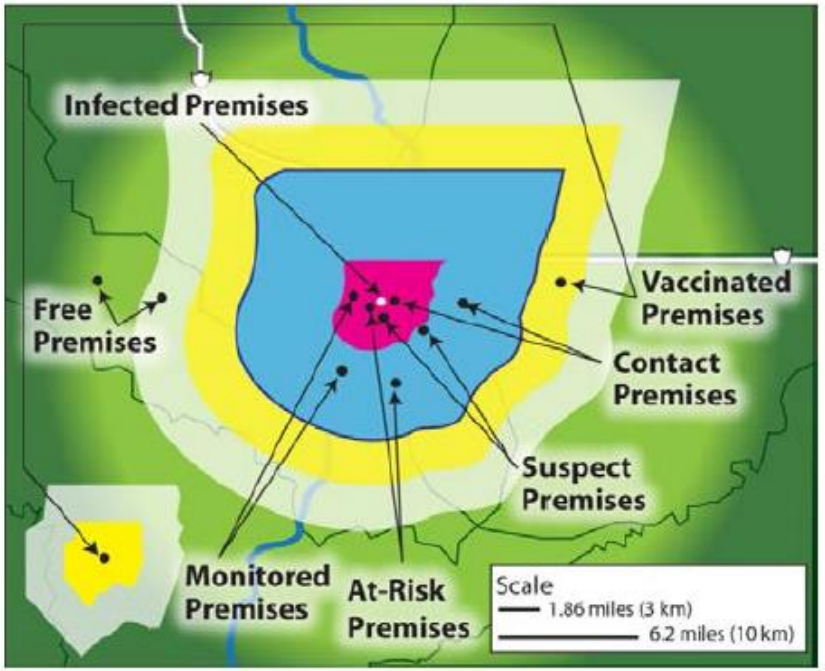
- Cases of clinical illness that are found to be presumptive positive by National Veterinary Services Laboratories—Foreign Animal Disease Diagnostic Laboratory (NVSLFADDL), based on the current case definition, will be reported to the affected States, other States, Tribal Nations, industry, other Federal agencies, trading partners, and the OIE.
- Appropriate Federal-State-Tribal-industry response and containment measures will be initiated during CSF investigations.

Example of Zones, Areas, and Premises in CSF Outbreak Response

Zones and Areas



Premises



Note: The Vaccination Zone can be either a Protection Vaccination Zone or Containment Vaccination Zone. Stamping-out is not pictured in these figures. The Surveillance Zone is part of the Free Area.

Infected Zone | Buffer Zone | Vaccination Zone | Surveillance Zone

Epidemiological Investigation

- Epidemiological investigation and movement tracing during an outbreak are critical in controlling and eradicating CSF.
- In a CSF outbreak, the goals are to:
  - within 6 hours of identifying potential IP or CP through tracing activities, assign a premises classification and a priority of investigation;
  - within 24 hours of identifying the IP or initial CP, identify all additional CP; and
  - within 96 hours of identifying the index case, characterize the nature of the CSF outbreak, identify the risk factors for transmission, and develop mitigation strategies.

Tracing

- One of the single most important and urgent veterinary activities during an CSF outbreak is to rapidly and diligently trace-back and trace-forward movements from an IP.
- This tracing aids in the control of the spread of CSFV and limit the impact of the outbreak.
- Tracing should cover all movements from the premises, including susceptible livestock, non-susceptible species, animal products, vehicles, crops and grains, and people.
- Tracing also includes consideration of all potential modes of transmission and possible contact with wildlife.

Communication

- Establish a network of stakeholders and systems for communication prior to an incident or outbreak.
- Brief the media, public, industry, Congress, trading partners, and others on the CSF outbreak status and the actions being taken to control and eradicate the disease.
- Coordinate with Federal, State, and local agencies, Tribal entities, producer groups, and Land Grant University-based Cooperative Extension.

Communication Objectives

- All CSF communications must:
  - furnish accurate, timely, and consistent information;
  - maintain credibility and instill public confidence in the government's ability to respond to an outbreak;
  - minimize public panic and fear; and
  - address rumors, inaccuracies, and misperceptions as quickly as possible.

Key Communication Messages

- For consumers:
  - CSF does not cause disease in humans.
  - Pork and pork products are safe to eat.
  - We are responding quickly and decisively to eradicate the virus.
- For producers:
  - Protect your swine with good biosecurity practices.
  - Be vigilant about reporting signs of illness.

Health and Safety and Personal Protective Equipment

- During an CSF outbreak, responders are exposed to many hazards, particularly in working with heavy equipment and large animals.
- Personal protective equipment (PPE) is fundamental in ensuring personnel are protected in the CSF response effort.
- All workers involved in the handling, culling, transport, or disposal of items or animals infected with CSFV must be provided with appropriate PPE.

Biosecurity

- An CSF outbreak would seriously impact the agricultural industry; strict biosecurity measures need to be implemented to prevent or slow the spread of CSF. Biosecurity procedures should be implemented within 24 hours of the identification of an index CSF case.
- Proper biosecurity measures have two functions:
  - containing the virus on IP (biocontainment), and
  - preventing the introduction of the virus via movement of personnel and material to naïve swine and premises (bioexclusion).

CSF Biosecurity Hazards and Appropriate Biosecurity Measures

Biosecurity Hazards	Biosecurity Measures to Mitigate Risk
• Movement of swine, vehicles, equipment, and people. • Contaminated feed and water. • Contact with infected swine and other non-susceptible animals that can act as mechanical vectors (other livestock, cats, or foxes). • Contact with contaminated people, clothes, footwear, or hands.	• Clean and disinfect premises, vehicles, and equipment and dispose of materials that cannot be disinfected in an appropriate manner. • Account for the movement of all swine, other animals, and equipment for accurate records. • Provide a location for all individuals to carry out appropriate cleaning and disinfection procedures and insist that these procedures are followed. • Prevent close or direct contact between herds (over a single fence line).

Biosecurity
Closed Herds

- To the fullest extent possible, close the herd to the introduction of swine (with population increases occurring only from offspring).
- If a closed heard is not possible, isolate newly introduced swine (from the healthiest possible sources) and those returning from existing herds for 30 days or more.
- Do not introduce vaccinated animals to naïve herds.

Quarantine and Movement Control

- By restricting the movement of infected animals, animal products, and contaminated fomites, quarantine and movement control can be a powerful tool in controlling and eradicating an CSF outbreak.
- Movement control is accomplished through a permit system that allows entities to make necessary movements without creating an unacceptable risk of disease spread.
  - EMRS is the system of record for these movements.

Virus Inactivation

Swill

- Should be maintained at a temperature of at least 90 °C for at least 60 minutes, with continuous stirring; or
- Maintained at a temperature of at least 121 °C for at least 10 minutes at an absolute pressure of 3 bar.

Virus Inactivation
Meat

- Heat: heat treatment in a hermetically sealed container with a F_o value of 3.00 or more; heat treatment at a minimum temperature of 70 °C, which should be reached throughout the meat; or
- Natural fermentation and maturation: The meat should be subjected to a treatment consisting of natural fermentation and maturation having the following characteristics: an a_w value of not more than 0.93, or a pH value of not more than 6.0. (Hams should be subjected to a natural fermentation and maturation process for at least 190 days and loins for 140 days)
- Dry cured pork meat: Italian style hams with bone-in should be cured with salt and dried for a minimum of 313 days. Spanish style pork meat with bone-in should be cured with salt and dried for a minimum of 252 days for Iberian hams, 140 days for Iberian shoulders, 126 days for Iberian loin, and 140 days for Serrano hams.

Virus Inactivation

Skins and trophies

- Boiling in water for an appropriate time so as to ensure that any matter other than bone, tusks or teeth is removed; or
- Gamma irradiation at a dose of at least 20 kGy at room temperature (20 °C or higher); or
- Soaking, with agitation, in a 4% (w/v) solution of washing soda (sodium carbonate – Na_2CO_3) maintained at pH 11.5 or above for at least 48 hours; or
- Soaking, with agitation, in a formic acid solution (100 kg salt [NaCl] and 12 kg formic acid per 1,000 litres water) maintained at below pH 3.0 for at least 48 hours; wetting and dressing agents may be added;
- In the case of raw hides, salting for at least 28 days with sea salt containing 2% washing soda (sodium carbonate –Na_2CO_3).

Continuity of Business

- Secure Food Supply Plan recommendations help animals and products keep moving during the outbreak.
- These items and their movements were permitted, issued, and recorded successfully in EMRS.
- Successful collaboration between States (both sending and receiving product), the Unified Incident Command, and APHIS.

SPS SECURE PORK SUPPLY

Mass Depopulation and Euthanasia

- The *Mass Depopulation and Euthanasia SOP* offers CSF-specific information on mass depopulation and euthanasia, including evaluation of various euthanasia methods, such as
  - gunshot,
  - penetrating captive bolt,
  - electrocution,
  - injectable euthanasia, and
  - carbon dioxide and other gas.

Disposal

- On-site burial, which has been a commonly accepted means of disposal, may be an inexpensive and biosecure method of disposal that minimizes the transportation of infected materials.
  - On-site methods may be significantly limited by several factors and the potential for environmental contamination, such as topography, soil type, soil depth to bedrock, seasonal high-water table, and environmental regulations.
- Other disposal methods such as rendering, incineration, and composting are considered viable alternatives for both large and small ruminants.

Cleaning and Disinfection

- Because of CSF's high survival rate on both organic and inorganic materials, aggressive cleaning and disinfection practices are required for control and eradication.
- Cleaning and disinfection are to be conducted within 48 hours of the disposal of depopulated animals.

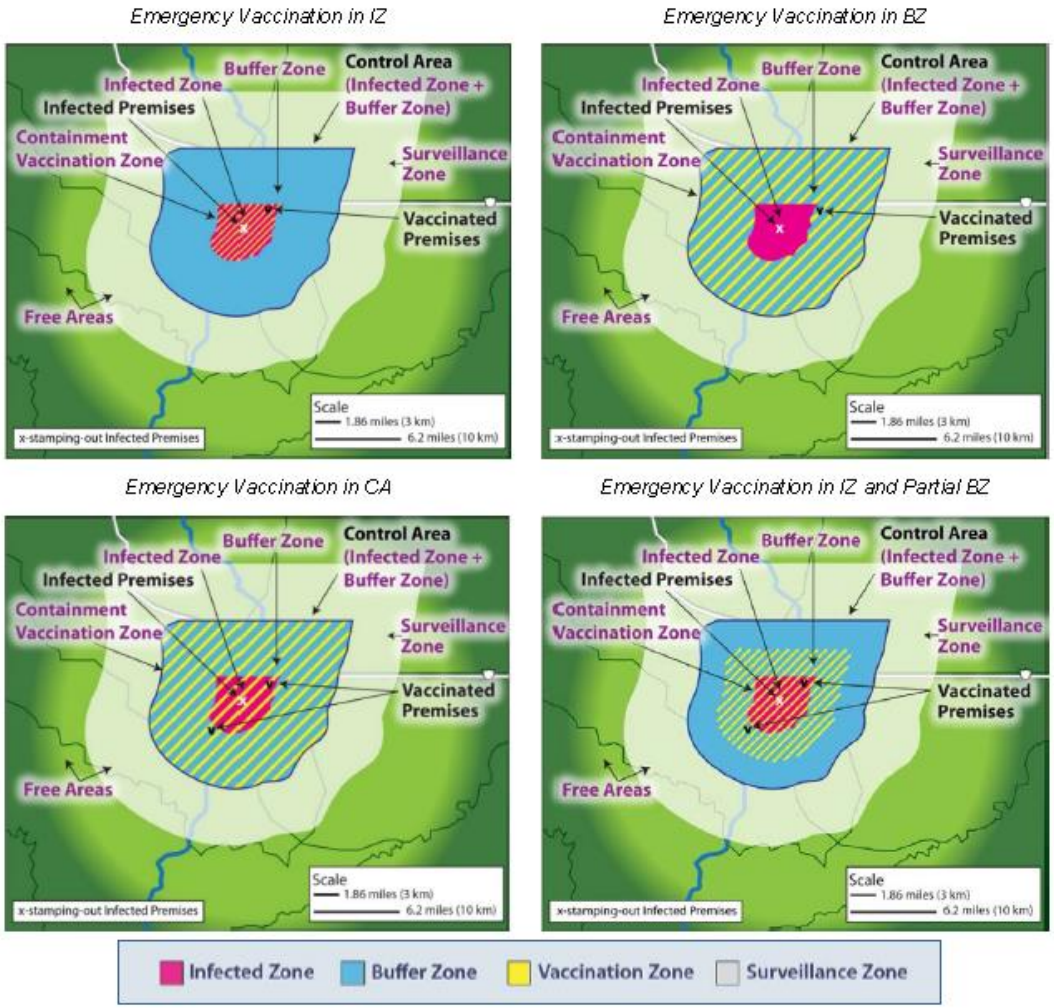
Vaccination

- There are two types of CSF vaccine.
- The NVS has access to both types of vaccine.
- The first type, the CSFV Vaccine, with a modified live virus (MLV), has been successfully used in countries where CSF is endemic, successfully preventing the transmission of CSF from animal to animal.
  - The MLV vaccine may be administered parenterally or orally (i.e., in bait vaccines to immunize feral swine) and confers immunity in 4–5 days. The immunized swine and the field-infected swine produce the same antibodies so they cannot be differentiated.

Vaccination, continued

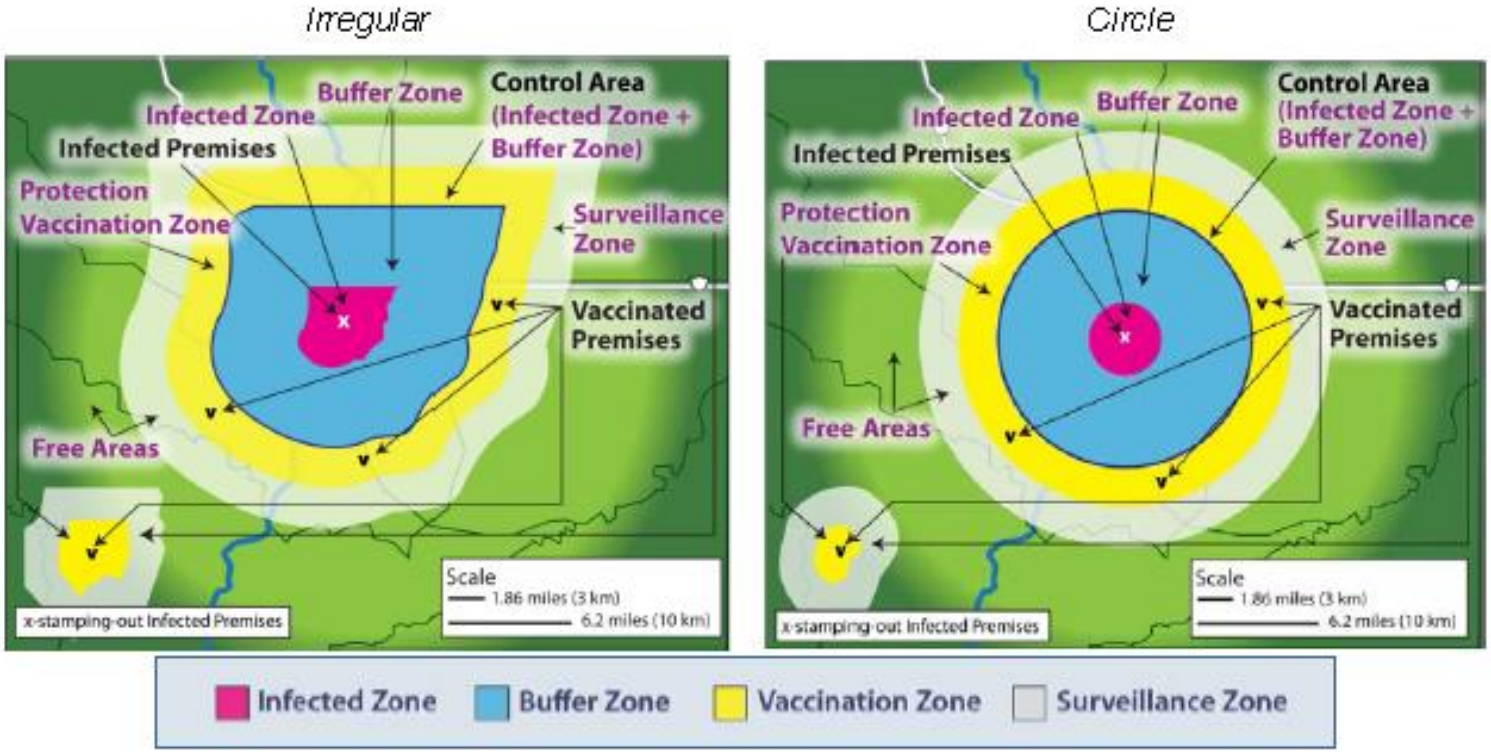
- The second type, a marker vaccine, was developed due to lack of DIVA.
  - Animals vaccinated with the DIVA-compatible E2 antigen-based CSFV, killed baculovirus vector vaccine can be differentiated from field-infected animals through an ELISA test for a specific glycoprotein.
  - These marker vaccines permit the use of DIVA diagnostic tests, so that field-infected and vaccinated swine can be distinguished.
  - This is critical in any emergency vaccination strategy.
  - The vaccine requires two doses for maximum immunity, and an effective onset of immunity may not occur until 14–21 days after the first dose is administered.
  - The vaccine is only effective when given parenterally.

Examples of Containment Vaccination Zones



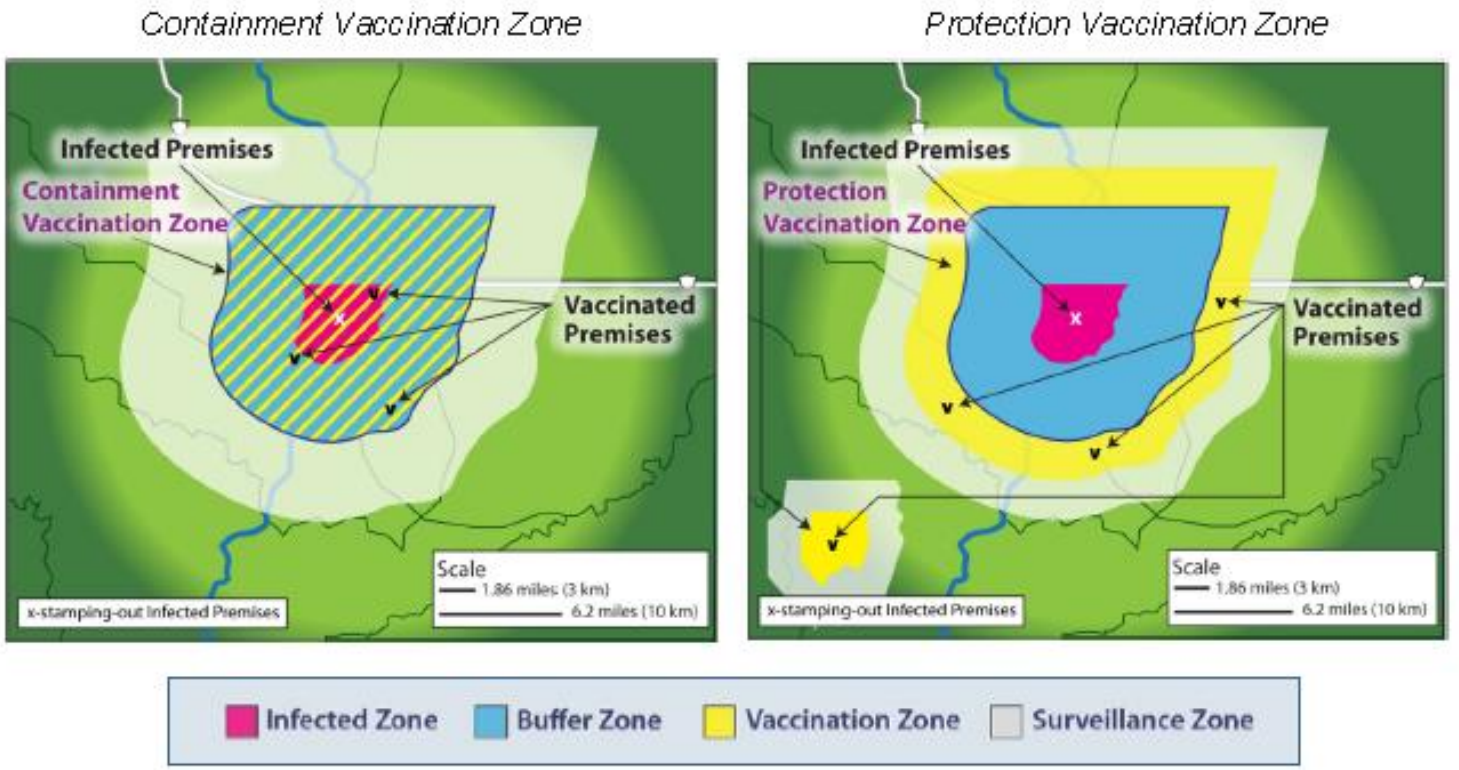
Examples of Protection Vaccination Zones

- The PVZ is an emergency vaccination zone typically outside the CA. Typically, a PVZ is observed with stamping-out modified with emergency vaccination to live



Examples of Vaccinated Premises

- VP is typically a secondary designation to another premises designation, and is only used if vaccination is employed in an outbreak.



Wildlife Management and Vector Control

- A wildlife management plan that addresses feral swine will be developed as soon as possible after identification of the index case in domestic swine.
- An assessment of the risk that feral swine pose for the transmission of CSFV to susceptible domestic swine will be conducted within 7 days of confirmation of the index case.
- CSF may be transmitted mechanically by mice, vultures, and other vectors. To date, there is no evidence that insects can biologically transmit the CSFV to susceptible animals.

Appraisal and Compensation

- Indemnity payments are to encourage disease reporting, reduce the spread of animal disease, and compensate owners on the basis of fair market value.
- The following website offers additional guidance on appraisal and compensation:

USDA APHIS Livestock Appraisal, Indemnity, and Compensation Section

Finance

- During an CSF outbreak, funding may be rapidly required. For responding to specific emergency situations, VS has access to a variety of sources for funding. The two most common sources are the APHIS Contingency Fund (CF) and the Commodity Credit Corporation (CCC).

CSF RESPONSE PLAN

Recovery After an Outbreak

Surveillance for Recognition of Disease- Freedom

- Surveillance is fundamental in proving DF to regain disease-free status after an CSF outbreak.

Proof of Freedom

Recognition of Disease Freedom

- The OIE does not grant official recognition for CSF-freedom, but OIE members can self-declare a compartment, zone, or country free from certain OIE-listed diseases such as CSF.
- In cases of self-declaration, delegates are advised to consult the OIE *Terrestrial Animal Health Code* for specific requirements for self-declaration of freedom from CSF.

Repopulation

- Following appropriate cleaning and disinfection procedures, IP will remain vacant for a period of time before restocking susceptible animals onto premises.
  - Minimum recommendation is 28 days.
- During restocking, animals will be subject to clinical inspection every 3 days for the first 14, and once per week thereafter up to 28 days. At 28 days *after the last* animals are introduced, each animal must be clinically examined by a veterinary inspector and samples tested for the presence of CSFV antibodies.
- Introduced livestock must originate on and come from premises on which there has not been a confirmed case of CSF within 6.2 miles (10 kilometers) for at least 30 days.

Further Information

FAD PReP Supporting Documents and Materials

- Strategic Plans—Concept of Operations
- National Animal Health Emergency Management System (NAHEMS) Guidelines
- Industry Manuals
- Disease Response Plans
- Standard Operating Procedures (SOPs) for Critical Activities
- Continuity of Business Plans
  - Commodity specific plans developed by public-private-academic partnerships
- Ready Reference Guides

Key Abbreviations

CSF	classical swine fever
CSFV	classical swine fever virus
DIVA	differentiation of infected from vaccinated animals
FAD	foreign animal disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
NRF	National Response Framework
NVSL	National Veterinary Services Laboratories
OIE	World Organization for Animal Health
PPE	personal protective equipment
SES	Secure Pork Supply
USDA	U.S. Department of Agriculture
VS	Veterinary Services