# Table of Contents

## Introduction

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABOUT THIS LESSON</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>What is an Agriculture Emergency?</td>
<td>4</td>
</tr>
<tr>
<td>Understanding the Targets</td>
<td>4</td>
</tr>
<tr>
<td>Unintentional and Intentional Introduction of Disease</td>
<td>5</td>
</tr>
<tr>
<td>Vulnerabilities</td>
<td>6</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>7</td>
</tr>
<tr>
<td>Achievability</td>
<td>8</td>
</tr>
<tr>
<td>Introduction to Transmissible Animal Diseases</td>
<td>9</td>
</tr>
<tr>
<td>Zoonotic – AI, END (Hint on flu types, food safety, eggs)</td>
<td>9</td>
</tr>
<tr>
<td>Non-zoonotic</td>
<td>10</td>
</tr>
<tr>
<td>Routes of Transmission</td>
<td>10</td>
</tr>
<tr>
<td>Laboratory Diagnostics and Disease Surveillance</td>
<td>11</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>11</td>
</tr>
<tr>
<td>Surveillance</td>
<td>13</td>
</tr>
<tr>
<td>Vaccination</td>
<td>13</td>
</tr>
<tr>
<td>National Veterinary Stockpile</td>
<td>15</td>
</tr>
<tr>
<td>Animal Health Response Agencies</td>
<td>15</td>
</tr>
<tr>
<td>International - OIE - World Organization for Animal Health</td>
<td>15</td>
</tr>
<tr>
<td>Federal</td>
<td>16</td>
</tr>
<tr>
<td>State</td>
<td>17</td>
</tr>
<tr>
<td>Local</td>
<td>17</td>
</tr>
<tr>
<td>Integrated Response</td>
<td>19</td>
</tr>
<tr>
<td>Incident Command System/Unified Command</td>
<td>19</td>
</tr>
<tr>
<td>Euthanasia and Disposal ICS</td>
<td>19</td>
</tr>
<tr>
<td>Chain of Events</td>
<td>21</td>
</tr>
<tr>
<td>Reaching a Diagnosis</td>
<td>21</td>
</tr>
<tr>
<td>Case classification</td>
<td>22</td>
</tr>
<tr>
<td>Economic Impact</td>
<td>23</td>
</tr>
<tr>
<td>Economic Impact Estimates</td>
<td>24</td>
</tr>
<tr>
<td>Continuity of Business</td>
<td>25</td>
</tr>
<tr>
<td>Stress Factors</td>
<td>25</td>
</tr>
</tbody>
</table>
Summary ................................................................................................................................. 27
Appendix A OIE Listed Diseases ................................................................................................. 28
Appendix B USDA Select Agent and Toxin List ............................................................................. 30
Slides ......................................................................................................................................... 31

Personal Protective Equipment ................................................................................................. 39

ABOUT THIS LESSON ............................................................................................................. 41
Introduction .............................................................................................................................. 42
Responder Protection in Animal Disease Exposure ................................................................. 42
Personal Protective Equipment Overview .................................................................................. 43
  Impermeable Suits .................................................................................................................. 43
  Permeable Suits ...................................................................................................................... 43
  Hand Protection ..................................................................................................................... 43
  Eye Protection ......................................................................................................................... 44
  Foot Protection ...................................................................................................................... 45
  Respiratory Protection .......................................................................................................... 45
Integrated Protection - Combining Components of PPE .......................................................... 50
  Protection Levels .................................................................................................................. 50
  Level C Personal Protective Equipment ............................................................................... 51
  The Components of Level C ................................................................................................ 51
  Level D Personal Protective Equipment ............................................................................... 51
  Role of the Safety Officer ...................................................................................................... 51
Level C Donning Procedures .................................................................................................... 52
  Physiological Stressors ......................................................................................................... 53
  Psychological Stressors ......................................................................................................... 54
Doffing ........................................................................................................................................ 55
  Dry Decontamination ........................................................................................................... 55
  Individual C&D (Bag and Stash) ......................................................................................... 55
  Level C Doffing Procedures .................................................................................................. 56
Summary .................................................................................................................................. 58
Appendix A Wear It Right ........................................................................................................... 59
Slides ........................................................................................................................................ 60

Biosecurity and Quarantine ..................................................................................................... 67

ABOUT THIS LESSON ............................................................................................................. 69
# Table of Contents

Introduction ......................................................................................................................................................... 70

Federal Government and USDA APHIS Response ................................................................................................. 70

Biosecurity ............................................................................................................................................................ 71

Biosecurity Hazards ............................................................................................................................................... 71

Mitigating Biosecurity Risk .................................................................................................................................. 72

Animal Identification ........................................................................................................................................... 73

Housed Animals .................................................................................................................................................. 73

Pastured Animals ................................................................................................................................................ 73

Isolated Animals ................................................................................................................................................ 74

Protecting Animals from Wildlife ........................................................................................................................ 74

Visitor Risk in an Outbreak ................................................................................................................................ 75

Visitor Biosecurity Outside a Control Area ......................................................................................................... 75

Visitor Biosecurity Within a Control Area ........................................................................................................... 75

Quarantine ............................................................................................................................................................ 75

Guidelines ......................................................................................................................................................... 76

Responder Assistance in Quarantine .................................................................................................................... 76

Animal Quarantine Laws and Statutes ................................................................................................................. 77

Case Designations ............................................................................................................................................. 78

Classification of Premises .................................................................................................................................. 79

Control Area and Zone Designations ................................................................................................................ 81

Movement Control ............................................................................................................................................. 82

Impact of Movement Control Policies ................................................................................................................ 85

Responder Assistance to Protect Agriculture ....................................................................................................... 85

Summary ............................................................................................................................................................... 87

Slides ..................................................................................................................................................................... 88

Euthanasia and Disposal ....................................................................................................................................... 93

ABOUT THIS LESSON ......................................................................................................................................... 95

Introduction to Euthanasia and Disposal .............................................................................................................. 96

Euthanasia and Disposal Health and Safety Considerations .................................................................................... 96

Coping with Traumatic Events ............................................................................................................................ 98

Mental Health Service Providers ........................................................................................................................ 98

Animal Movement and Restraint .......................................................................................................................... 100

Animal Welfare and Handling Considerations .................................................................................................. 100

Humane Animal Handling .................................................................................................................................. 100

Indemnification .................................................................................................................................................. 101
# Table of Contents

Euthanasia ......................................................................................................................................................... 102  
Methods of Euthanasia ................................................................. 102  
Physical Methods of Euthanasia .................................................. 103  
Chemical Methods of Euthanasia .............................................. 104  
Site Selection for Euthanasia ...................................................... 106  
Assessing On-Site Needs ............................................................. 106  
Manpower Needs ........................................................................ 107  
Implementation of Euthanasia .................................................... 107  
Protection of the Public and Responder ................................. 107  
Administering Euthanasia .......................................................... 108  
Prioritizing Euthanasia Activity According to Disease Risk ....... 108  
Concluding Euthanasia Activities ............................................. 109  
Introduction to Animal Disposal .............................................. 109  
Selecting the Method of Disposal ........................................... 110  
Burial ......................................................................................... 111  
Composting............................................................................... 112  
Outdoor Compost Site Selection Criteria ............................... 114  
Alternative Locations for Composting ....................................... 115  
Incineration (Burning) ................................................................. 115  
Air-Curtain Incineration .............................................................. 117  
Fixed-Facility Incineration ......................................................... 118  
Other Possible Disposal Options ............................................. 118  
Site Selection: Use of Geographic Information System Maps .... 119  
Assess and Request Disposal Resources Needed .................... 119  
Implementing Disposal .............................................................. 120  
Arrange for Security at the Disposal Site ................................. 120  
Summary .................................................................................. 120  
APPENDIX A .............................................................................. 121  
Symptoms of Traumatic Stress ................................................. 121  
APPENDIX B .............................................................................. 122  
Coping with Traumatic Stress - Guidelines ......................... 122  
APPENDIX C .............................................................................. 123  
Burial Site Zoning ....................................................................... 123  
Trench Dimensions: Animal Design Basis ............................. 124  
Appendix D ............................................................................... 125
## Table of Contents

- Safe Handling of Animals ......................................................................................................................125
- Slides ................................................................................................................................................... 127

### Cleaning and Disinfection ..................................................................................................................133

- ABOUT THIS LESSON .............................................................................................................................135
- Introduction ...............................................................................................................................................136
- Cleaning and Disinfection ..........................................................................................................................136
  - Basic Steps of a Cleaning and Disinfection Protocol .............................................................................136
  - Cleaning .............................................................................................................................................. 137
  - Disinfectants ........................................................................................................................................ 138
- Personnel, Vehicles and Property ..............................................................................................................139
  - C&D Station .......................................................................................................................................... 139
  - Personnel ............................................................................................................................................ 140
  - Individual C&D (Bag and Stash) ........................................................................................................... 140
  - Multi-Personnel C&D Station ............................................................................................................... 141
  - Disposal of Contaminated Clothing and Equipment ............................................................................141
  - Other Personnel on Site ...................................................................................................................... 141
  - Vehicles .............................................................................................................................................. 141
- Premises Cleaning and Disinfection ...........................................................................................................142
  - Premises Cleaning ................................................................................................................................. 142
  - Premises Disinfection ............................................................................................................................ 143
- Regaining Disease Free Status ...................................................................................................................144
  - Restocking .......................................................................................................................................... 144
  - Accident Cases from an IP or CP .......................................................................................................... 144
  - Safety Considerations for Cleaning and Disinfecting .......................................................................144
- Summary .................................................................................................................................................. 146
- Slides ...................................................................................................................................................... 147

### Glossary/Statute/Acronyms

- USDA Statutory Authorities ....................................................................................................................153
- Glossary .................................................................................................................................................. 156
- Acronyms .............................................................................................................................................. 165
This page intentionally left blank
Animal Disease Response Training

1 Introduction
Instructor Notes:
ABOUT THIS LESSON

Scope Statement
The participant will gain an appreciation of the vulnerability of U.S. agriculture to animal disease threats, be introduced to the factors that trigger response efforts, and understand the important role of responders in an agriculture emergency and gain appreciation for the role of Unified Command. This lesson will also address continuity of business and issues of traumatic stress.

Duration: 60 Minutes

Resources
Participant Procedure Guide
Presentation Slides

Practical Exercise Strategy
Students will discuss the possible consequences of an agriculture emergency in their community and the role their agency or organization might perform. Students should show an understanding of their role in all phases of response.

Instructor to Participant Ratio 1:20

Terminal Learning Objective
Review the elements of an animal disease emergency and understand the critical role of responders.

Enabling Learning Objectives

Upon completion of this lesson, the participant will be able to:

1-1 Define agriculture emergency and recognize vulnerabilities of agricultural systems.

1-2 Identify the various groups, authorities, and jurisdictions that will play major roles in a foreign animal disease event.

1-3 Identify the steps in determine the presence of disease, process of diagnostics and surveillance, and the need for deployment of personnel.

1-4 Discuss the importance of continuity of business planning within a control zone.

1-5 Define traumatic stress as it relates to a foreign animal disease response.
Introduction

America not only feeds itself, but also a good portion of the world. Our nation’s food supply is produced and processed by the American food and agriculture industry, one of the largest by any measurement, in the world. Sadly, that industry is a potential target for a chemical or biological act of terrorism as well as naturally occurring diseases that could seriously damage our economy and disrupt our food supply.

Plant and animal disease threats can arise from natural or accidental introduction, which can disrupt our agricultural systems, impact our national food supply, and affect economic stability. Monitoring of these diseases occurs continuously on a global scale to ensure protection of this critical system.

Deliberately introduced agricultural diseases are now considered to be a class of Weapons of Mass Destruction (WMD). The United States government has embarked upon a series of actions to further enhance and improve our nation’s ability to detect, deter, and respond to events involving a WMD.

Responders play an important role in the control, containment, and response to an agriculture emergency.

What is an Agriculture Emergency?

An agriculture emergency is defined as any event that jeopardizes the economic stability of any portion or segment of the agriculture/agribusiness industry. This includes exposure of any portion of pre and post harvest livestock, feed, and water supplies to any chemical, biological, nuclear, and/or explosive hazard. These hazards may be introduced naturally or through criminal activity such as arson, vandalism, or intentional introduction of a highly infectious or high consequence disease. This course will raise awareness of the response efforts necessary to minimize the impact of an agriculture emergency on a community, the industry, our nation, and the economy.

Understanding the Targets

Responders must understand the different components of the agriculture system to adequately prepare and plan for an agriculture emergency. Each component represents a target at which the overall system of agriculture production could be threatened. These targets can include animals or plants, and may also include:

- Transportation systems
- Water supplies
- Grain elevators and other storage facilities
- Producers, farmers, and farm workers
- Restaurants and food handlers
The individual components of this “farm to fork” continuum of agriculture are closely related in production and processing. For example, an event that threatens consumer consumption of orange juice would impact retail sales of the product. Likewise, transportation systems, processing, and distribution will be impacted as a result of reduced consumption. Hence, an impact to any one component of this agriculture system may adversely impact the system as a whole as demonstrated in the following figure.

**HINT**

Inputs refer to water, feed, fertilizers, or other substances entering the agriculture system to sustain or improve growth.

The United States Department of Agriculture (USDA) in collaboration with other state and federal agencies is taking actions to improve the awareness of the vulnerability of agriculture in America. Additionally, local, state, federal, and tribal entities have developed response plans in the event of an agriculture emergency. These plans outline the roles of agencies in response to an animal health event.

**Unintentional and Intentional Introduction of Disease**

Unintentional threats are defined as “natural” or “accidental” according to their origin and existence of human intervention. Natural occurrences are, for the most part, unavoidable. However, physical barriers and good hygienic practices can greatly minimize the risk. Accidents represent the greatest number of occurrences...
and can be greatly reduced by incorporating preventative measures into production and processing methods.

Natural threats involve disease introduction where the point of origin is unknown and there is no evidence of intentional or unintentional actions by humans. This is typical of biological events involving bacteria, viruses, or prions such as chronic wasting disease, West Nile virus, or salmonellosis.

Accidental threats involve unintentional introduction of an agent into a susceptible population with a known point of origin and evidence of unintentional human intervention. A situation such as this may include unintentional contamination of feed or improper processing techniques.

The deliberate, intentional introduction of a threat is classified as either criminal or an act of terrorism. Agroterrorism is the intentional introduction of a threat targeting agriculture or agribusiness for the purpose of imposing financial hardship on the economy.

**EXAMPLE: Chromium Cows**

A dairy farm in Enumclaw, Washington experienced a most perplexing event in 2004 that initiated the investigation by several state and federal agencies. A gooey reddish-black substance blistered and burned the skin of several dairy cows, ultimately killing three cows, making seven others sick, and contaminating tens of thousands of gallons of milk. A task force of federal investigators including members of the Federal Bureau of Investigation (FBI), Food and Drug Administration (FDA), and the Department of Homeland Security (DHS) joined local sheriff’s deputies and local and state health and agriculture officials to investigate the poisoning incident. The act thought to have been intentional was found later to be accidental. A corroded container left in the barn above milking operations had leaked corrosive chromic acid compounds onto the dairy cows.

**Vulnerabilities**

Vulnerabilities exist within the agriculture system that make it susceptible to an introduction of animal disease. Agricultural practices that contribute to these vulnerabilities include:

- Geographical dispersion and concentration of agriculture
- Consolidation of agribusinesses such as production and processing
- Extensive movement of animals
- Commingled products from many sources
- Inadequate biosecurity in and around agriculture facilities
Over two million farms span over one billion acres within the United States. Protecting this vast amount of area and providing total security are a monumental task. In many cases, farms or livestock operations can be easily accessed and are therefore vulnerable.

Today’s agriculture is much more geographically concentrated than in previous generations. An estimated 80 to 90 percent of grain-fed beef cattle production is concentrated in less than 5 percent of the nation’s feedlots.

Livestock operations are more consolidated within regions and high capacity confinements are common. For example, many animal species are raised in geographically defined parts of the country. The majority of the nation’s pigs are raised in Iowa, North Carolina, and Illinois, while the largest producers of beef cattle are Texas, Kansas, and Nebraska. Fewer agribusinesses now manage larger portions of production and processing. Consolidation of these businesses has taken place in farming, meat packing plants, grain elevators, food processing plants, and grocery store distribution points.

Animals are transported extensively throughout the nation, sometimes over 1,000 miles. Live markets and sale barns receive animals from many different sources. If a disease is present, this can cause rapid infection. Millions of animals are purchased, sold, and transported each year. A single infected animal could cause widespread infection.

Some animal products may be commingled in the production of processed foods. This commingling may lead to contamination or spreading of diseases carried by animals that enter the plant. Federal regulations, security measures, and USDA and FDA inspectors exist within food processing plants in order to reduce this vulnerability to a minimum.

One of the largest challenges to providing any level of biosecurity is the lack of awareness of producers and processors. Increased on-farm biosecurity and good processing practices help to reduce the vulnerability and lessens the threat of disease at each phase of agricultural production.

Susceptibility

The United States’ agriculture industry remains highly susceptible to the introduction of animal diseases. Unexposed animals have no immunity or resistance to many foreign animal diseases, which are usually robust, highly contagious, and have evolved to persist in the environment.
Because of these factors and the low risk to humans, animal diseases may be used as a source of terrorism.

Animal diseases make good terrorism agents because:

- Animal targets are easily accessible
- Animal diseases rapidly spread from animal to animal
- Disease spread may be facilitated by wildlife or human activity
- Many animal diseases are difficult to kill and persist in the environment
- Sources of animal disease are difficult to trace and can go undetected for a long time
- Global sources of animal disease agents exist and are easily accessible in animal products. (i.e. animal blood, fecal material, saliva)

Success of an attack will depend on the disease agent selected, ease of transmission or spread, rate of infection, and the ability to identify and contain.

**Achievability**

The success of an agroterrorism event is dependent upon many factors that include:

- Motivation
- Opportunity
- Technical ability
- Goal
- Willingness to utilize biological weapons

The threat to agriculture can come from a lone perpetrator, animal extremist organizations, rogue nations, or terrorist groups. Many terrorist organizations have researched chemical and biological weapons as a means of attack. Their motivations may stem from religious beliefs, hatred, or the desire to inflict damage or injury. Coordinated attacks may occur simultaneously or in multiple locations or regions over a period of time.

Some potential chemical and biological agents are easily accessible in nature and have few technical barriers. Some require only limited knowledge for their dissemination, while others may require significant technical expertise and equipment. When released, either agent could infect any number of herds or flocks, resulting in the devastation and decimation of thousands of animals across the nation.
Introduction to Transmissible Animal Diseases

Zoonotic

Zoonotic diseases (or zoonoses) can be transmitted from animals to animals and from animals to humans and represent the most likely source of emerging and re-emerging infectious diseases. Some examples include:

- Anthrax
- Avian influenza
- Swine flu
- Brucellosis
- Plague
- Lassa fever
- Listeriosis
- Lyme disease
- Monkeypox
- Rabies
- Salmonellosis
- Trichinosis
- Toxoplasmosis
- Typhus
- West Nile virus

Zoonotic diseases in animals result in varying levels of illness depending upon the agent involved. While the definition of “zoonotic” refers to transmission from animals to humans, these diseases still spread effectively between non-human animals and may have a considerable, widespread impact on the health of these populations.

The level of illness in humans can vary depending on the agent. For example, vesicular stomatitis and exotic Newcastle disease can be transmitted to humans in close contact with infected animals, but only result in mild, if any, illness. In contrast, some pathogens, such as highly pathogenic avian influenza, rabies, brucellosis, and anthrax can cause serious human illness and possibly death.

There are different methods of transmission for different diseases. Diseases may be spread through direct contact with infected animals, or by other means, such as contaminated feed or water, insects, or people and equipment.
Some animals that carry zoonoses include:

- Primates
- Cats
- Dogs
- Pigs
- Horses
- Cattle
- Rodents
- Rabbits
- Bats
- Reptiles

**Non-zoonotic**

Non-zoonotic diseases in animals are non-infectious to humans. While there is no threat (or rarely a threat) of human illness, humans may still act as a fomite and spread disease between animal populations. These types of diseases include foot and mouth disease (FMD), hog cholera, African swine fever, and rinderpest.

**Routes of Transmission**

There are many ways both zoonotic and non-zoonotic disease agents can spread among animal populations. Many are similar to the routes of disease spread in humans. The method of spread will vary with the organism or agent involved, and some may have more than one method of transmission.

Understanding the potential ways these agents can spread may help the responder appreciate the control and containment methods needed in an animal disease response.

**Direct Contact**

Direct contact is the most common route of transmission for pathogenic organisms. This includes touching and handling animals which may be infected. Objects contaminated by urine, feces, or any type of bodily fluids may also be a source of infection. This would include objects such as equipment, bedding, feedstuff, or facilities.

**Ingestion**

Some disease-causing microorganisms can be transmitted by consumption of contaminated meat or drinking water. Animal feed should be obtained from reliable sources. Additionally, food for human consumption should always be prepared according to FDA or USDA standards for food safety.
Airborne
The transmission of a disease agent can occur by coughing or sneezing or on wind-borne dust. Airborne diseases cause extreme challenges to responders because they are difficult to control and require additional personal protective measures.

Fomites (Boots, Clothing, Shovels, Vehicles)
Fomites are inanimate objects that may transport disease agents to other locations. For example, clothing, shoes, and equipment are capable of carrying diseases and transferring them from one surface to another. Biosecurity measures and restrictions must be implemented to reduce the possibility of transfer of disease agents.

Vectors (Insects, Birds, Rodents)
A vector is an organism, often an insect, that carries disease-causing microorganisms from one host to another. Insects such as mosquitoes and ticks are the most common vectors for disease transmission. Rodents, birds, wildlife, and other animals may also serve as disease vectors.

Laboratory Diagnostics and Disease Surveillance
Diagnosis
Definitive diagnosis requires isolation of the disease organism and identification in the laboratory. In poultry, tracheal or cloacal swabs from live or dead birds, as well as droppings, can be used for virus isolation and identification. In livestock, samples can be taken from various sources such as blood, secretions, or excretions, depending upon the suspected disease agent.

The Animal and Plant Health Inspection Service’s (APHIS) National Veterinary Services Laboratories (NVSL) provides support to National Animal Health Laboratory Network (NAHLN) laboratories for sample processing from livestock, wildlife, commercial production animals, upland game birds and waterfowl, and live bird markets. NVSL develops and contracts for the production of test reagents distributed at no charge to approved laboratories. The USDA analyzes collected samples in surveillance efforts to identify specific disease agents.

Laboratory Confirmation of a Foreign Animal Disease Diagnosis
Only an official federal laboratory can confirm or refute the presence of a foreign animal disease in the U.S. Two official national laboratories exist—the Foreign Animal Disease Diagnostic Laboratory (FADDL) located at Plum Island Animal Disease Center (PIADC) and the National Veterinary Services Laboratory (NVSL).

FADDL handles testing for foreign animal diseases in cloven hoofed animals, such as cattle. The lab is located at PIADC on Plum Island off the northeastern tip of New York’s Long Island. For foreign animal diseases in birds and non-cloven hoofed animals, NVSL is used. NVSL is located in Ames, Iowa.
Plum Island Animal Disease Center (PIADC)

Since 1954, Plum Island Animal Disease Center (PIADC) has been protecting America’s livestock from foreign animal diseases through research and diagnostic testing. As a diagnostic facility, PIADC is capable of diagnosing foreign animal diseases in addition to domestic animal diseases that may mimic FADs. PIADC completes between 22,000 and 35,000 diagnostic tests annually.

U.S. federal law mandates that live foot-and-mouth disease (FMD) virus cannot be studied on the mainland. PIADC is the only U.S. laboratory permitted to study and test for FMD. Activities at PIADC are a joint effort of USDA APHIS and USDA Agricultural Research Service. Safety, security and facility management are the responsibility of DHS.

USDA Agricultural Research Service conducts research on countermeasures against FADs, such as prevention, control and recovery methods. The principal diseases studied are FMD, classical swine fever and vesicular stomatitis virus.

USDA APHIS operates the Foreign Animal Disease Diagnostic Laboratory (FADDL) at PIADC. FADDL is the official, internationally recognized lab which conducts testing of samples from U.S. livestock as well as testing of animals and animal products being imported into the U.S. At PIADC, USDA APHIS runs its Foreign Animal Disease Diagnostic (FADD) school to train federal and state veterinarians and laboratory diagnostic staff, military veterinarians, veterinary school faculty and some industry veterinarians on how to recognize and diagnose FADs.

Accidental or intentional introduction of foreign animal diseases can cause catastrophic economic losses and losses of agricultural animals and animal products. A DHS Science and Technology Directorate Blue Ribbon Panel assigned highest priority to FMD when considering high consequence pathogens for study and development of necessary countermeasures because of its potential for severe economic and social impact as well as the devastation an outbreak could bring to the U.S.

National Veterinary Services Laboratories (NVSL)

The National Veterinary Services Laboratory (NVSL) protects U.S. animal health and contributes to public health by providing laboratory support through a nationwide animal health diagnostic system. NVSL tests for domestic and foreign animal diseases and supports disease control and eradication programs. In addition to serving as one of the two official, internationally recognized reference labs for the U.S., NVSL also produces and provides reagents, conducts training, certifies other labs and responds to animal health emergencies.
Some testing for specific diseases may be conducted by USDA APHIS-approved state, federal or private laboratories. NVSL supports those approved labs with reagents, training and laboratory certification.

The National Animal Health Laboratory Network (NAHLN) is part of a nationwide strategy to coordinate the work of all organizations providing veterinary surveillance and testing services. NVSL manages the NAHLN.

**Surveillance**

USDA has both international and domestic roles in controlling diseases in animals and animal products and reducing the effects of disease on the animal agriculture industry and public health. The USDA supports a variety of domestic surveillance programs in cooperation with state animal health officials and animal agriculture industry to monitor prevention efforts and control potential disease spread.

For example, the USDA international effort for poultry involves collaboration with the United States Agency for International Development (USAID) and Health and Human Services (HHS) to prevent, control, and eradicate highly pathogenic avian influenza where it currently exists. The domestic program is focused on prevention and control of H5 and H7 through increased surveillance of United States poultry and the live bird markets.

**Vaccination**

The use of vaccination in response to a foreign animal disease outbreak is dependent upon state and federal epidemiological assessment. This assessment is managed by USDA/APHIS in coordination with state and local authorities and includes consideration of the following:

1. The probability of disease containment
2. The proximity of high value animal agriculture
3. The threat to valuable, rare or endangered non-domestic species
4. The density of animals at risk
5. The extent to which wildlife is involved
6. The availability of staff to carry out vaccination efforts
7. Public opinion
8. Potential for zoonotic infection
9. The impact on export markets
10. The economic impact of failing to control the disease

These considerations require that a vaccination be available for the disease agent involved.
Vaccination

Many participants will inquire about the use of vaccination as an alternative to euthanasia in the face of a foreign animal disease, particularly foot and mouth disease.

You may answer questions with the following facts about FMD vaccination:

The seven serotypes or families of FMD virus contain many genetically different viral strains. For vaccination to be useful in the face of an FMD outbreak would require a national stockpile of well over 100 unique vaccines containing millions of doses of each type.

Although vaccinated animals may not show symptoms of the disease, they may harbor and shed live virus.

Current as of spring 2009, laboratory tests cannot differentiate between blood drawn from an FMD-vaccinated animal and a sample taken from an animal that contracted the disease naturally.

If vaccination is used to control an outbreak of FMD, it will be applied in a “buffer vaccination zone” surrounding the infected zone or “ring vaccination.” This may create a firebreak intended to slow the spread of disease.

Vaccination presents a logistics problem during an FAD response. To be effective, the vaccine must be given to hundreds, and perhaps thousands, of animals almost simultaneously. This would require rapid mobilization of hundreds of trained vaccination personnel, animal handlers, and equipment.

Pending future scientific advances, the strategic application of vaccination during an FMD outbreak will, of necessity, require that vaccinated animals eventually be destroyed. This may be referred to as “Vaccinate to Slaughter”.

Birds in commercial poultry flocks are routinely vaccinated at very early ages for communicable disease. During an outbreak of poultry disease, the concern becomes the vaccination status of non-commercial pet or hobby birds. Such was the case, and the root cause, for the introduction of exotic Newcastle disease in California and bordering states in 2002. These pet birds typically are not vaccinated and may serve as reservoirs for disease; thus, they present a risk to commercial flocks.

Responders from law enforcement can expect to be asked to help animal health authorities locate and gain entry to premises harboring small flocks of birds.
**National Veterinary Stockpile**

The National Veterinary Stockpile provides supplies, equipment, field tests, vaccines, and other response support services that states need in response to an animal disease outbreak within 24 hours of request. Deployment of the NVS includes large numbers of highly trained personnel with the ability to transport equipment and deliver services in support of efforts to depopulate, dispose, and decontaminate. These services act as countermeasures against the worst animal diseases including, but not limited to, highly pathogenic avian influenza, foot and mouth disease, Rift Valley fever, exotic Newcastle disease, and classical swine fever.

The NVS program also assists states in planning, training, and exercises involving the rapid acquisition, receipt, processing, and distribution of the countermeasures that would be utilized during an event.

**Animal Health Response Agencies**

There are many agencies and organizations involved in response to an FAD incident. These agencies function collaboratively under a Unified Command structure. The following provides a brief overview of a few agencies involved.

**International - OIE - World Organization for Animal Health**

The International Office of Epizootics (OIE), also known as the World Organization for Animal Health, is the international organization responsible for setting animal health standards on which international trade restrictions are based. The OIE mission strives to improve the health and the welfare of animals all over the world, regardless of the cultural practices or the economic situations in member countries. The two purposes of the OIE are to (1) monitor multiple diseases in member countries and (2) set the international standards for trade of animals and animal products. The organization contains members from countries worldwide including the U.S.

The OIE:

- Informs governments regarding animal diseases throughout the world and recommends means of control.
- Coordinates international animal disease surveillance and control.
- Harmonizes regulations for international trade of animals and animal products.

The OIE maintains a list of diseases with potential for rapid spread, serious socioeconomic or public health consequences, and major consequence in international trade of animals and animal products. The introduction of any of these diseases could severely damage U.S. agricultural markets and is internationally recognized as grounds for export embargo. The presence of diseases listed by OIE must be reported within 24 hours. The table in Appendix A provides OIE Listed Diseases. For additional information, OIE’s web site is www.oie.int.
Federal

United States Department of Agriculture (USDA)

The USDA is a large organization with more than 120,000 employees across the United States and around the world. The mission of the USDA is to protect and promote the growth of United States agriculture. There are specific programs and divisions within the USDA that participate in response to agriculture emergencies. Similar to OIE, the USDA has a Select Agent and Toxin List of high consequence livestock pathogens (see Appendix B) that are reportable by all animal health authorities.

USDA Animal and Plant Health Inspection Service (APHIS)

The primary agency within the USDA that addresses animal and plant disease events is the Animal and Plant Health Inspection Service (APHIS). APHIS controls international border inspections, surveillance, animal import testing, and quarantine, as well as training of animal health authorities for foreign animal disease detection.

Agencies within USDA/APHIS that coordinate efforts in an animal health emergency include:

- **Wildlife Services** addresses wildlife issues affecting livestock production, wildlife damage to crops, and disease transmission between captive livestock and free-range animals. Wildlife Services assists in disease events with potential for spread between domestic and wild animal populations.

- **Plant Protection and Quarantine (PPQ)** maintains the international border control responsibility, monitoring all ports of entry for imported animal and plant material. PPQ inspectors nationwide, working with DHS/Customs and Border Protection, intercept more than 1.5 million illegal agriculture products each year.

- **Animal Care (AC)** provides leadership for determining and enforcing standards of humane care and treatment of animals under the Animal Welfare Act. Animal Care implements these standards and achieves compliance through inspection, education, and cooperative efforts.

- **Veterinary Services (VS)** has the primary responsibility to protect, detect, contain, and eliminate foreign animal diseases and promote animal health in the United States. Veterinary Services has 42 area offices and 2 regional offices in the United States and Puerto Rico. Some VS responsibilities include:
  
  ◦ **Federal Animal Health Authorities**: Most states have an Area Veterinarian in Charge (AVIC) and a number of Veterinary Medical Officers (VMO) who investigate possible disease events. The VS personnel work closely
with the state animal health authorities to protect animal health. The AVIC for your area can be found at usda.gov.

◊ **Foreign Animal Disease Diagnosticians (FADD):** Animal health authorities who have received specialized training and certification in the detection of foreign animal diseases are referred to as Foreign Animal Disease Diagnosticians. These veterinarians are employees of state departments of agriculture, USDA/APHIS/VS, or the U.S. Military. Upon notification of a suspicious disease, an FADD will be sent to the site within 24 hours.

◊ **National Animal Health Emergency Response Corps (NAHERC):** Personnel are trained animal health emergency responders mobilized to support and fight an outbreak in support of state and federal efforts. They may include animal health authorities, technicians, disease specialists, and administrative or clerical personnel.

◊ **Health Certification:** Livestock and poultry imported into the U.S. must be accompanied by an official health certificate and may be quarantined for a set time at its port of entry. Additionally, if the animals are from a country where an FAD has been diagnosed, diagnostic testing may be conducted while the animal is in quarantine.

The USDA/APHIS/VS operates two national diagnostic laboratories: the National Veterinary Services Laboratory (NVSL) in Ames, Iowa, and the Foreign Animal Disease Diagnostic Laboratory (FADDL) at Plum Island, New York. Foreign animal diseases are officially confirmed by these diagnostic laboratories.

**State**

Every state has an animal health official, most often a veterinarian, responsible for oversight of animal health related activities including surveillance, movement permits, quarantine, disease investigation and licensing or registration. Local or federal animal health authorities immediately notify this chief animal health authority if a foreign animal disease or disease of high consequence is suspected.

There are also a number of state field veterinary medical officers. Many of these individuals are Foreign Animal Disease Diagnosticians. Contact information for your state’s animal health authority can be found at usda.gov.

Many states have animal health response teams such as State Animal Response Teams, or SARTs. These teams of highly trained individuals respond in cooperation with federal teams and coordinate with local response efforts in natural disasters.

**Local**

Local responders will function within their current skill set and training level during an animal disease event in cooperation with state and federal efforts.

In addition to the traditional responders discussed in this training, agriculture
emergencies will also include local private veterinary practitioners, extension agents, and veterinary technicians. Local response efforts should be implemented in such a way as to incorporate all disciplines under the National Incident Management System (NIMS).

These local community groups may be called upon to assist the state and federal agriculture agencies utilizing the NIMS to:

- Coordinate local efforts
- Establish communication centers
- Disseminate public information
- Maintain public order
- Aid in planning and resource identification
- Enforce animal movement restrictions
- Assist with euthanasia and disposal efforts
- Assist with biosecurity and decontamination procedures
- Aid in recovery efforts.

These essential individuals who will conduct these tasks include but are not limited to:

- Law enforcement
- Fire departments
- Hazmat teams
- Community Emergency Response Teams (CERTs)
- Emergency Medical Services (EMS)
- Private veterinary practitioners
- Public health
- Emergency Management Agency (EMA)

Local efforts will be required for the duration of the response, which can last several months.

**EXAMPLE**

Exotic Newcastle disease eradication efforts, following an outbreak in California, lasted from October 2002 to August 2003 and had a tremendous impact on human resources. Because of the duration of the event, state and federal veterinarians from across the country were needed for varying lengths of service.
Integrated Response

The National Response Framework (NRF) provides a guide for how the nation conducts response efforts from local to national level incidents under the National Incident Management System (NIMS). This system guides all levels of government, the private sector, and non-government organizations on seamless, integrated efforts to prepare for, prevent, respond to, recover from, and mitigate the effects of an incident. The documents which define this system outline the authorities and best practices for overall management of a response and outline a multi-agency comprehensive nationwide systematic approach and standardize operations, terminology, and requirements for the response community.

In concert with this organizational structure, APHIS established the National Animal Health Emergency Management System (NAHEMS) to provide an operational framework for responding to foreign animal diseases. These guidelines comprise a series of documents designed for use by APHIS Veterinary Services (VS) personnel in the event of an outbreak and should be integrated into state, local, and tribal preparedness plans. This integration assures that consistent response capabilities for animal health emergencies exist across all jurisdictions.

Incident Command System/Unified Command

Response to an animal disease event is conducted according to the guidelines of the Incident Command System (ICS) under Unified Command (UC). Unified Command is a structure that brings together the “Incident Commanders” of all the major response organizations involved in an incident. This command structure creates coordinated response efforts and at the same time allows each organization to carry out its own jurisdictional responsibilities. The UC links the organizations, provides a forum for consensus decisions, and creates an integrated response team. The UC is responsible for overall management of the incident, directs activities, releases resources and assures the implementation of objectives and strategies. By working together, the UC can best share information, maximize the use of available resources, and enhance the efficiency of each individual response organization.

Euthanasia and Disposal ICS

Euthanasia and disposal of animals will be coordinated by the Operations Section of the Incident Command System. Under the National Animal Health Emergency Management System (NAHEMS), the Euthanasia Unit Leader is based at and remains in the Incident Command headquarters and reports to the Operations Section Chief. Veterinarians serve as Euthanasia Team Leaders in the field. A variety of support personnel including animal health technicians, slaughterhouse workers, animal identification specialists, and animal handlers all serve as Euthanasia Team members.
Unified Command
State Veterinarian/USDA Area
Veterinarian In Charge

Planning Section Chief
Operations Section Chief
Logistics Section Chief
Admin/Finance Section Chief

Disease Support Branch Director (Biosecurity)
Disease Management Branch Director

Euthanasia Team (Local, State and Federal)
C&D Team (Local, State and Federal)
Appraisal Team (State and Federal)
Disposal Team (Local, State, Federal)

Disease Surveillance Branch Director

National Veterinary Stockpile
Chain of Events

Reaching a Diagnosis

Producers should contact their local veterinarian in the event animals become sick. If the producer’s private practice veterinarian suspects foreign or high consequence animal disease, he/she notifies state or federal animal health officials. Once the possible presence of a foreign or high consequence animal disease is suspected or diagnosed by a licensed veterinarian, that professional, in consultation with state animal health officials, may issue a “hold order” or quarantine, which prevents animals from being moved on or off the farm.

The field diagnosis of an animal disease may be made by a Foreign Animal Disease Diagnostician (FADD). When an FADD visits a farm with a potential disease problem, clinical findings are entered into the USDA Veterinary Service’s Emergency Management Resource System (EMRS). The FADD will make biosecure entry and exit to and from the premises by donning appropriate personal protective equipment.

If the FADD feels the animal symptoms are consistent with a foreign or high consequence animal disease, the farm becomes a potential infected premises, and the FADD will assume the role of On-Scene Incident Commander. Depending on a number of factors, the FADD may request law enforcement to assist in restricting movement on or off the premises.

As noted earlier in this module, only an official federal laboratory can confirm or refute the presence of a foreign animal disease in the U.S. The two official national laboratories are the Foreign Animal Disease Diagnostic Laboratory (FADDL) located at Plum Island Animal Disease Center (PIADC) and the National Veterinary Services Laboratory (NVSL). States may arrange for law enforcement to participate in the rapid transport of critical laboratory specimens using ground relays or law enforcement aircraft.

HINT

Rumor or suspicion of a foreign animal disease within the United States can cause alarm that may lead to an immediate drop in livestock or commodity markets. Approximately 1,100 foreign animal disease investigations are initiated routinely each year. For this reason, the activities surrounding a foreign animal disease investigation will not be made public until the results of laboratory testing are returned to animal health officials.

Laboratory testing can take between 12 and 24 hours for preliminary results. Farmers, personnel, and family will be asked, but not be required, to remain on the farm. If the FADD has determined the observed symptoms are “highly likely” to be
confirmed by a laboratory, persons leaving the farm will have to undergo personal and vehicle cleaning and disinfection.

The FADD will begin an epidemiological investigation immediately. This process is similar to a forensic investigation consisting of a series of questions to determine animal movement to and from the farm during the past two to three weeks. Farm records will be reviewed and the producer asked to identify visitors who may have unknowingly transported disease to and from the farm.

**HINT**

Animals show no outward sign of illness at the moment they first become infected with any disease. During this asymptomatic incubation period, which is often one week or more in duration, animals may begin to shed the disease agent. Vehicles, transported animals, and people can carry the disease off the farm to other susceptible animals.

Additional veterinarians will be assigned to visit other premises in question and monitor for the existence of disease. Farms, sale barns, or fairs that show direct contact with suspect animals may be classified as contact or suspect premises and placed under disease surveillance and quarantines.

If intentional disease introduction is suspected, law enforcement agencies will arrive at the scene. Agencies may include local police or Sheriff’s Office, FBI, and DHS. Should an infected premises also become a crime scene, all responders should realize that preservation of potential evidence will be critical for forensic investigators. Local law enforcement may be asked to assist with security at farms being added to the suspect or contact premises list.

**Case Classification**

Case classifications include:

- **Suspect** – Animal with clinical signs, which may be consistent with the animal disease in question.
- **Presumptive Positive** – Animal with clinical signs consistent with the animal disease in question and initial testing and epidemiology are indicative of the disease.
- **Confirmed Positive** – Animal with clinical signs consistent with the animal disease in question and from which the agent was isolated and identified at FADDL or NVSL or by a USDA APHIS-approved state, federal or private laboratory.

Based on the case classification selected, appropriate control measures will be taken. Actions will depend on several factors such as the disease suspected or confirmed, the animal species affected, and the economic impacts and results from risk analyses.
For a presumptive positive, a quarantine of the premises, surveillance, and biosecurity measures will be implemented immediately. The Governor and/or state Secretary of Agriculture should be notified. The state emergency response plan may be initiated, in which case the assistance of the responders may become essential.

**Economic Impact**

An FAD or high consequence animal disease outbreak in the U.S. would inevitably start a chain of events resulting in destruction of infected herds or flocks in order to contain and eradicate the disease and prevent its spread. This would not only lead to economic losses for the individual producers involved, but also for local communities and the U.S. as a whole. These losses include:

- Production losses (meat, milk, eggs and other animal products)
- Costs associated with overall response efforts (sample collection and testing, depopulation, disposal, vaccination, C&D, surveillance)
- Loss of animal populations and valuable genetic stock
- Decrease or cessation of international trade through market losses and export restrictions
- Income losses of farmers, producers, food processors and exporters and other allied industries (feed, equipment suppliers, drug and pharmaceutical companies, veterinarians, etc.)
- Movement restrictions that may impact area businesses such as hunting and tourism
- Higher prices of commodities for consumers
- Lack of market for commodities due to unfounded public perception of “contaminated” animals and animal products and lack of consumer confidence in the food supply
- Economic losses to local businesses as a result of community financial instability and business interruption (reduction in consumer spending)

The enormity of an FAD can be glimpsed in the nation’s first case of bovine spongiform encephalopathy (BSE or “mad cow disease”). In December 2003, a single case of BSE was confirmed in Washington State. Forty-six days after the confirmed positive test result was received, the investigation was officially closed on February 4, 2004.

The epidemiological investigation to find animals in addition to the one BSE-positive cow led to a total of 189 investigations, involving complete herd inventories on 51 premises in three states, Washington, Oregon and Idaho. These herd inventories involved examination of identification on more than 75,000 cattle.
A total of 255 adult “Animals of Interest” were identified on 10 premises in Washington, Oregon and Idaho. All 255 adult cattle were depopulated and all subsequently tested BSE-negative. Four hundred and forty-nine calves that were depopulated were not tested because they were too young for detection of the BSE agent. All carcasses were disposed of in landfills in accordance with all federal, state and local regulations.

During the investigation, over 2,000 tons of meat and bone meal was located and held due to potential contamination with protein from the BSE-positive cow. The meat and bone meal was eventually disposed of in a landfill.

International markets were closed to U.S. live cattle and beef, with U.S. beef exports in 2004 dropping to 451 million pounds from a record 2.5 billion pounds in 2003. As of January 2010, some of the U.S.’s international export markets have yet to reopen.

**Economic Impact Estimates**

<table>
<thead>
<tr>
<th>Event</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental contamination of livestock feed with dioxin (Belgium, 1999)</td>
<td>$850 million cost of slaughtering 50,000 hogs and 3.3 million chickens. Consumer health costs unknown.</td>
</tr>
<tr>
<td>Intentional contamination of restaurant food by religious cult (Oregon, 1984)</td>
<td>751 persons affected by Salmonella poisoning. Total health costs unknown.</td>
</tr>
<tr>
<td>Outbreak of BSE in UK cattle industry</td>
<td>177,812 animal cases by August 2001. $5.8 billion cost to UK economy.</td>
</tr>
<tr>
<td>Outbreak of foot and mouth disease (FMD) in the UK</td>
<td>Over 4 million head of livestock affected. $3.6 - 11.6 billion cost to UK economy.</td>
</tr>
<tr>
<td>Outbreak of FMD in Taiwan pork industry</td>
<td>3.85 million hogs slaughtered. Total cost unknown.</td>
</tr>
</tbody>
</table>
Continuity of Business

The goal of eradicating a disease within a control zone may be contrary to efforts to maintain continuity of operations on farms located within the zone. Likewise, farms that wish to re-establish business as rapidly as possible will first be required to establish an infection-free status and demonstrate effective biosecurity practices. Maintaining an operation or returning to business as usual will prove to be more than challenging in a disease outbreak.

Some competing priorities may be impossible to avoid or resolve prior to an incident or outbreak. Others may be partially resolved or mitigated prior to an incident by raising awareness, educating farmers and responders, establishing policy, developing plans, and identifying resources. Actions or areas of concern that may impact continuity of operations and should be addressed prior to an incident include:

- Identify disease agents that cause quarantine or movement control restrictions.
- Establish biosecurity protocols for producers and responders and conduct education programs to ensure proper compliance.
- Pre-identify potential disruptions to business that occur with implementation of stop movement and quarantine restrictions and perform risk assessment for the specific animal movements or animal commodities that are disrupted. Address all disruptions and mitigate competing priorities prior to an incident.
- Identify personnel and equipment resources for diagnostic testing and define surge capacity requirements.
- Pre-establish epidemiological assessment or questionnaires for immediate implementation at the start of an incident to establish traces to infected premises and contaminated personnel and equipment.
- Identify all of the resources needed at the local, state and federal level to prepare and implement continuity of business planning. Recognize, discuss, and analyze the economic consequences for the competing goals of disease containment and business continuity in control zones.

Stress Factors

A foreign animal disease incident may have a significant impact on the mental health of producers, responders, and the community. The psychological and emotional trauma resulting from the incident can be very serious as individuals may be more prone to depression and suicide.

Almost all individuals will experience a crisis and even a traumatic event in the course of their lifetime. A crisis is commonly considered to be an event of limited
duration that is unexpected and overwhelming. A traumatic event is considered an incident in which an individual perceives actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The individual’s response involves intense fear, helplessness, or horror.

During crises and traumatic events, individuals may feel overwhelmed and unable to use their normal means of coping with stress. This can leave long-lasting deficits in:

- Cognitive abilities
- Emotional stability
- Physical well-being
- Spiritual functioning
- Relationships

Traumatic stress is usually a temporary response to overwhelming stress. Individuals react differently to stress and to traumatic events, depending upon their personalities, past experiences, severity of the event, and degree of exposure to the trauma.

Situational stress may be experienced when producers and family members lose their livestock and can be debilitating. Responders placed in unfamiliar roles may also experience situational stress. Communities may also experience situational stress in response to unfolding events.

Most individuals are resilient to daily stress and have coping techniques to help them effectively manage the occasionally intense stressors of their lives. Individuals normally recover from critical incident stress and may even experience personal growth if given the proper tools and emotional support to handle the experience.

Left unattended, acute stress may progress to a more serious level of unmanageable stress or post-traumatic stress disorder. The potential for acute or chronic stress to progress to post-traumatic stress disorder is amplified by threats of terrorism aimed at public health and public safety work sites.

Anyone involved in traumatic events has the potential to experience:

- Physical illness
- Inability to function adequately on the job
- Depression
- Anxiety
- Marital and family conflict
- Hostility and aggression
- Death through suicide as a reaction to overwhelming stress.
The first steps toward managing stress effectively are being aware of one’s own particular stressors and the warning signs that stress is beginning to show its effects (physically, cognitively, emotionally, behaviorally, and/or spiritually). Awareness involves:

- Self-examination
- A mental attitude of self-care
- Knowing what types of incidents and sensory experiences (e.g., smells, sounds, sights, and feelings) trigger emotional response.

Communities, agencies, and responders should remember to include mental health services in planning efforts for agriculture emergencies.

**Summary**

The system of agriculture that exists in our country is highly vulnerable to animal disease. Many groups with varying authorities and jurisdictions participate in response to an agriculture emergency under Unified Command. An important component to response is an understanding of the steps necessary to determining the presence of disease, the process of diagnostics and surveillance and the need for deployment of personnel. Within this response effort is the constant need to understand the importance of business continuity and the economic and emotional stresses imposed on producers and the surrounding community.
## Appendix A

### OIE Listed Diseases for Select Species

<table>
<thead>
<tr>
<th>Multiple Species Diseases</th>
<th>Cattle Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Bovine anaplasmosis</td>
</tr>
<tr>
<td>Aujeszky’s disease</td>
<td>Bovine babesiosis</td>
</tr>
<tr>
<td>Bluetongue</td>
<td>Bovine genital campylobacteriosis</td>
</tr>
<tr>
<td>Brucellosis (Brucella abortus)</td>
<td>Bovine spongiform encephalopathy</td>
</tr>
<tr>
<td>Brucellosis (Brucella melitensis)</td>
<td>Bovine tuberculosis</td>
</tr>
<tr>
<td>Brucellosis (Brucella suis)</td>
<td>Bovine viral diarrhea</td>
</tr>
<tr>
<td>Crimean Congo haemorrhagic fever</td>
<td>Contagious bovine pleuropneumonia</td>
</tr>
<tr>
<td>Echinococcosis/hydatidosis</td>
<td>Enzootic bovine leukosial</td>
</tr>
<tr>
<td>Epizootic haemorrhagic disease</td>
<td>Haemorrhagic septicaemia</td>
</tr>
<tr>
<td>Equine encephalomyelitis (Eastern)</td>
<td>Infectious bovine rhinotracheitis/infectious pustular vulvovaginitis</td>
</tr>
<tr>
<td>Foot and mouth disease</td>
<td>Lumpy skin disease</td>
</tr>
<tr>
<td>Heartwater</td>
<td>Theileriosis</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Trichomonosis</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Trypanosomosis (tsetse-transmitted)</td>
</tr>
<tr>
<td>New world screwworm (Cochliomyia hominivorax)</td>
<td></td>
</tr>
<tr>
<td>Old world screwworm (Chrysomya bezziana)</td>
<td>African swine fever</td>
</tr>
<tr>
<td>Paratuberculosis</td>
<td>Classical swine fever</td>
</tr>
<tr>
<td>Q fever</td>
<td>Nipah virus encephalitis</td>
</tr>
<tr>
<td>Rabies</td>
<td>Porcine cysticeriosis</td>
</tr>
<tr>
<td>Rift Valley fever</td>
<td>Porcine reproductive and respiratory syndrome</td>
</tr>
<tr>
<td>Rinderpest</td>
<td>Swine vesicular disease</td>
</tr>
<tr>
<td>Surra (Trypanosoma evansi)</td>
<td>Transmissible gastroenteritis</td>
</tr>
<tr>
<td>Trichinellosis</td>
<td></td>
</tr>
<tr>
<td>Tularemia</td>
<td>Myxomatosis</td>
</tr>
<tr>
<td>Vesicular Stomatitis</td>
<td>Rabbit haemorrhagic disease</td>
</tr>
<tr>
<td>West Nile fever</td>
<td></td>
</tr>
</tbody>
</table>

### Swine Diseases

| Old world screwworm (Chrysomya bezziana)      | African swine fever                                      |
| Paratuberculosis                              | Classical swine fever                                    |
| Q fever                                       | Nipah virus encephalitis                                 |
| Rabies                                        | Porcine cysticeriosis                                    |
| Rift Valley fever                             | Porcine reproductive and respiratory syndrome            |
| Rinderpest                                    | Swine vesicular disease                                  |
| Surra (Trypanosoma evansi)                    | Transmissible gastroenteritis                             |
| Trichinellosis                                |                                                          |

### Lagomorph Diseases

| Tularemia                                     | Myxomatosis                                              |
| Vesicular Stomatitis                          | Rabbit haemorrhagic disease                              |
| West Nile fever                               |                                                          |
### Sheep and Goat Diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Equine Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caprine arthritis/encephalitis</td>
<td>African horse sickness</td>
</tr>
<tr>
<td>Contagious agalactia</td>
<td>Contagious equine metritis</td>
</tr>
<tr>
<td>Contagious caprine pleuropneumonia</td>
<td>Dourine</td>
</tr>
<tr>
<td>Enzootic abortion of ewes (ovine chlamydiosis)</td>
<td>Equine encephalomyelitis (Western and Venezuelan)</td>
</tr>
<tr>
<td>Maedi-visna</td>
<td>Equine infectious anaemia</td>
</tr>
<tr>
<td>Nairobi sheep disease</td>
<td>Equine influenza</td>
</tr>
<tr>
<td>Ovine epididymitis (Brucella ovis)</td>
<td>Equine piroplasmosis</td>
</tr>
<tr>
<td>Peste des petits ruminants</td>
<td>Equine rhinopneumonitis</td>
</tr>
<tr>
<td>Salmonellosis (S. abortusovis)</td>
<td>Equine viral arteritis</td>
</tr>
<tr>
<td>Scrapie</td>
<td>Glanders</td>
</tr>
<tr>
<td>Sheep pox and goat pox</td>
<td></td>
</tr>
</tbody>
</table>

### Equine Diseases

<table>
<thead>
<tr>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>African horse sickness</td>
</tr>
<tr>
<td>Contagious equine metritis</td>
</tr>
<tr>
<td>Dourine</td>
</tr>
<tr>
<td>Equine encephalomyelitis (Western and Venezuelan)</td>
</tr>
<tr>
<td>Equine infectious anaemia</td>
</tr>
<tr>
<td>Equine influenza</td>
</tr>
<tr>
<td>Equine piroplasmosis</td>
</tr>
<tr>
<td>Equine rhinopneumonitis</td>
</tr>
<tr>
<td>Equine viral arteritis</td>
</tr>
<tr>
<td>Glanders</td>
</tr>
</tbody>
</table>

### Avian Diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian chlamydiosis</td>
<td>Highly pathogenic avian influenza (HPAI)*</td>
</tr>
<tr>
<td>Avian infectious bronchitis</td>
<td>Low pathogenic avian influenza (LPAI)*</td>
</tr>
<tr>
<td>Avian infectious laryngotracheitis</td>
<td>*Per Chapter 10.4 of the Terrestrial Animal Health Code</td>
</tr>
<tr>
<td>Avian mycoplasmosis (M. gallisepticum)</td>
<td>Infectious bursal disease (Gumboro disease)</td>
</tr>
<tr>
<td>Avian mycoplasmosis (M. synoviae)</td>
<td>Marek’s disease</td>
</tr>
<tr>
<td>Duck viral hepatitis</td>
<td>Newcastle disease (END)</td>
</tr>
<tr>
<td>Fowl cholera</td>
<td>Pullorum disease</td>
</tr>
<tr>
<td>Fowl typhoid</td>
<td>Turkey rhinotracheitis</td>
</tr>
</tbody>
</table>

Table does not include following: Bee, Mollusk, Fish, Crustacean, and Amphibian.

Other diseases not listed include Camel pox and Leishmaniasis.
## Appendix B

### USDA Select Agent and Toxin List

<table>
<thead>
<tr>
<th>USDA only agents and toxins</th>
<th>USDA/HHS overlap agents and toxins</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Livestock</strong></td>
<td></td>
</tr>
<tr>
<td>• African horse sickness virus</td>
<td>• Bacillus anthracis</td>
</tr>
<tr>
<td>• African swine fever virus</td>
<td>• Botulinum neurotoxins</td>
</tr>
<tr>
<td>• Akabane virus</td>
<td>• Botulinum neurotoxin producing species of Clostridium</td>
</tr>
<tr>
<td>• Avian influenza virus (highly pathogenic)</td>
<td></td>
</tr>
<tr>
<td>• Bluetongue virus (exotic)</td>
<td>• Brucella abortus</td>
</tr>
<tr>
<td>• Bovine spongiform encephalopathy agent</td>
<td>• Brucella melitensis</td>
</tr>
<tr>
<td>• Camel pox virus</td>
<td>• Brucella suis</td>
</tr>
<tr>
<td>• Classical swine fever virus</td>
<td>• Burkholderia mallei</td>
</tr>
<tr>
<td>• <em>Cowdria ruminantium</em> (Heartwater)</td>
<td>• Burkholderia pseudomallei</td>
</tr>
<tr>
<td>• Foot-and-mouth disease virus</td>
<td>• Clostridium perfringens epsilon toxin</td>
</tr>
<tr>
<td>• Goat pox virus</td>
<td>• Coccidioides immitis</td>
</tr>
<tr>
<td>• Japanese encephalitis virus</td>
<td>• Coxiella burnetii</td>
</tr>
<tr>
<td>• Lumpy skin disease virus</td>
<td>• Eastern equine encephalitis virus</td>
</tr>
<tr>
<td>• Malignant catarrhal fever virus (exotic)</td>
<td>• Francisella tularensis</td>
</tr>
<tr>
<td>• Menangle virus</td>
<td>• Hendra virus</td>
</tr>
<tr>
<td>• <em>Mycoplasma capricolum/M. F38/M. mycoides capri</em> (contagious caprine o pleuropneumonia)</td>
<td>• Nipah virus</td>
</tr>
<tr>
<td>• <em>Mycoplasma mycoides mycoides</em> (contagious bovine pleuropneumonia)</td>
<td>• Rift Valley fever virus</td>
</tr>
<tr>
<td>• Newcastle disease virus (VVND)</td>
<td>• Shigatoxin</td>
</tr>
<tr>
<td>• Peste des petits ruminants virus</td>
<td>• Staphylococcal enterotoxins</td>
</tr>
<tr>
<td>• Rinderpest virus</td>
<td>• T-2 toxin</td>
</tr>
<tr>
<td>• Sheep pox virus</td>
<td>• Venezuelan equine encephalitis virus</td>
</tr>
<tr>
<td>• Swine vesicular disease virus</td>
<td></td>
</tr>
<tr>
<td>• Vesicular stomatitis virus (exotic)</td>
<td></td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
</tr>
<tr>
<td>• <em>Candidatus Liberobacter africanus</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Candidatus Liberobacter asiaticus</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Peronosclerospora philippinesis</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Ralstonia solanacearum</em>, race 3, biovar 2</td>
<td></td>
</tr>
<tr>
<td>• <em>Sclerotinia rayssiae var. zeae</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Synchytrium endobioticum</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Xanthomonas oryzae pv. Oryzicola</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Xylella fastidiosa</em> (citrus variegated chlorosis strain)</td>
<td></td>
</tr>
</tbody>
</table>

United States Department of Agriculture • Animal and Plant Health Inspection Service

May 2005
Scope Statement

- The participant will gain an appreciation for the vulnerability of U.S. agriculture to animal disease threats, be introduced to the factors that trigger response efforts, and understand the important role of responders in an agricultural emergency and gain appreciation for the role of unified command. This lesson will also address continuity of business and issues of traumatic stress.

Terminal Learning Objective

- Review the elements of an animal disease emergency and understand the critical role of responders.

Enabling Learning Objectives

1-1 Define agriculture emergency and recognize vulnerabilities of agriculture systems.
1-2 Identify the various groups, authorities, and jurisdictions that will play major roles in a foreign animal disease event.
1-3 Identify the steps to determine the presence of disease, process of diagnostics and surveillance, and the need for deployment of personnel.
1-4 Discuss the importance of continuity of business planning within a control zone.
1-5 Define traumatic stress as it relates to a foreign animal disease response.

What is an Agriculture Emergency?

- Any event that jeopardizes the economic stability of any portion or segment of the agriculture or agribusiness industry.
  - Pre and Post Harvest
    - Naturally occurring
    - Intentional introduction
  - CBRNE

Understanding the Targets

- Transportation systems
- Water supplies
- Grain elevators
- Producers, farmers, farm workers
- Restaurants and food handlers
- Grocery stores
- Food and agriculture research labs
- Packing and processing facilities

Introduction of Disease

Unintentional threats
- Natural
  - Point of origin is unknown
  - West Nile, Chronic Wasting Disease
- Accidental
  - Known point of origin
    - Contamination of feed
    - Improper processing
Introduction of Disease

**Intentional introduction**
- Criminal
- Act of Terrorism (AgroTerrorism)
- Targets economy

Vulnerability

- Geographical dispersion and concentration
- Commingled products from many sources
- Consolidation of agribusinesses
- Extensive movement of animals
- Inadequate biosecurity

Susceptibility

Animal diseases make good terrorism agents
- Rapidly spread
- Spread facilitated by wildlife or humans
- Difficult to kill and persist in environment
- Difficult to trace, go undetected for long periods
- Global sources exist and easily accessible

Achievability

- Motivation
- Opportunity
- Technical Ability
- Goal
- Willingness to utilize biological weapons

Transmissible Animal Diseases

Zoonotic
- Transmitted from animals to humans
- Represent source of emerging infectious disease
- Avian Influenza
- Brucellosis
- Tularaemia
- Rabies
- Lassa fever
- Listeriosis
- West Nile virus
- Trichinosis
- Swine Flu
- Lyme Disease
- Vesicular stomatitis

Zoonotic diseases can spread through:
- Direct contact
- Drinking water containing parasites
- Eating raw or contaminated animal products
- Insect vectors
- Primates
- Cats
- Dogs
- Pigs
- Horses
- Cattle
- Rodents
- Rabbits
- Bats
Transmissible Animal Diseases

- Non-zoonotic
  - Non-infectious to humans
  - Humans may still transmit
  - Foot and mouth disease
  - African swine fever
  - Rinderpest
  - Hog cholera
  - Vesicular exanthema
  - Bovine Pleuropneumonia

Routes of Transmission

- Direct Contact
- Ingestion
- Airborne
- Fomites
- Vectors

Laboratory Diagnostics and Disease Surveillance

Diagnosis
- Requires organism isolation in lab
- Poultry
  - tracheal or cloacal swab
- Livestock
  - blood or secretions

Laboratory Confirmation
- Only federal lab can confirm
- Plum Island (FMD)
- NVSL (Avian influenza)

Surveillance
- USDA both domestic and international roles
- Domestic prevention efforts
- Collaboration with USAID and HHS for avian influenza H5 and H7

Vaccination in an Animal Disease Outbreak

- Dependent upon state and federal epidemiological assessment and managed by USDA/APHIS

Vaccination Assessment

- Probability of disease containment
- Proximity of high value animal agriculture
- Threat to valuable, rare or endangered nondomestic species
- Density of animals at risk
- Extent to which wildlife is involved
- Availability of staff to carry out vaccination efforts
- Public opinion
- Potential for zoonotic infection
- Impact on export markets
- Economic impact of failing to control the disease
Animal Disease Response Training Participant Guide

Introduction

Version 4.0 2013

Slide 19

National Veterinary Stockpile

- Provides equipment, field tests, vaccines and other support services that states need in response to an animal disease outbreak.

Slide 20

Animal Health Response Agencies

- Informs governments about diseases worldwide and recommends means of control
- Coordinates international disease surveillance and control
- Coordinates regulations for international trade in animals and animal products

Slide 21

Animal Health Response Agencies

Protect and promote the growth of U.S. agriculture
- Addresses animal and plant disease events
  - Border inspections
  - Animal import testing
  - Training for foreign animal disease detection
- Protect, detect, contain, control disease
  - Wildlife Services
  - NAHRC
  - FADD
  - AVIC

Slide 22

State Animal Health Response Agencies

Department of Agriculture or Board of Animal Health
- State Veterinarian
- Foreign Animal Disease Diagnosticians (FADD)

Oversight of animal health related activities
- Surveillance
- Quarantine
- Movement permits
- Disease investigation
- Licensing or registration

Slide 23

Integrated Response

ICS/Unified Command
- Overall management of incident
- Directs activities
- Releases resources
- Implementation of strategies

Slide 24

ICS Structure
Reaching a Diagnosis

- Local producer or veterinarian notices problem
- Notification of state or federal animal health authorities
- Field sample collection by a Foreign Animal Disease Diagnostician (FADD)
- Diagnosis confirmed by a federal laboratory
  - Plum Island for Foot and Mouth disease
  - NVSL for Avian Influenzas
- National Animal Health Laboratory Network (NAHLN)
  - Responds to overflow and additional confirmations

Case Classification

- Suspect
  - Animals with clinical signs of disease
- Presumptive Positive
  - Animals with clinical signs and positive initial testing
  - Quarantine of premises, surveillance and biosecurity measures will be implemented immediately

Case Classification

- Confirmed Positive
  - Animals with clinical signs and identification at a USDA laboratory
    - FADDL – Plum Island
    - NVSL – Ames, Iowa

Economic Impact

- Production losses
- Overall response effort costs
- Loss of animals and genetics
- Loss of international trade, exporting barriers

What is Continuity of Business?

- Goal of eradicating disease may be contrary to continuity of operations on nearby farms
- Return to business-as-usual will prove to be challenging
- Some priorities may be resolved prior to outbreak
  - Raise awareness
  - Establish policies
  - Develop plans
  - Identify resources

Economic Impact

- Loss of income for farmers, producers
- Movement restrictions impacting tourism, hunting
- Higher prices for consumer commodities
- Economic losses to local businesses via reduction in consumer spending
Stress Factors

- Individuals may feel overwhelmed and suffer deficits in:
  - Cognitive abilities
  - Emotional stability
  - Physical well-being
  - Spiritual functioning
  - Relationships

What Steps Can Help Manage Stress?

- Self examination
- Mental attitude of self care
- Knowing what types of incidents and sensory experiences trigger emotional response
  - Smells
  - Sounds
  - Sights
  - Feelings

Summary

- Our agriculture system is vulnerable to animal disease.
- Many groups participate in response to an agriculture emergency.
- Important to understand the steps necessary to determine the presence of disease.
- Continuity of business is essential to maintain.
- Economic and emotional stress imposed on producers and communities.
This page left intentionally blank
2

Personal Protective Equipment
Instructor Notes:

-----------------

-----------------

-----------------

-----------------

-----------------

-----------------

-----------------

-----------------
ABOUT THIS LESSON

**Scope Statement**

This lesson provides responders with information regarding procedures for selection, inspection, and safe use of appropriate personal protective equipment (PPE). Varying styles and levels of PPE appropriate for animal disease incidents and the associated requirements will be introduced. The lesson also discusses selection of task specific PPE, donning and doffing, and safety issues associated with wearing PPE.

**Duration:** 60 Minutes

**Resources**
- Participant Procedure Guide
- Presentation Slides
- Donning/Doffing Sheets
- Sample PPE

**Practical Exercise Strategy**

Participants will select, inspect, and don and doff Level C personal protective equipment (PPE) using information received in this lesson.

**Instructor to Participant Ratio** 1:20

---

**Terminal Learning Objective**

Describe the proper procedures for inspection and use of Personal Protective Equipment to ensure the safety of responders during an animal disease incident.

**Enabling Learning Objectives**

Upon completion of this lesson, the participant will be able to:

- 2-1 Describe the process and authority used to determine proper levels of protection mandated during response to an animal disease incident.
- 2-2 Identify factors to consider while working in PPE.
- 2-3 Identify the various components of PPE used in an agricultural emergency.
- 2-4 Identify physiological and psychological stressors that can affect users of all levels of PPE.
Introduction

In the event of an animal disease incident, responders may be called upon to perform specific functions that may require the use of personal protective equipment (PPE). This lesson will provide responders with information on using PPE Levels C and D, examining components, and identifying challenges associated with working in specialized PPE. The participant will be provided with the knowledge, skills, and abilities needed to inspect and safely don and doff specific types of PPE.

Responder Protection in Animal Disease Exposure

Animal disease agents can enter the body through the lungs, skin, eyes, or ingestion, but most are not harmful to humans. However, there are some zoonotic animal diseases that can also cause disease in humans. When responders enter a known or suspected contaminated area, they should rely on personal protective equipment (PPE) and/or respiratory protection as described in the Occupational Safety and Health (OSHA) regulations. For most animal disease incidents, PPE is used as a biosecurity measure or as a protective measure during certain tasks such as cleaning and disinfecting.

PPE consists of various types and combinations of protective equipment. The level of protection required will depend upon:

- The specific disease agent.
- The conditions in which the equipment is worn.
- The activities and exposure level of response personnel.

The level of protection will also be determined by animal health authorities in cooperation with public health officials. This includes but is not limited to:

- State Veterinarian or State Public Health Official.
- Area Veterinarian In Charge (USDA/VS-AVIC).
- Federal, state, and tribal public health officials.

Safety Officers need to assure workers that the levels of protection established by the professionals in charge will be appropriate to the task.
**Personal Protective Equipment Overview**

Personal protective equipment (PPE) is available in a variety of materials and offers a wide range of protection including fire resistant capabilities.

**Impermeable Suits**

Impermeable suits form a physical barrier between the wearer and chemical hazards, providing longer breakthrough times and increased protection from potential exposures. Because these suits do not allow the release of body heat, the responder may become very warm and at greater risk for heat-related injuries.

**Permeable Suits**

Permeable suits allow air to diffuse through the suit, allowing the wearer’s perspiration to evaporate. These suits do not offer as much skin protection as impermeable suits.

No single manufactured material provides protection against all known hazards. Personal protective equipment must be researched to determine which gives the most protection against the hazards responders are most likely to encounter. The amount of skin protection and respiratory protection provided by a garment and respirator determines the level of protection.

**Hand Protection**

Hand protection should be selected based on the task and the associated hazard(s). Detailed information can be obtained from the manufacturer. The following information describes glove material types and their functions.

**HINT**

All gloves come in various thicknesses. Just because a glove is used, the thickness may not be adequate to provide a proper level of protection. The selection of glove will depend upon the anticipated hazards. A minimum of two layers, an inner and outer glove, is recommended.

**Mechanical Hazards**

*Leather/Work gloves* reduce nuisance hand injuries from snags, punctures, abrasions and cuts. This type of glove does not provide protection from chemicals and liquids.
Chemical Hazards

Nitrile gloves provide protection from acids, alkaline solutions, hydraulic fluid, fuels, lubricants, aromatics, petroleum, and chlorinated solvents. They also offer some resistance to cuts and snags.

Neoprene gloves offer resistance to oil, grease, acids, solvents, alkaline solutions, and most refrigerants.

Polyvinyl chloride (PVC) gloves protect against petroleum products, grease and acids and are good for general purpose applications where protection against liquids is needed.

Latex (natural rubber) gloves resist mild acids, alkaline solutions, detergents, germicides, and ketone solutions. Latex will swell and degrade if exposed to gasoline or kerosene. When exposed to prolonged, excessive heat or direct sunlight, latex gloves can start to degrade, causing the glove materials to lose their integrity. A latex-free alternative is available for those sensitive to latex.

HINT

Latex is a milky fluid that comes from the tropical rubber tree. Hundreds of everyday products contain latex. Repeated exposure to a protein in natural latex can make you more likely to develop a latex allergy. If your immune system detects the protein, a reaction can start in minutes. You could get a rash, asthma, and, in rare cases, shock from latex exposure.

Eye Protection

Appropriate eye protection, such as safety glasses meeting the American National Standards Institute Z-87.1 standard or goggles must be worn. Face shields offer additional protection when there is a potential for splashing or flying debris. Face shields must be worn in combination with safety glasses or goggles because face shields alone are not considered appropriate eye protection.

In June 2005, the National Institute for Occupational Safety and Health (NIOSH) reviewed existing research on contact lens use while working with chemicals and recommended that workers be permitted to wear contact lenses when handling hazardous chemicals, with some conditions. The rationale for this recommendation is that wearing contact lenses provides workers with a greater choice of eye and face protection, as well as better visual acuity. Some sources indicate that in the event of a chemical splash into the eye, it can be difficult to remove the contact lens to irrigate the eye. Contact lenses must be worn in conjunction with safety glasses or goggles to protect the eyes. When necessary, protective eyewear should be worn over prescription glasses.
Foot Protection

Protective footwear should always be worn. This includes footwear that provides physical protection and barrier protection and reduces the risk of transferring a disease off the premises. Shoe and boot covers provide barrier protection and increase biosecurity. Reusable footwear must be cleaned and disinfected prior to leaving the quarantined area. Shoe and boot covers should be disposed of properly.

Respiratory Protection

Certain response activities and airborne animal diseases may require respiratory protection. Compliance with OSHA respirator standard 29 CFR 1910.134 is mandatory whenever respirators are used. These standards include:

- A written respiratory protection program plan.
- Medical evaluation and surveillance.
- Respirator selection and fit testing.
- Training on use, selection, and maintenance of respirators.

Without these components, the wearer will not receive an adequate degree of protection.

Respiratory classes

Respirators can be divided into two broad classes: those that provide their own air and those that purify the air. The latter type is far less protective.

Air supplying self-contained breathing apparatus (SCBA)

Air purifying respirator (Full face)
It is critical to understand that air purifying respirators are not safe in oxygen deficient environments. Oxygen meters are used to evaluate the oxygen content of the atmosphere. Ambient air should contain 20.8 percent oxygen. If the oxygen content decreases below 19.5 percent, the atmosphere is considered oxygen deficient and air-supplying respiratory protection is required. Concentrations above 23 percent are considered oxygen-enriched and therefore increase the risk of combustion. Deadly oxygen deficient atmospheres may occur in unventilated areas such as silos and manure pits or because of terrain variations, where heavier-than-air vapors may collect. Under these circumstances, a supplied-air respirator is required if entry is made.

**Pressure Inside the Facepiece**

Pressure inside the mask when inhaling is a key factor in identification of respirators. Both broad categories of respirators discussed above can be further classified as to whether the pressure inside the respirator becomes negative when the wearer takes a breath. A drop in pressure inside the respirator increases the likelihood that contaminants can enter if the seal is not tight. Even for atmosphere-supplying respirators, the positive pressure respirators are given much higher protection factors than those that become negative.

**Half-face versus Full-face**

Another important division among respirators is whether they cover the full face or just half of the face. Full-face respiratory protection has several strong advantages: the fit is generally better because they don't have to go over the bridge of the nose, the eyes are protected and the respirators aren't dislodged as easily. They are prone to fogging, however, and aren't as comfortable.

**Hint**

When CO$_2$ is used as a euthanasia agent, an oxygen-deficient atmosphere is created that may necessitate the use of supplied air.
Required Fit Testing

OSHA requires that responders pass a fit test before wearing a respirator. The test can be either a qualitative test where the wearer indicates if he or she can detect the presence of a test agent, like irritant smoke, in the respirator. It is a yes or no answer. Quantitative fit testing, on the other hand, provides a numerical estimate of the fit of the respirator on the user's face by actually measuring the amount of a non-hazardous challenge agent outside the respirator to that inside, providing a fit factor that is just the concentration measured outside the respirator divided by the concentration measured inside.

Disposable Particulate Respirators

Disposable particulate respirators are the minimum level of respiratory protection that should be worn. These respirators filter out dust and aerosol particles based on micron size and minimize exposure.

Particulate filters are further classified based on efficiency:

- 95 percent, designated 95
- 99 percent, designated 99
- 99.97 percent, designated 100 (HEPA filter)
Fitting Instructions

Knowledge Check

The following is an example of fitting instructions:

1. Place the respirator over your nose and mouth. Be sure the metal nose clip is on top and pre-stretch the straps before wearing.

2. Pull the top strap over your head until it rests on the crown of your head above your ears.

3. Pull the bottom strap over your head until it rests just below your ears.

4. Using both hands and starting at the top, mold the metal nose clip around your nose to achieve a secure seal.

Fitting instructions for donning a respirator must be followed each time the respirator is worn, per manufacturer’s recommendations. Be sure to read and follow all manufacturer’s instructions on proper use of a respirator.

Air-Purifying Respirators (APRs)

Air-purifying respirators may be necessary to protect against airborne contaminants such as dust, dried manure, aerosols, vapors, or disease agents. These contaminants may result from animal herding, euthanasia, structure demolition, or cleaning and disinfecting activities. Air-purifying respirators cover the face and pass contaminated air through a filter that removes the biological or chemical agent. Particulate filters work very differently from organic vapor cartridges. When particulate filters become loaded with dust they make it more difficult to breathe, but they don't release contaminants into the mask. Chemical cartridges, on the other hand, are designed to trap contaminants as they pass through a series of absorbent/adsorbent materials. Eventually, filters become saturated (this is called “breakthrough”) and lose their protective quality, allowing vapors to enter the facepiece. OSHA requires that these chemical cartridges have an end-of-life indicator that changes color when approaching breakthrough or the employer must create a schedule for changing cartridges before breakthrough is anticipated. Cartridges are color-coded, and it is absolutely critical that the right cartridges are chosen and are marked as approved by NIOSH.
### Most useful cartridges for zoonotic disease outbreaks

<table>
<thead>
<tr>
<th>Color</th>
<th>Type</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magenta, purple</td>
<td>High Efficiency Particulate Air</td>
<td>Dust particles, viruses, bacteria</td>
</tr>
<tr>
<td></td>
<td>(HEPA)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>Organic Vapor</td>
<td>Solvents</td>
</tr>
<tr>
<td>Yellow</td>
<td>Ammonia</td>
<td>Animal waste</td>
</tr>
</tbody>
</table>

Particulate filters are classified based on resistance to oil.

**User Seal Check**

**Knowledge Check**

Positive Pressure User Seal Check

1. Place both hands completely over the respirator and exhale. The respirator should bulge slightly.

2. If leaks between the face and face seal of the respirator occur, reposition it and readjust the nose clip for a more secure fit.

Negative Pressure User Seal Check

1. Place both hands completely over the respirator and inhale. The respirator should collapse slightly.

2. If leaks between the face and face seal of the respirator occur, reposition it and readjust the nose clip for a more secure fit.

*If you cannot achieve a proper fit, DO NOT enter the contaminated area*

The wearer must perform a user seal check every time they don a respirator. The following procedures provide directions on how to perform positive and negative checks. For additional information on mandatory user seal checks, see Appendix A.

**Powered Air-Purifying Respirator (PAPR)**

Responders who cannot wear a disposable particulate respirator because of facial hair or other fit limitations should wear a loose fitting (i.e., helmeted or hooded) powered air-purifying respirator (PAPR) equipped with high-efficiency particulate air filters (HEPA).

Powered air-purifying respirators do not require fit testing, but medical clearance is still required and protocols must to be included in the written respiratory protection program plan.
### Integrated Protection - Combining Components of PPE

The Environmental Protection Agency (EPA) has designated four levels of protection. The two levels that apply to responders in an animal disease incident are Levels C and D. Combinations of dermal and respiratory ensembles are used to protect responders and increase biosecurity.

**PPE Levels are outlined in the following table:**

<table>
<thead>
<tr>
<th>Level of Protection</th>
<th>PPE Description</th>
<th>Recommended Use</th>
</tr>
</thead>
</table>
| **Level A**         | The highest level of respiratory, skin and eye protection available:  
• Fully encapsulating, chemical resistant suit with attached boots and outer gloves  
• Hard hat if necessary | This level is recommended for:  
• Site entries if operations involve high potential for splash  
• Exposure to vapors, gases, or particles that have high degree of hazard to the skin  
Note: Must be compatible with chemicals involved |
| **Level B**         | The highest level of respiratory protection, but limited skin protection from airborne hazards (gases, vapors, dusts and mists)  
• SCBA  
• Chemical resistant clothing, coveralls or two piece style  
• Inner and outer gloves  
• Chemical resistant boots or boot covers  
• Hard hat if necessary | This is the minimum level recommended for initial site entries until the hazards have been further identified. Use only when:  
• Vapor or gases are not suspected in high concentrations  
• Chemicals are not capable of being absorbed through intact skin |
| **Level C**         | Provides an adequate level of protection when concentrations and types of airborne substances are known and the criteria for using air-purifying respirators are met. Level C includes:  
• Full-face or half mask  
• Air-purifying respirator or SAR  
• Same hooded chemical resistant clothing as Level B | Recommended when:  
• Levels of contaminant, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin.  
• Types of chemical have been identified, concentrations have been measured, and an air-purifying respirator is available that can remove these impurities.  
• Atmosphere contains greater than 19.5% oxygen  
• Note: Not appropriate for initial entry and response at a chemical or CBRNE incident |
| **Level D**         | Work uniform or normal work attire providing no respiratory protection and minimal skin protection to chemical exposure | Recommended when:  
• Atmosphere contains no known hazards  
• Work functions preclude splashes, immersions, or potential for unexpected inhalation of any chemicals |

### Protection Levels

The appropriate level of PPE will be determined by the animal health authority in charge or outlined in your state’s animal disease response plan. The type or level of PPE required is dependent upon the responder’s tasks. All associated safety and health issues will be monitored by the Safety Officer.
Level C Personal Protective Equipment

Level C provides protection against chemical and biological agents. The appropriate filters on the air-purifying respirator (APR) are selected based on contaminants. It is important to know and understand the environment one will be working in as well as the filtering capability of the air-purifying respirator that will be worn.

The Components of Level C

Level C protection is selected when the type of contaminant is known, concentration is measured, and the threat to skin and eye exposure is minimal. Level C components include:

- Air-purifying respirator (half or full face) with appropriate filters
- Safety glasses or goggles (face shield)
- Chemical resistant clothing (coveralls, two-piece)
- Gloves - both inner and outer (chemical-resistant)
- Boots (steel toe/shank) with or without disposable covers

Level D Personal Protective Equipment

Level D provides the least amount of skin protection and no respiratory protection. It should only be used when no known levels of hazardous contaminants or materials are present. In addition to a long-sleeve shirt and long pants, Level D may include:

- Gloves (as needed)
- Boots (steel toe/shank) with or without disposable covers
- Safety glasses or chemical splash goggles (as needed)
- Hard hat (as needed)
- Comfort mask (as needed)
- Face shield (as needed)

Role of the Safety Officer

In response to animal disease incidents, Unified Command will appoint a Safety Officer or officers. The Safety
Officer assists Command by providing appropriate supervision regarding safety and risk management concerns by performing the following tasks:

- Monitors and observes safety factors specifically associated with an animal disease incident.
- Advises the Incident Commander of relevant safety concerns.
- Ensures correct and complete utilization of PPE.
- Alters, suspends, or terminates any unsafe activity.

**Level C Donning Procedures**

The following guidelines are meant to provide an overview of one possible procedure. Other safe and effective measures are equally acceptable. Check with your agency response plans for specific policies and procedures.

1. Inspect the clothing and respiratory equipment before donning. Check for holes, tears, punctures, or imperfections in the suit which may interfere with the ability of the suit to protect against hazardous materials.

2. Standing or sitting, step into the legs of the suit ensuring proper placement of the feet. Pull sleeves over arms and shoulders. Have an assistant adjust the suit to ensure unrestricted motion and secure by closing all fasteners. Secure all belts and adjustable leg, head, and waistbands.
3. Select the appropriate respirator. Don the facepiece and adjust it to be secure but comfortable. Perform the user seal check procedures and check for proper breathing.

4. Select appropriate eye protection such as safety glasses or goggles and face shield. Raise the hood over your head being careful that you do not disrupt the facepiece seal of the mask, and adjust the hood to give satisfactory comfort.

5. Put on boot, over boot or disposable booties.
6. Put on inner gloves. When working with heavily contaminated materials such as blood, carcasses, or other organic material that may transmit the disease agent, it is prudent to wear a double layer of gloves.

7. Put on outer gloves appropriate for the assigned task or known hazards. Change gloves when torn or punctured or when their ability to function as a barrier is compromised.

8. Check all closures and put on apron, if necessary

**Physiological Stressors**

Wearing any type of personal protective equipment can pose considerable risk to a response worker. Health effects ranging from transient heat fatigue to serious illness or death may occur. A number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics of a worker can cause heat stress, which is the most common illness at an incident. Factors that may influence the risk of thermal stress include:

- Level of physical fitness
- Underlying medical conditions
- Age
- Dehydration
- Rate of work
- Ambient temperature
Hint
Emphasize that thermal stress includes response to both heat and cold.

Psychological Stressors
Responders may experience psychological stressors while wearing personal protective equipment. This may include:

- Claustrophobia
- Anxiety or panic
- Situational traumatic stress

Doffing
Dry Decontamination
Dry decontamination can be defined as the process of removal of contaminants without the use of water or other liquids. For example, the removal of clothing or brushing of dry contaminants from the skin can be considered dry decontamination and is usually the first step of any comprehensive decontamination procedure.

Individual Cleaning & Disinfection (Bag and Stash)
Proper cleaning and disinfection in the absence of a C&D station requires specific equipment which includes but is not limited to:

- Coveralls - Cloth or Tyvek
- Boots - Rubber or disposable plastic
- Inner examination gloves
- Outer nitrile gloves
- Trash bags
- Paper towels
- Spray bottle with water
- Disinfectant
- Liquid and/or gel antibacterial soap
- Respirator (if necessary)
**Level C Doffing Procedures**

The following guidelines are meant to provide an overview of one possible procedure. Other safe and effective measures are equally acceptable. Check with your agency response plans for specific policies and procedures.

1. Spray disinfectant on outer gloves and open the red biohazard bag.

2. Remove and dispose of apron in the red biohazard bag and repeat spraying of disinfectant on outer gloves.

3. Unzip and roll down coveralls until it is inside-out and then step out. Place the used coveralls into the red biohazard bag. Reapply disinfectant.
4. Remove and dispose of outer footwear protection and place in red biohazard bag.

5. Remove and dispose of outer gloves and place in biohazard bag.

6. Remove goggles over head, handling only by headband or earpieces. Place in red biohazard bag.

7. Remove the respirator by grasping the top and then bottom elastic bands and pull over head. Place in red biohazard bag.

8. Remove inner gloves. Carefully roll one glove starting at the wrist until the glove is inside out. Repeat with the other glove.

9. Close the red biohazard bag by tying a knot at the top or otherwise tying it shut. Place in a designated area for collection and proper disposal.

10. Wash hands and forearms with soap and water and/or waterless hand sanitizer.
Summary

Many factors are considered when determining the type of PPE to be worn in an agricultural emergency. This includes the tasks being performed, the conditions in which the equipment is worn, and the specific disease agent involved in the response. Identifying the proper procedures for inspection and use of PPE, as well as donning and doffing, is critical to worker safety and for reducing the spread of disease.
Appendix A

Wear It Right

Wearing your filtering facepiece respirator

1. Place the respirator over your nose and mouth. Be sure the metal nose clip is on top. With models 8210 or 07048, pre-stretch the straps before wearing.

2. Pull the top strap over your head until it rests on the crown of your head above your ears.

3. Pull the bottom strap over your head until it rests just below your ears.

4. Using both hands starting at the top, mold the metal nose clip around your nose to achieve a secure seal.

5. Check the seal of your filtering facepiece respirator each time you don the respirator.

Positive Pressure User Seal Check

For non-valved respirators

1. Place both hands completely over the respirator and exhale. The respirator should bulge slightly. If air leaks between the face and faceseal of the respirator, reposition it and readjust the nose clip for a more secure seal. If you cannot achieve a proper seal, do not enter the contaminated area. See your supervisor.

For valved respirators

2. Place both hands over the respirator and inhale sharply. The respirator should collapse slightly. If air leaks between the face and faceseal of the respirator, reposition it and readjust the nose clip for a more secure seal. If you cannot achieve a proper seal, do not enter the contaminated area. See your supervisor.

WARNING:

- Breathing certain dusts, mists, fumes, gases or vapors can cause sickness or death.
- This respirator can help protect you when worn during all times of exposure.
- Do not use with beards or other facial hair or other conditions that prevent a good seal between the face and the faceseal of the respirator.
- OSHA standard 1910.134 and the CSA standard Z94.4-93 requires that the wearer be fit tested.
- See your supervisor with questions regarding which respirator to wear and its proper use, or call 3M: 1-800-243-4630 Internet: www.3M.com/occsafety E-mail: occsafety@mmm.com (In Canada, call 3M: 1-800-267-4414, E-mail: ohes@ca.mmm.com).
**Scope Statement**
This lesson provides responders with information regarding procedures for selection, inspection, and safe use of appropriate personal protective equipment (PPE). Varying styles and levels of PPE appropriate for animal disease incidences and the associated requirements will be introduced. The lesson also discusses selection of task specific PPE, donning and doffing, and safety issues associated with wearing PPE.

---

**Terminal Learning Objective**
Describe the proper procedures for inspection and use of personal protective equipment to ensure the safety of responders during an animal disease incident.

---

**Enabling Learning Objectives**
2-1 Describe the process and authority used to determine proper levels of protection mandated during response to an animal disease incident.
2-2 Identify factors to consider while working in PPE.
2-3 Identify the various components of PPE used in an agriculture emergency.
2-4 Identify physiological and psychological stressors that can affect users of all levels of PPE.

---

**Choice of respiratory and dermal protection depends upon?**
- Specific disease agent
- Conditions in which equipment is worn
- Activities and exposure level of personnel

---

**Level of Protection**
- Determined by animal health authorities in cooperation with public health officials
  - State Veterinarian
  - Area Veterinarian In-Charge (USDA-AVS)
  - Federal, state, tribal public health officials
- Assured by safety officers to be appropriate

---

**Personal Protective Equipment Overview**
- Body
- Hand
- Eye
- Foot
- Respiratory
Body Protection

- Impermeable suits
- Permeable suits

Hand Protection

- Biological and Chemical Hazards
  - Polyvinyl chloride (PVC)
  - Nitrile
  - Neoprene
  - Latex
- Mechanical Hazards
  - Leather/work glove

Eye protection should always be worn when dealing with biological and chemical materials

- Safety glasses
- Face shield
- Safety goggles

Foot protection should always be worn

- Shoes should completely cover and protect the foot
- Impermeable shoe covers can provide barrier protection to shoes or boots

What are the required components of a respiratory protection program?

- Written program
- Training
- Medical evaluation
- Fit testing
- Respirator maintenance program

OSHA’s respiratory standard (29 CFR 1910.134) is mandatory

NIOSH approved disposable particulate respirators are the minimum level of respiratory protection that should be worn

Respirators can be divided into two classes

- Air supplying
- Air purifying

Which offers more protection?
Oxygen-Deficient Atmospheres

- Present in pits, silos, and tanks
- Normal air contains 20.8% O₂
- ≤ 19.5% O₂ in air is deficient
  - displaced by another gas
  - consumed by combustion
  - changed by reaction

Respirator type may be determined by pressure inside the mask when inhaling

- Negative pressure
- Positive pressure

Which offers more protection?

OSHA requires workers pass a fit test before wearing a respirator on the job

Quantitative
Qualitative

Both are acceptable. Which is better?

Particulate filters are classified based on resistance to oil

- **N**  • Not resistant to oil
- **R**  • Resistant to oil
  • Good for one shift in oil mist!
- **P**  • Oil Proof
  • Good for prolonged use in mist

Particulate filters are further classified based on efficiency

- 95 percent, designated 95
- 99 percent, designated 99
- 99.97 percent, designated 100 (HEPA filter)
Animal Disease Response Training

Nine categories of particulate respirators

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>R</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>99</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>95</td>
<td>95</td>
<td></td>
</tr>
</tbody>
</table>

Acceptable for animal disease response

Slide 19

Respirators can be further divided based on facial coverage

- Full-face
- Half-face

Which offers more protection?

Slide 20

Air Purifying Respirators

- Filter out dusts and vapors
- Must have correct color-coded cartridge
- Must be NIOSH-approved

<table>
<thead>
<tr>
<th>Color</th>
<th>Type</th>
<th>Protection against</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magenta, purple</td>
<td>High Efficiency Particulate Air (HEPA)</td>
<td>Dust particles, virus, bacteria</td>
</tr>
<tr>
<td>Black</td>
<td>Organic vapor</td>
<td>Solvents</td>
</tr>
<tr>
<td>Yellow</td>
<td>Ammonia</td>
<td>Animal wastes</td>
</tr>
</tbody>
</table>

Slide 21

What is the proper order of Fitting Instructions?

1. Put on the helmet. Make sure it is secure. Use the Velcro strap if necessary. Then, try to breathe. If it's tight enough, you might have to adjust it. If it is too loose, you might not have a good fit.
2. Put on the mask. Make sure it is secure. Use the Velcro strap if necessary. Then, try to breathe. If it's tight enough, you might have to adjust it. If it is too loose, you might not have a good fit.
3. Put on the filter. Make sure it is secure. Use the Velcro strap if necessary. Then, try to breathe. If it's tight enough, you might have to adjust it. If it is too loose, you might not have a good fit.
4. Put on the respirator. Make sure it is secure. Use the Velcro strap if necessary. Then, try to breathe. If it's tight enough, you might have to adjust it. If it is too loose, you might not have a good fit.

Must be followed each time respirator is worn

Slide 22

User seal checks must be performed before each use

- Only after passing a fit test
- To ensure a good respirator-to-face seal
- Positive pressure respirators must be checked in negative mode

If you CANNOT achieve a proper fit DO NOT enter the contaminated area.

Slide 23

Powered Air-Purifying Respirator (PAPR)

PAPRs use a fan to convey contaminated air through a HEPA filter that removes contaminants and supplies purified air to the facepiece worn by the responder.

Slide 24
Integrated Protection
Combining Components of PPE

Level A
Level B
Level C
Level D

Personal Protective Equipment
Level C
- Air-purifying respirator (N-95)
- One-piece coverall with apron
- Hooded two-piece splash suit
- Gloves, inner chemical-resistant
- Gloves, outer chemical-resistant
- Boots or booties
- Safety glasses or goggles

Personal Protective Equipment
Level D
- Coverall
  - Hooded or two-piece
- Gloves
- Boots/shoes
  - disposable covers
- Safety glasses
- Comfort mask

What are Physiological Stressors?
- Lack of physical fitness
- Age
- Dehydration
- Obesity
- Work Rate
- Ambient Temperature

What are Psychological Stressors?
- Claustrophobia
- Anxiety or panic
- Situational traumatic stress

Summary
- Many factors determine PPE in an agriculture emergency
  - Tasks performed
  - Conditions which PPE is worn
  - Specific disease agent involved
- Proper procedures for inspection and use of PPE critical for reducing spread of disease
This page intentionally left blank
Animal Disease Response Training

Biosecurity and Quarantine

3

Biosecurity and Quarantine
Instructor Notes:
ABOUT THIS LESSON

Scope Statement

This lesson will provide information in an effort to establish a basic knowledge of biosecurity, quarantine and movement control operations. This information will help responders understand their assigned roles and tasks during an animal disease outbreak and provide a basis for planning efforts.

Duration: 60 Minutes

Resources

Participant Procedure Guide
Presentation Slides
Presentation Maps

Practical Exercise Strategy

Utilization of maps and scenario to enhance participant understanding or resources needed in establishing quarantine zones.

Instructor to Participant Ratio 1:20

Terminal Learning Objective

Identify the agencies participating in establishment of quarantine perimeters and implementation of movement control procedures.

Enabling Objectives

After completing this lesson, the participant will be able to:

3-1 Define and describe aspects of biosecurity, quarantine and movement control.

3-2 List and describe the premises and zone designations used for control and containment in an animal disease outbreak.

3-3 List some activities that responders may need to perform to assist state and federal animal health authorities in the implementation of quarantine and stop movement procedures.
Introduction

During an animal disease response, biosecurity, quarantine and movement control procedures are used to prevent the spread of disease. Properly implemented biosecurity during response to an animal disease outbreak is imperative. These activities reduce the risk of disease agent transmission by personnel, equipment, and materials necessary in support of the extensive tasks undertaken during the control and eradication campaign.

Each animal disease outbreak is unique. The disease agent, animal species affected, and extent of spread will impact the response efforts and define levels of control. The overall goal of any response to an animal health emergency is to detect and eradicate or control the agent as quickly as possible. This will enable individual production facilities to return to normal operations and allow the United States to re-establish disease-free status.

Containment, eradication or control of animal disease rely on three basic principles:

1. Prevent contact between susceptible animals and the disease agent. This may be accomplished by actions such as quarantine and stop movement, biosecurity measures, risk assessment, tracing, and surveillance.

2. Stop the production of the disease agent by infected animals. This is most commonly accomplished using euthanasia and disposal of infected and exposed animals.

3. Increase disease resistance of susceptible animals. This may be accomplished through established vaccination protocols.

This lesson will focus on the first principle by providing an awareness of the roles and responsibilities associated with biosecurity, quarantine, and stop movement and outlining the importance of each to the reduction of disease spread in animals.

Federal Government and USDA APHIS Response

The National Response Framework and Target Capabilities List outline response capabilities and provide guidance for state and local entities in preparation for response to an animal disease outbreak.

At the federal level, USDA/APHIS is the lead agency for animal and plant health emergencies as identified in Emergency Support Function #11. The objectives for foreign animal disease response focus on detection, control, and eradication in an effort to quickly return the United States to “disease free” status. A presumptive positive case will generate immediate, appropriate local and national measures to isolate the crisis and minimize the consequences. A confirmed positive case will generate additional measures on a regional, national, and international scale.
Biosecurity

Biosecurity is a set of preventative measures designed to reduce the risk of cross contamination of biological material. These measures consist of a combination of systems or practices taken to minimize the risk of introducing an infectious disease into an animal population. This may include preventing the transmission of disease through physical barriers or hygiene practices. Veterinarians, owners, and other personnel in regular contact with animal production operations implement strict biosecurity measures to prevent or slow the spread of disease agents. Many farmers practice these measures as standard operating procedures on the farm. Likewise, all responders functioning within an animal disease event must practice strict biosecurity measures to avoid furthering the spread of disease.

To aid with these biosecurity efforts, personal protective equipment (PPE) will be provided to responders in support of their specific roles and responsibilities. When the disease in question is zoonotic, the proper use of PPE and other equipment is not only important to reducing the potential spread of disease, but also to protecting the health of responders. Animal and human health authorities will determine the need for PPE and provide information on the necessary components. The choice of PPE may present additional challenges to response efforts, but it is critical to protecting the health of response workers.

Biosecurity Hazards

Identification of biosecurity hazards is a key element in preventing the introduction of disease pathogens onto premises. Common hazards include:

- **People, animals, vehicles, and equipment.** All movement of people, animals, vehicles, and equipment on and off the property must be controlled to reduce the risk of pathogen transmission. This may include measures such as establishing a guard at entrances, locking unguarded entrances, and patrolling and repairing boundary fences. Employees, visitors, and drivers of delivery vehicles that enter and exit a farm under normal operations have often been a source of disease introduction and should be counseled on their role in the possible transmission of disease. Strict biosecurity measures must be observed at all times.

- **Contaminated feed and/or water.** Feed should be purchased only from suppliers with a documented quality assurance program in place for the safe manufacturing, storage, and delivery of their products. Special care should be taken to prevent feed and water from coming into contact with animal
waste or other potentially contaminated animal products. If for any reason, owners suspect that water has been contaminated, it should be tested before being given to animals. Owners should be in control of any feed or water animals receive.

- Contact with other animals. Exposure to pathogens can occur at livestock shows, in hospital pens, in situations involving contact with wildlife or insects/pests, and during introduction or reintroduction of animals into herds or flocks. Isolation of animals is discussed later in this lesson.

**Mitigating Biosecurity Risk**

Fatigue, stress, distraction, and lack of forethought can cause even the most conscientious individual to lose focus on the crucial importance of biosecurity measures. Thus, it is essential that all personnel exercise the utmost thought, patience, persistence, and care during an agriculture emergency to reduce the risk of disease spread.

The risk associated with the introduction of disease can be mitigated by following appropriate biosecurity measures. Many of the following actions will not be performed by emergency personnel, but are provided for awareness purposes to increase understanding of the various tasks performed on a premises.

- Inspect susceptible livestock and poultry regularly for signs of disease, and discuss any concerns with a veterinarian.
- Account for the health history of all animals on the premises and maintain accurate record keeping.
- Make every effort to avoid moving animals except in situations where animal welfare is compromised.
- Account for the movement of all animals on and off the premises and maintain accurate records.
- Account for the movement of potentially contaminated equipment and transport vehicles that have left the premises, including rendering trucks that may be used to haul carcasses away from the premises. Maintain a log of any such vehicles entering the property.
- Establish appropriate biosecurity for persons visiting the premises or animals and animal products leaving the premises. Minimize visitor contact.
- Visit poultry breeding stock before other commercial birds and follow strict biosecurity measures when entering and leaving poultry houses.
• Separate pick-up locations for dead stock from rearing areas. The locations should not allow cross-contamination between live animals and farm personnel and vehicles.
• Quarantine and isolate animals added or returned to herds or flocks.
• Clean and disinfect premises, vehicles, equipment and materials, or dispose of contaminated materials that cannot be adequately cleaned or disinfected.

Animal Identification
Animal identification is essential to the effective implementation of biosecurity measures. Identification:
• Enables the owner to track all animal movement on or off the premises.
• Can be used to identify animals used for breeding purposes and monitor all contact.
• Facilitates record keeping of health, vaccination, pedigree, and production information.

Housed Animals
Under most circumstances, housed susceptible birds are at reduced disease risk and should remain housed if possible. Biosecurity measures should be instituted at building entry points. Preventing wild bird entry into housing or eliminating wild birds from housing is necessary to avoid disease spread. Housing should also be designed to prevent groundwater entry and entry of rodents. Animals should not be moved into barns or other facilities that have housed infected or potentially infected animals unless these buildings have first been thoroughly cleaned and disinfected. The introduction of sentinel animals following cleaning and disinfection should be considered before repopulating a house.

Pastured Animals
If susceptible animals are penned outside, animal health officials should encourage owners to reduce the risk of pathogen transmission by implementing good biosecurity practices. In addition, owners should keep groups of animals separated by a distance (determined based on pathogen) sufficient to prevent pathogen transmission, not permit close or direct contact between groups of animals, and not put animals in contact with areas that have been in contact with potentially infected animals.

Maintaining a Closed Facility
To the extent possible, owners should maintain facilities that are “closed.” This type of facilities prohibits the introduction of new animals from off-site facilities with population increase occurring only from facility offspring. This practice
reduces the potential for transmission of disease agents from “outside” animals. When appropriate, animals should be vaccinated against common diseases. If new animals must be introduced, they should be isolated upon arrival and vaccinated when possible.

Routine disease prevention principles such as “all-in/all-out” housing in poultry also should be followed. Ideally, the premises on which animals are housed should be fenced and should have a locked, gated driveway.

Isolated Animals

Introducing new animals to a herd or flock poses a risk for introducing an infectious disease agent into the resident population. Animals should be purchased from quality producers who practice high standards of biosecurity and maintain animal health records, and bedding and feed should be obtained from known, reputable sources. Newly purchased animals or animals being returned to the herd or flock should be isolated for 30 days. This can be accomplished by confining the new animals to pens that do not permit any contact with other animals, their excretions, or secretions.

In planning isolation areas, particular care should be taken to provide for effluent waste to avoid contamination of other animals, feed, and water supplies. No sharing of feed, water supplies, or equipment should occur between the isolated animals and the resident animals.

If vaccination is used, newly purchased animals should be vaccinated within the first week of the 30-day isolation period to establish consistency with herd vaccination levels. This will allow at least 21 days for the new animal to develop adequate immunity before joining the main herd or flock.

The caretaker of new or returning animals should have separate coveralls and boots available for use while caring for isolated animals. This individual should care for the isolated animals after taking care of the other animals and should not return to the main flock or herd until he or she has practiced recommended biosecurity measures.

During the isolation period, the animals can be tested for the presence of disease. The animals should not be allowed contact with the flocks or herds until negative test results are received.

Protecting Animals from Wildlife

Rodents, vermin, and wildlife are very mobile and can spread disease agents on the premises. Owners should take action to protect production animals from contact with vermin and other wildlife by cleaning old buildings, removing debris and spilled grain, and implementing a pest control program. During a disease outbreak, rodent control should take place on the premises before animals are euthanized to minimize the potential spread of disease, as rodents tend to relocate.
Visitor Risk in an Outbreak
When an outbreak occurs, officials typically establish a control area around infected and contact premises. Information about the location and boundary of the control area should be disseminated widely and through various media outlets (television, radio, posters, publications, etc.). Visitors should be restricted unless absolutely necessary. Records should be maintained regarding any visitors for future tracking.

Visitor Biosecurity Outside a Control Area
Owners should ensure that visitors observe biosecurity and cleaning and disinfecting measures commensurate with the level of perceived threat for premises outside the control area. A premises located immediately adjacent to the border of a control area may have stricter measures than a premises located hundreds of miles away that has no livestock connections to the control area. Considering the multiple locations to which livestock typically are moved on their way to market, premises might be vulnerable to pathogen transmission even if it is located a considerable distance from a control area.

As a general rule, premises owners outside a control area during an outbreak may choose to ensure that visitors use either the “medium” to “high” risk category of visitor biosecurity during an outbreak. As always, recommendations from animal health officials should be followed.

Visitor Biosecurity Within a Control Area
If a given premises is located within a control area, all visitors should be considered “high risk” and thus, the frequency of visitors must be kept to a minimum. Veterinary practitioners should limit their visits to one premises per day within a control area. Livestock/poultry owners and even children that visit other premises in the control area should be regarded as high risk, and strict biosecurity measures should be implemented.

Adequate planning for essential services such as feed delivery, etc., should include separate routes and pick-up sites that are not near animal rearing facilities, if possible. Additional biosecurity measures should be placed on those personnel and vehicles to minimize disease spread.

Quarantine
The term quarantine refers to a system of measures for preventing disease and involves restrictions placed on the entrance or exit of a premises or region. Quarantine is used to prevent the further spread of disease agents and allow for control and containment measures to be determined and implemented. Quarantine is put into effect when there is a highly infectious or contagious disease agent or contamination that threatens the health or safety of surrounding premises and livestock, such as in a Foreign Animal Disease outbreak. Quarantine is a formal process of declarations requiring statutory authority.
Guidelines

Effective quarantine and movement control are essential for preventing further spread of a disease agent. Movement control, in the form of a permit system, allows otherwise uninvolved entities to continue travel necessary for maintaining farming operations. Quarantine of susceptible animals, potentially contaminated products, and conveyances, etc., prevents the dissemination of the disease agent. Implementation of quarantine and the administration of a permit system for movement control should be described in your state animal health emergency response plans.

Responder Assistance in Quarantine

The expertise of local responders may be essential for containment of animal disease. Responders may be called upon to assist with:

- Establishment of quarantine perimeters for infected animal populations.
- Contact tracing of animals.
- Tracing of visitors to the premises for the days prior to the initial investigation of disease plus one incubation period.
- Cleaning and decontamination of equipment, vehicles, and personnel.

Responders may also need to assist state and federal response authorities in the operation of the Control Area and may be required to:

- Work individually on infected premises with the owner and his/her family, personnel, and any visitors.
- Assist in determining the necessary personnel, vehicles, and equipment required to operate biosecurity and disease prevention activities efficiently.
- Work with the premises owner, extension agent, or response veterinarian to create a detailed property map showing roads, neighboring premises, gates, property access, and other relevant geographic information.
- Ensure personnel consistently follow biosecurity measures and that such measures are implemented for all people, vehicles, equipment, and other materials entering or leaving an infected or contact premises.
- Ensure all movement on and off the premises and within the various zones is controlled. This may include:
  - Establishing premises security or serving as a permanent guard.
  - Preventing the entry of unauthorized people, animals, machinery, and vehicles onto the property (with entry allowed only if a permit has been issued).
  - Patrolling boundary fences.
◊ Checking valid emergency response credentials.
◊ Ensuring compliance with established premises movement restriction plans until animals have been depopulated and preliminary cleaning and disinfection (C&D) has been completed.
◊ Ensuring that if and when residents leave a property, strict attention is paid to establish biosecurity and C&D measures, and emphasizing the need to prevent contact with animals on other premises.
◊ Ensuring that all movement of animals or animal products on or off premises are identified and monitored for compliance with movement restrictions.
◊ Verifying that quarantine notices are placed at all premises entrances.
◊ Maintaining an accurate log of all personnel and equipment (including vehicles) entering and leaving each infected and contact premises.

• Reporting possible biosecurity breaches.
• Establishing and maintaining an effective communications system on the infected premises and throughout the control area.
• Establishing and operating a C&D station.

**Animal Quarantine Laws and Statutes**

*State Quarantines*

Every state has laws relating to control of communicable diseases among livestock and other animals and enforceable legal tools such as quarantines and health certificate requirements to assist in official acts.

Typically, the power to quarantine animals is given to a department of agriculture or a livestock commission or board. (Check your individual state statutes for specific authorities.) The power to declare quarantine includes the power to go onto private land and into buildings to inspect animals, taking whatever action is necessary to reduce the further spread of disease.

States are also empowered to destroy animals when necessary to further contain disease. Legal provisions frequently exist for compensating the owner for all or a portion of the assessed value of the destroyed animal(s). (See “Indemnification” in the Euthanasia and Disposal Module.)

*Federal Quarantines*

In part, federal quarantines are used to control interstate and international movement of diseased animals and contaminated items, whereas state quarantines are used to control intrastate movements of such animals and items.
USDA will impose a federal quarantine on interstate commerce from the infected state(s) and request the infected and adjoining states (or country, if state borders are also international borders with Canada or Mexico) provide resources to enforce the quarantine. Reimbursement formulas for this activity will be set out in a cooperative agreement between the states and USDA. The federal quarantine will be maintained until the disease is either eradicated or until such time as an effective control area smaller than a whole state is implemented.

Case Designations

Premises designations are established by state and federal animal health officials based upon the presence of one or more animals meeting the criteria for one of the following case identification terms:

- **Suspect case** – A premises containing an animal that has clinical signs consistent with a highly contagious or high consequence disease.

- **Presumptive positive case** – A premises containing an animal that has clinical signs consistent with the disease in question and additional epidemiologic information indicative of a highly contagious case.

- **Confirmed positive case** – An animal has clinical signs consistent with the disease in question and positive results of the presence of the disease agent isolated and identified in a USDA laboratory or other laboratory designated by the U.S. Secretary of Agriculture.

In addition, other factors will be considered in premises designations including:

- Recent history of the premises as it relates to pathogen transmission. Information from prior movement permits, animal health records, and other records may be helpful.

- Observations and notes from the Foreign Animal Disease Diagnostician (FADD) concerning diagnostic visits.

- Results of laboratory analysis of collected samples.

Implementation of quarantine, surveillance, and increased biosecurity are put into effect immediately for presumptive positive cases. Upon notification of the Governor and state Secretary of Agriculture, the state emergency response plan may be initiated.

When laboratory confirmation is obtained, further actions will be taken. A positive identification of a highly contagious disease may lead to quarantines of surrounding premises, stop movement orders in the region or state, and euthanasia actions.
Depending on the scale of the event, disease agent in question, or the potential for spread of the disease, federal agencies may become involved in the overall response. If the disease has spread to many states, the U.S. Secretary of Agriculture has authority to declare various types of emergencies such as a Declaration of Extraordinary Emergency. This declaration provides federal resources in support of response efforts such as federal veterinary response teams. Considerable disease control activities may occur before a federal Declaration of Extraordinary Emergency is made.

Additionally, with the confirmation of a foreign animal disease, the Office International des Epizooties (OIE), also known as the World Organization for Animal Health, must be notified within 24 hours. Additional information on the OIE can be found at www.oie.int

Intention introduction of disease is a criminal act. If there is a report or suspicion of intentional introduction of a disease, the animal health authorities will notify the USDA’s Office of the Inspector General, who will notify and coordinate with appropriate law enforcement agencies at the local, state, federal, and tribal levels as the situation warrants.

**Classification of Premises**

In an animal disease outbreak, there are typically five types of premises identified. A sixth premises identification is added in specific instances:

1. Infected Premises (IP)
2. Contact Premises (CP)
3. Suspect Premises (SP)
4. At-Risk Premises (ARP)
5. Free Premises (FP)
6. Vaccinated Premises (VP) (If strategic vaccination is used, there will be a sixth type of premises.)

**Infected Premises** – An Infected Premises is a premises on which a highly contagious disease agent is presumed or confirmed to exist based on laboratory results and compatible clinical signs. All presumed positive premises and confirmed positive premises are classified as Infected Premises. A quarantine is imposed and all susceptible animals are euthanized and disposed of properly.

**Contact Premises** – A Contact Premises contains susceptible animals or animal products that have been exposed directly or indirectly to animals, animal products, materials, people, or aerosol from an Infected Premises (the specific exposure factors to be considered must be appropriate to the epidemiology of the agent involved). Contact Premises are quarantined and subjected to disease control...
measures, which may include euthanasia and disposal of susceptible animals. If the susceptible animals on a Contact Premises are not euthanized, they will be placed under surveillance for at least two maximum incubation periods.

**Suspect Premises** – Suspect Premises contain susceptible animals with reported, compatible clinical signs with no apparent epidemiological link to an Infected or Contact Premises. Premises with susceptible animals in the Infected Zone that is not classified as an Infected Premises or Contact Premises is initially considered a Suspect Premises. These premises are under quarantine, movement restrictions (movement by permit only), and surveillance for at least two maximum incubation periods.

**At-Risk Premises** – At-Risk Premises are premises located in a Buffer-Surveillance Zone or Surveillance Zone with susceptible animals showing no compatible clinical illness. Susceptible livestock from an At-Risk Premises within a Buffer-Surveillance Zone may be allowed to move with a permit and application of appropriate biosecurity measures.

Non-susceptible poultry and other species from an At-Risk Premises may move in and out of a Buffer-Surveillance Zone with a permit and application of appropriate biosecurity measures as determined by risk assessment.

**Free Premises** – Free Premises are those located in the Free Zone and have no identifiable contact with the disease agent.

**Vaccinated Premises** – Vaccinated Premises are those within a Buffer-Vaccination Zone on which vaccination is being, or has been, administered.
Control Area and Zone Designations

The designation of control areas and zones is essential to successful quarantine and movement control activities. Appropriate zone designation and size will be determined through application of standard epidemiological practice using surveillance data gathered throughout the outbreak. The size and span of the area and zones are established by animal health officials in charge and may fluctuate throughout the event in response to epidemiological data.

**Control Area** – A Control Area, consisting of an Infected Zone and a Buffer-Surveillance Zone, will be established to ensure the rapid and effective containment of the disease. All susceptible animal movement within this zone may be stopped for a period long enough to determine the scope of the disease outbreak. The potential modes of transmission (e.g., aerosol, water, direct contact, fomites, vectors, etc.) will be considered when determining the minimum size and shape of a control area. Movement control through the use of permits should be maintained until the disease is eradicated.

**Infected Zone** – Initially, this zone will encompass the perimeter of all presumptive or confirmed positive premises and include as many of the Contact Premises as the situation requires. The boundary of this Infected Zone should span at least 6.2 miles beyond the perimeter of the presumptive or confirmed infected premises. The actual perimeter is determined by factors such as disease agent, terrain, pattern of livestock movements, livestock concentrations, weather, prevailing winds, distribution and movements of susceptible wild and feral animals, processing options, and affect on non-susceptible animals and animal products. Susceptible animals should not move into or through an Infected Zone unless they are being transported to slaughter at a facility inside the zone.

It is critical to enforce movement restrictions within the Infected Zone in order to achieve the following:

- Prevent susceptible animals from leaving the Infected Zone except if going directly to slaughter.
- Prevent animal products from susceptible animals from leaving the zone unless risk assessment determines that such movement can be permitted.
• Prevent the movement of vehicles, equipment, and non-susceptible animals out of the zone unless appropriate biosecurity procedures are followed.

It is important to provide public awareness information to increase compliance with movement restrictions.

**Buffer-Vaccination Zone** – If vaccination supplies and procedures are available and vaccination is deemed a viable option for the disease in question, a Buffer-Vaccination Zone will be established to strategically create a “firebreak” ahead of the spreading disease agent. This zone borders the Infected Zone and is surrounded by the Buffer-Surveillance Zone.

**Buffer-Surveillance Zone** – The Buffer Surveillance Zone immediately surrounds the Buffer Vaccination Zone or, if no vaccination options are available or selected, the Infected Zone. Movement within this zone may be allowed with a permit and appropriate biosecurity measures. Premises within this zone that have clinically normal susceptible animals are known as At-Risk Premises. The combined Buffer Surveillance Zone and Infected Zone (with or without vaccination zones) make up the Control Area.

**Surveillance Zone** – A Surveillance Zone separates the Free Zone from the Buffer-Surveillance Zone. Surveillance in this zone will focus on premises determined to be at the highest risk of infection. The size of the boundary will be established based upon factors that include transmissibility of the disease agent, long distance spread capabilities, susceptible hosts, environmental conditions, and geographic features. Other factors such as resource availability and response capacity may also impact the boundaries of this zone.

Activities in the Surveillance Zone include:

• Conducting case finding activities (surveillance).

• Conducting a public awareness campaign to increase compliance.

**Free Zone** – A Free Zone is a zone in which the absence of the disease under consideration has been demonstrated by meeting requirements for disease-free (or “free”) status as specified in the OIE International Animal Health Code. Within a Free Zone and at its borders, appropriate official veterinary control is applied for animals and animal products, as well as for their transportation.

**Movement Control**

While producers strengthen their own on-farm biosecurity, animal health officials will limit or restrict the movement of susceptible animals to reduce the potential spread of disease. These movement restrictions, typically known as Stop Movement Orders, suspend the movement of animals and animal products in the affected portion of agriculture and allow for the continued movement of non-affected animals and animal products. To implement effective quarantine
and reduce the spread of disease, these orders must be established as soon as the determination of a presumptive positive or confirmed positive is made.

Movement permits are issued by state or federal animal health authorities and may fall into one of the following categories:

- Return to place of origin, no escort
- Return to place of origin, escort required
- Forward to destination, no escort
- Forward to destination, escort required
- Hold at stopped location

The determination of permit type may be based on disease epidemiology, proximity of slaughter facilities or animal holding facilities, transit routes, or other variables deemed influential to reducing the spread of disease.

**HINT**

The decision to hold animals in transit at or near a permit checkpoint presents the biggest local challenge. All aspects of animal welfare and containment must be met rapidly and possibly under adverse weather conditions, likely using improvised or hastily assembled facilities. This is a good discussion topic when classes are given in areas with high instances of animal transport traffic, particularly interstate highways.

Federal agricultural officials have the authority to impose national or regional stop movement orders. State-level stop movement orders are imposed by the Governor, Livestock Commissioner, State Veterinarian, or the state department of agriculture on a state-by-state basis. Violations of these orders may carry criminal penalties.

It is important to note that few local or state jurisdictions have the legal authority to prohibit the movement of people due to animal diseases that do not threaten human health. Implementing time consuming and cumbersome vehicle inspections and cleaning/disinfection procedures may achieve the desired effect of reducing traffic in areas with high densities of susceptible animals.

**Checkpoints and Road Blocks**

Checkpoints and roadblocks should be located on all rural roads at the entrance to a Control Area and all vehicles suspected of containing farm-related products, materials, or animals should be stopped.

Although it may be impractical to establish checkpoints on interstate highways, checkpoints should be established at entrances and exits of major highways within the Control Area.
Checkpoints should be staffed 24 hours per day and may require they be maintained for 30 days after the last infected animal is euthanized or until the situation indicates the checkpoints are no longer needed. Roadblocks may be established where human resources are limited.

**Permits to Move**

Official permits must accompany all transported animal or animal products. These permits are issued by authorized animal health officials under designation from state and federal animal health authorities in charge. Performance under permit may require on-site supervision by animal health authorities and participation of law enforcement personnel.

**Movement Within a Control Area**

In general, permits to move animals over short distances within a Control Area are issued only for proposed transfers within the same zone. For example, a producer in a Surveillance Zone may be granted a permit to move heifers to a pasture within the same zone but would be denied a permit if he wished to move them into or across either an Infected or Free Zone.

**Movement Within an Infected State**

Animal movements may be allowed to occur under permit within an infected state’s Free Zone by authority of animal health officials in charge. These loads may not enter or cross any portion of a Control Area containing infected, suspect, or surveillance premises and may be subject to inspection.

**Movement Between States**

Interstate movement of animals becomes problematic during an animal disease event. States with no reported disease may refuse to allow any animal imports or through-transits from known infected states. These restrictions will be enforced at border checkpoints and require significant law enforcement, logistic, and veterinary or animal health resources. Animal health inspections and paper-work reviews will determine whether the load:

- Must return to the place or farm of origin.
- May be held at or near a checkpoint based on suspicion of disease or animal welfare concerns.
- May move to final destination under permit with or without an escort.
Impact of Movement Control Policies

Large-scale commercial agriculture moves animals through the production system on an “around-the-clock” basis. Because of this, movement control policies have a significant impact on farm production, the availability of animals entering processing facilities, and ultimately the economic viability of the agriculture industry.

Animal health officials will strive to limit the duration and severity of an initial Stop Movement Order to reduce the loss of production and economic impact on the agriculture industry as a whole.

HINT

Stop Movement Orders can be applied to animals and animal products. Feed deliveries, service activities, and agricultural vendor visits, mail deliveries and other normal farm support functions may not be impacted by a SMO. However the practical effect will be the same. It is expected than many farm vendors will halt operations or refuse to enter a Control Area to eliminate the potential that their business vehicles might become fomites for disease transmission between farms. This can present immense challenges regarding animal welfare when, for example, large farms in Control Areas exhaust current supplies of feed and cannot find feed dealers to deliver to them.

Responder Assistance to Protect Agriculture

Even though an initial Stop Movement Order may be lifted or modified relatively soon, prolonged movement controls at the local level can be expected to last from weeks to months. These local controls may be put into place to assure completion of isolated response efforts such as cleaning and disinfection, aid in speeding recovery, and continue efforts to prevent disease spread.

Community responder efforts will be required in order to sustain the operations of the local agricultural base. This is necessary to protect the economic vitality of any region that is highly dependent on agriculture.

In addition to setting up checkpoints and monitoring agricultural traffic on rural roads, local responders may assist response efforts by:

- Training and supplying PPE to non-responders, such as skilled servicemen and utility workers, who need to enter disease free farms in a biosecure manner.
• Assisting with transportation of children to and from school in nearby towns who may live in an area of farms being protected from disease.

• Setting up agricultural transfer stations to serve as buffer points between areas free of disease and areas of unknown or infected status. These facilities receive critical inputs such as feed, mail, and supplies from areas outside a protected area and move it to secondary clean, disease free vehicles for delivery within the biosecure area. Transfer stations may also be used to move outputs such as growing animals or market ready animal products further along the production or processing chain.

• Establishing long term environmentally safe cleaning and disinfection stations capable of rapidly processing large over-the-road vehicles around the clock in all types of weather.

HINT
When discussing movement permits, encourage responders from law enforcement to review their state animal quarantine and movement control laws and statutes. Those responsible for enforcing stop movement orders must be familiar with state emergency movement permit forms.
EXAMPLES

• If a Stop Movement Order is necessary, movement of animals from one step in animal agriculture production to another (i.e., farm to farm and eventually to market) will be greatly disrupted. For example, sows farrow or give birth to baby pigs on hundreds of farms every day of the week. Weaned piglets are moved to other more specialized farms several times before they reach market weight. Animals would not be moved within this production system, and animals already in transit may be unable to reach their intended destinations. Ultimately, the flow of animal products to the consumer may be interrupted.

• Animal products would not move through production systems and reach consumer markets. For example, cows must be milked and their milk sent to market daily. Stop Movement Orders may prohibit this process.

• Broiler hens grow from chicks to market weight in 6 to 8 weeks after which their farm of origin begins another grow-out or production cycle by receiving baby chicks from a commercial hatchery. Likewise, the birth of new animals and the production of marketable animal products will not stop. If these restrictions are not lifted within days, producers may need to destroy bottle-necked animals that cannot be moved.

• Animal agriculture also requires a sustained flow of inputs such as animal feed, labor, and critical repair services. Farm outputs, such as market ready animals and products, must continue to flow to processing and eventually to the consumer.

Summary

Biosecurity, quarantine, and movement control procedures are integral to preventing the further spread of disease. Local, state, and federal agencies must coordinate efforts in order to assure rapid control, containment and eradication. Responders must be aware of the various premises and zone designations within a response area, as they will be essential for carrying out the appropriate quarantine and stop movement activities associated with each.
Scope Statement

Provide basic knowledge of biosecurity, quarantine, and movement control operations to help responders understand their assigned roles and tasks during an animal disease outbreak and provide a base for planning efforts.

Terminal Learning Objective

Identify the agencies participating in establishment of quarantine perimeters and implementation of movement control procedures.

Enabling Objectives

3-1 Define and describe aspects of biosecurity, quarantine and movement control.

3-2 List and describe the premises and zone designations used for control and containment in an animal disease outbreak.

3-3 List some activities that responders may need to perform to assist state and federal animal health authorities in the implementation of quarantine and stop movement procedures.

Biosecurity Quarantine and Movement Control

- Procedures to prevent spread of disease
- Activities reduce risk of virus transmission
- Determined by specific variables
  - Location of susceptible animals
  - Type of disease
  - Local environment
  - Available resources
  - Climate

Control and Containment

- Prevents contact between susceptible animals
- Stops production of the disease agent by infected animals
- Increases disease resistance of susceptible animals

Federal Government

Core Documents

Doctrine, organization, roles and responsibilities, response actions and planning requirements that guide national response.

Emergency Support Function Announces

Mechanisms to group and provide Federal resources and capabilities to support State and local responders

ESF #11 Agriculture & Natural Resources

Lead Agency
Biosecurity
- Preventative measures designed to reduce the risk
- Measures consist of a combination of systems or practices including physical barriers or hygiene practices.

Slide 7

What are key biosecurity elements?

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Mitigating Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>People, animals, vehicles, and equipment</td>
<td>Movement Control/Stop Movement Orders</td>
</tr>
<tr>
<td>Contaminated feed/water</td>
<td>Cleaning and Disinfection</td>
</tr>
<tr>
<td>Contact with other animals</td>
<td>Quarantine and Isolation</td>
</tr>
</tbody>
</table>

Slide 8

Animal Identification
- Essential to effective biosecurity
- Enables tracking of animal movement
- Identifies animals used for breeding purposes
- Facilitates record keeping for health, vaccination, pedigree, and production

Slide 9

Identifying Animals
- Housed animals
  - At reduced risk when entry point biosecurity is maintained
- Pastured animals
  - Prevent contact with new animals
- Isolated animals
  - Introduced to herd or flock after 30 days
- Wildlife
  - Mobility and ability to spread disease
  - Pest control program

Slide 10

Visitor Risk in an Outbreak
- Reduce or restrict visitors to premises
- Distance means safety

Slide 11

Quarantine
- Involves restrictions placed on movement of animals
- Helps prevent further spread of disease
- Provides authority for control and containment measures

Slide 12
Animal Quarantine Laws and Statutes

- State quarantines
  - Specific authority may be given to:
    - Department of Agriculture
    - Livestock Commission
    - Board of Animal Health
    - Other elected officials
- Federal quarantines
  - Animal Health Protection Act of 2002

Case Designations

Suspect case
- Clinical signs consistent with a contagious disease

Presumptive positive case
- Clinical signs and epidemiological information indicative of a contagious disease

Confirmed positive case
- Laboratory confirmation of disease presence

Premises Classification

- Infected Premises (IFP): Animals considered exposed to disease agent.
- Contact Premises (CP): Contacts with IFP with possible exposure.
- Suspect Premises (SP): Pets with exposure to an IFP.
- At-Risk Premises (ARP): Animals with suspected exposure but no signs of disease.

Planning for Protective Zones or Quarantine Zones
Biosecurity and Quarantine

Movement Control

- Determined by disease agent
- Includes recordkeeping of personnel, vehicle or animal movements

Movement Control

- Preventing unauthorized visits
- Managing movement
- Developing movement plans
- Equipment and enforcement
- Animal movement
- Susceptible animals
- Non-susceptible animals

Summary

- Biosecurity, quarantine, and movement control procedures are integral to preventing further spread of disease.
- A successful response requires the coordination of local, state and federal entities.
- Responders must be aware of various premises and zone designations which are essential for carrying out quarantine and stop movement activities.
Animal Disease Response Training

Euthanasia and Disposal

4

Euthanasia and Disposal
Instructor Notes:
ABOUT THIS LESSON

**Scope Statement**
This lesson will identify and explain the various methods of euthanasia and options for disposal of animal carcasses. In addition, this lesson will address the roles and responsibilities, operational safety, and emotional elements associated with these activities.

**Duration:** 60 Minutes

**Resources**
- Participant Guide
- Presentation Slides
- Presentation Maps

**Practical Exercise Strategy**
Utilization of maps and scenario to enhance participant understanding

**Instructor to Participant Ratio** 1:20

**Terminal Learning Objective**
Identify euthanasia and disposal measures that control, prevent the spread of, and eradicate animal disease.

**Enabling Objectives**
After completing this lesson, the participant will be able to:

4-1 List effective methods and resources used for animal carcass disposal during an animal disease event.

4-2 Identify personnel safety concerns associated with euthanasia and disposal procedures.

4-3 Review the process of indemnification based on fair market value of destroyed animals and materials.

4-4 Describe the content of on-site educational materials that will be provided to producers, farmers, and responders.
**Introduction to Euthanasia and Disposal**

Effective euthanasia and disposal of animals and materials are key components of successful response to an animal health emergency or disease outbreak. Depopulation of animals may pose daunting challenges, but will be carried out using the same methods whether the disease in question arose by accident or resulted from an act of terrorism. The overall goal of euthanasia is to control and contain the spread of disease while minimizing the negative economic impact on the agricultural industry.

The concepts discussed in this lesson are applicable to any circumstance requiring euthanasia and/or disposal of large numbers of animals, including foreign animal disease outbreaks, domestic animal disease outbreaks such as tuberculosis or brucellosis or natural disasters resulting in the death of numerous animals.

Actual procedures and policies outlined in this lesson may vary from state to state. We encourage responders to review the animal disease response plans within their state for specific information.

**HINT**

Emphasize to students this lesson concerns only euthanasia and disposal of common farm animals such as cattle, swine, sheep, goats, and poultry. It does not address similar activities regarding wildlife such as deer, antelope, elk or bison; susceptible exotics, wild bird populations or captive wild animals and birds that might be found in a zoo or farmed deer facility. Although the question invariably arises regarding infections in wild species, it is beyond the scope of this course. Students expressing concern or curiosity regarding disease control efforts in wildlife or similar non-domestic species should be referred to state animal health authorities or state wildlife specialists.

**Euthanasia and Disposal Health and Safety Considerations**

Implementing and following safe work practices are imperative during euthanasia and disposal operations. The Safety Officer (SO) assists Command by providing appropriate advice and specifically focuses on safety and risk management concerns that include:

- Monitoring and observing risks unique to agricultural settings
- Altering, suspending, or terminating unsafe acts, conditions, or operations
Standing safety orders will apply to each phase of the euthanasia and disposal procedures. Examples of safety issues may include:

- Handling stunned animals
- Walking and working surfaces contaminated with slippery animal fluids
- Slips, trips, and falls
- Heavy equipment operations
- Methods and/or equipment available for animal restraint
- Obscure operator vision and excessive noise. (Animal noise levels, especially in swine confinement facilities, can be extreme, thus contributing to an inability to communicate critical safety messages between responders.)
- Trench operations
- Burning operations
- Heat and/or cold stress
- Fatigue
- Mental and physical stress
- Nighttime operations
- Working in inclement weather

The safety of the Euthanasia Team may also be affected by other factors including:

- The size and body weight of the animals to be euthanized.
- The temperament of the species being euthanized.
- The animals’ familiarity with humans. Special care and precautions must be taken if the animals are unaccustomed to being handled by humans.
- Animals generally regarded as being dangerous (e.g., bison, bulls, sows with litters, large boars, tusked boars, and all of the antlered species).
- The presence and demeanor of the animal owner.
- Team training and bystanders.
In agriculturally-rich areas, many responders will have farm backgrounds and thus can be expected to be familiar with the hazards found on farms, both physical and those presented by animals. However, it is likely that additional non-farm response personnel will be required to control and eradicate disease, including those who serve to assist euthanasia and disposal.

**HINT**

Include safety examples specifically associated with agricultural settings such as barn interiors, tools, loose animals, low level lighting, noise, uneven floors, etc.

**Coping with Traumatic Events**

Any person (farm family, farm employees, responders, etc.) exposed to depopulation and disposal operations, especially if those operations are protracted, may suffer negative impacts from this exposure. This impact may manifest itself in one, and usually more, of the following four areas:

- Physical symptoms
- Cognitive or thought disturbances
- Emotional changes
- Behavioral changes

For a list of symptoms, see Appendix A.

Persons who are faced with ongoing stress, are socially isolated (without support of family, friends, community, etc.), and those who have had previous traumatic experiences are especially susceptible to the negative effects.

Guidelines for dealing with symptoms of critical incident stress are provided in Appendix B.

**Mental Health Service Providers**

It is natural to be upset, sad, fearful, or depressed in situations involving danger or extreme stress. While it is normal for persons to have these strong reactions, if the symptoms persist over thirty days, or if the symptoms occur weeks, months or even years after the conclusion of the event/incident, it may be an indication of a very serious problem. These persons should seek the assistance of a trained clinician.

Many communities provide mental health services by licensed, trained professionals through volunteer and non-volunteer services such as professional clinics, the American Red Cross, faith-based organizations, and other non-profit entities. Refer to your state and local emergency response plans for a list of mental health services providers who specialize in critical incident stress management in your community.
In addition to local providers, there are many national organizations that provide support to individuals in need of mental health services. Some of those providers are listed in the following sections:

**National Institute of Mental Health Links:**

**Anxiety Disorders**


An online resource for families and co-workers to help people with depression is available at [http://www.familyaware.org](http://www.familyaware.org)

The Disaster Response Education and Training Project, Center for the Study of Traumatic Stress, provides resources pertaining to disaster response, both natural and man-made. Among the resources are Mental Health and Behavioral Guidelines, Preparedness, Stress Management and Maintaining Effectiveness. Links are available to Manuals, Fact Sheets, Video Interviews, Articles, and Research Tools. Additional information may be found at: [http://www.centerforthestudyoftraumaticstress.org/factsheets.shtml](http://www.centerforthestudyoftraumaticstress.org/factsheets.shtml)

**National Suicide Hotline:**

1.800. SUICIDE (1-800-784-2433)

Those looking for support may dial 1.800.SUICIDE (1-800-784-2433). This number will seamlessly connect the caller to an available certified crisis center nearest to their calling location.

**HINT**

The National Suicide 800 number will connect callers with the nearest local crisis center. A network of 140 crisis centers exist nationwide and services are available 24/7.
Animal Movement and Restraint

Animal Welfare and Handling Considerations

Euthanasia methods must be humane, safe, and appropriate to the species involved and implemented according to current professional standards. Euthanasia should take place in a manner that minimizes an animal’s pain and stress. Whenever practical, mass depopulation must be performed using agents and methods determined to be acceptable by the American Veterinary Medical Association’s Panel on Euthanasia. Guidance for mass euthanasia in extreme situations from the American Veterinary Medical Association (Section 4 of the AVMA Guidelines) states, “Under unusual conditions, such as disease eradication and natural disasters, euthanasia options may be limited. In those situations, the most appropriate technique that minimizes human and animal health concerns must be used.”

The use of humane methods of animal restraint and euthanasia also helps minimize the psychological impact on response staff, animal owners, caretakers, and family members. Affected families should be offered an explanation of the response activities and the methods chosen. They must be assured that every effort will be taken to spare their animals from unnecessary pain and suffering.

HINT

See Appendix D for information on the safe handling of cattle.

Humane Animal Handling

Producers are not equipped or staffed to move and process an entire livestock herd or poultry flock in a single day as would be required during a mass euthanasia operation. Therefore, Euthanasia Team Leaders will require additional animal handling personnel to efficiently, humanely, and quickly accomplish their mission. Animal handling assistants can be expected to have varying levels of experience and should be briefed in safe work practices and non-abusive animal handling techniques before beginning work.

Animals sense and react to rough handling of others in their herd or flock. Loud noises, unnecessary distractions, sudden moves and the smell of blood can all adversely affect the ability to calmly and safely move animals into position for euthanasia.

Methods for animal restraint can be as simple as manually handling each animal one at a time as might be the case in removal of caged laying hens during a flock depopulation. A simple rope halter can adequately restrain a well-socialized cow or calf. Most swine farms have simple snare-like devices used to lead single animals from one place to another.
In situations where many animals must be euthanized, responders will likely encounter mechanized restraint equipment such as head gates or chutes. The most sophisticated of these operate rapidly on air pressure or hydraulic systems and can quickly inflict serious crushing injuries on personnel unfamiliar with their functions, especially when the urgency of the euthanasia process is added to the situation.

No matter which method of euthanasia is selected and what method of restraint is used, it is important to remember that following euthanasia, the animal will be unable to exit the restraint system on its own.

**Indemnification**

Once the diagnosis of a foreign animal disease is confirmed, the producer will be briefed on the planned time frame for the arrival of the Euthanasia Team, the method of euthanasia to be used, and the disposal strategy selected for the animals. The producer will also receive information on rights and responsibilities under federal or state indemnification programs.

Animals identified for euthanasia must be appraised prior to administration of the procedure. Appraisal is necessary for a producer to receive indemnity payments for destroyed animals. Deceased animals and production losses are not eligible for indemnification. State and/or federal officials will indicate the proper policies and procedures for appraisal. In some states, the indemnity amount for domestic animal disease is defined in statute while for most foreign animal diseases the values are set to fluctuate based on fair market value which is determined at the time of the event (i.e., on the day of euthanasia during any outbreak).

Complex formulas, production and genetic record reviews, and/or multiple expert assessments may be required to achieve an indemnification value that is both acceptable to the producer and consistent with statute. An appraisal may be conducted by a state or federal employee or in conjunction with industry experts such as livestock auctioneers or breed association experts.

Other forms of payment also are often available for farm property seized or destroyed during a foreign animal disease response. Examples include

**HINT**

An excellent guide to humane and efficient cattle handling is available from the National Cattlemen's Beef Association, Beef Quality Assurance Division, 9110 East Nichols Ave., Ste 300, Centennial, CO 80015 www.BQA.org
compensation for use of farm equipment such as chutes, trucks, or loaders during depopulation and disposal; feedstuffs condemned as possibly contaminated with disease; damage done to physical property such as fences removed to gain access to the premises and buildings destroyed as deemed not suitable for cleaning and disinfection.

In some situations, euthanasia may proceed without completion of an appraisal if the producer/owner and animal health authorities agree that a mutually satisfactory value can be established using records and other resources after the fact.

**HINT**
The stated goal of USDA is to maximize the financial return to the producer for animals that must be sacrificed while minimizing the impact on state and federal financial resources. Accordingly, when products from animals that are exposed to certain FADs are deemed safe to sell for human consumption, some animals may be moved under permit into slaughter channels if appropriate facilities exist within the disease control zone.

**Euthanasia**
The euthanasia process occurs following five common steps. The policies and procedures surrounding each step are state specific. Responders are encouraged to refer to their state or local animal response plans for such details.

1. Select the most appropriate method of euthanasia.
2. Select a site for euthanasia.
3. Assess and request resources needed.
4. Implement euthanasia.
5. Withdraw from the farm premises; prepare for premises cleaning and disinfection, provide for on-going interagency support to the producer or farm.

Before beginning euthanasia operations, the Incident Action Plan for the infected premises will be reviewed with the responders who comprise the euthanasia team by the site commander including information about:

- The method of euthanasia to be used, animal numbers and supplies required.
- The locations(s) for euthanasia restraint equipment.
- The existence of observed or inherent risks on the property.

**Methods of Euthanasia**
This section does not address all possible means of euthanasia, but describes the most common methods. Proper training and safety education are necessary for participation on a Euthanasia Team.
Physical Methods of Euthanasia

Stunning

Captive bolt guns and percussion stunners are devices used for stunning animals prior to euthanasia. Proper stunning is essential for preventing pain and suffering of animals prior to exsanguination. The principle behind these devices involves delivery of a forceful strike to the forehead using a bolt to induce unconsciousness. Individual rounds of firearms ammunition, compressed air, or hydraulics trigger release of the bolt. Euthanasia with these devices is dangerous and should be performed only by skilled personnel. Personnel from local slaughterhouses with experience using stunning devices may be used to perform euthanasia activities.

HINT

Stunning does not kill the animal. As the name implies, the animal is only stunned or knocked unconscious. Following stunning, an animal may collapse and may assume a contracted or “fetal” position and appear to the untrained eye to be dead.

The ammunition-powered penetrating captive bolt gun is the most widely used device for field application as it is hand-held and not reliant on a connection to outside power.

The stunning method is selected for euthanasia of confined animals. Animals to be euthanized by stunning must be properly restrained according to AVMA guidelines. All stunners can be prone to failure resulting in poor or incomplete stunning of animals. For this reason, all euthanasia teams must have redundant euthanasia equipment at hand to assure the highest possible success rate.

Captive bolt devices operated by ammunition shells carry an inherent risk of explosion and projectile injury to bystanders if not properly maintained. One large manufacturer recommends that captive bolt guns powered by ammunition be disassembled, cleaned, and provided with new seals after every 1,000 rounds are fired. Observing use cycles and providing periodic maintenance of stunning equipment is an example of how experienced law enforcement personnel could assist their veterinary colleagues during euthanasia.

In the second phase which can last 1 to 2 minutes, many large animals will exhibit a period of potentially dangerous, but involuntary behavior such as kicking and vocalization. This brief activity can endanger responders who try to move a seemingly dead, but only unconscious, animal prematurely. Those who are unfamiliar with what they may witness during euthanasia should be briefed in advance before assisting.
Additional measures such as pithing further disable the central nervous system. Exsanguination and removal of the animal from the euthanasia scene must be accomplished with attention paid to the potential for sudden movement of the animal. A veterinarian must certify that death has been achieved.

**Gunshot**

Gunshot is the euthanasia method of choice for free roaming animals (such as bison) when physical restraint is impractical or unavailable. At the discretion of animal health officials, highly skilled personnel may use gunshot on properly restrained animals.

When using gunshot to the head as a method of euthanasia in captive animals, the firearm should be aimed so that the projectile enters the brain, causing instant loss of consciousness. The appropriate firearm should be selected for the situation which takes into account differences in brain position, skull conformation between species, as well as the energy required for skull bone penetration without emergence from the contralateral side of the head.

A gunshot to the heart or neck does not immediately render animals unconscious and thus is not considered to meet the AVMA definition of euthanasia.

**Chemical Methods of Euthanasia**

Examples of chemical methods include the following:

- Carbon dioxide gas (CO₂)
- Water-based foam
- Anesthetic overdose

**Carbon Dioxide**

Carbon dioxide is a method of choice in certain situations for poultry, swine, and some small ruminants such as goats and sheep. It is an anesthetic when used at an atmospheric concentration above 25 percent. It is heavier than air, making it convenient to use in open top containers. When used outside in roll-off dumpsters, the top must be covered with a tarp to prevent wind from stirring the gas. Chambers must be large enough to totally envelop the animal in gas.

**HINT**

Confinement swine operations will present a significant challenge to euthanasia teams. These facilities may have hundreds of animals confined in rows of small steel pens or crates, which would make removal of carcasses nearly impossible if animals were euthanized on-site. For that reason, most state FAD response plans call for live swine to be removed from the housing unit prior to euthanasia. Personnel with skills specific to handling swine as well as equipment suited to mass gas euthanasia will be required.
Before animals are removed for disposal, CO₂ must be evacuated from any enclosed euthanasia chamber or container to allow veterinarians to enter and make an official certification of clinical death.

**Water-Based Foam (Chemical and Physical)**

The poultry industry has long had a need to euthanize entire flocks of birds for disease, economic, or production reasons. As a result, this industry has developed new, more efficient methods than were previously available. One such was an adaptation of “fire foam”. This method combines water, air, sometimes additional CO₂ and a surfactant similar to detergent to create a foam product of very small bubble size. When birds are covered with this product, it deprives them of air, resulting in rapid and humane asphyxiation. The technique has shown proven commercial application in the field and is approved as humane by euthanasia experts.

Generally, foam is appropriate only for floor-raised meat chickens and is problematic when applied to larger birds such as turkeys or elevated caged egg-laying birds. Some jurisdictions have used it with varying success in post-disaster situations to humanely euthanize birds trapped in destroyed confinement facilities.

**HINT**

Water-based foam presents a risk to personnel, especially when CO₂ has been added. Proper PPE, accountability for the location of each responder, and safety supervision are required.

**Anesthetic Overdose**

Any product used for lethal injection must be recognized as effective and humane. They should be considered for use when animals are closely associated with their owners or considered pets. The syringe and needle are somehow perceived as being more refined and humane than the techniques previously discussed.

Injectable euthanasia agents contain high concentrations of common anesthetic drugs and must be treated as a controlled substance. Proper security, documentation, and record keeping are necessary for use of these products.

Carcasses that have been contaminated with injected euthanasia agents should not be left where scavengers have the opportunity to eat them and become secondary victims of the chemicals used.
Site Selection for Euthanasia

Euthanasia sites must be selected that allow the euthanasia team to confine or move animals in a safe, efficient, and humane manner. The selected site must simultaneously facilitate the disposal team’s carcass removal process. In general a mass euthanasia site, especially for livestock, should be on level ground that offers firm footing and provides responders with an escape route in the event an unruly animal becomes loose. The site must also allow access for heavy equipment.

It is important to note that many farms may not have animal handling facilities appropriate for euthanasia and disposal. If restrained euthanasia is selected but proper facilities are not available on an infected farm, responders with logistics, engineering and construction expertise will be called upon to deliver and erect temporary or portable animal movement, confinement and restraint equipment. Construction of temporary access roads may become necessary.

Euthanasia without restraint for swine, poultry and some small ruminants may not begin until specialized equipment or custom-made containers or chambers have been delivered and properly assembled.

HINT

When faced with the pressure to control a fast-moving animal disease, the temptation exists to use hastily constructed or crudely improvised euthanasia facilities. Make-shift or ill-suited devices, sites, and equipment risk the safety of responders and are prone to failure and should be avoided. Time should be taken at the outset to construct a properly equipped site for euthanasia that allows simultaneous removal of carcasses.

Assessing On-Site Needs

Following discovery of the first case of high consequence animal disease, additional infected or suspect premises will be identified by members of veterinary surveillance teams. Each newly discovered infected premises presents a unique set of challenges and resource requirements. In each case, the lead surveillance veterinarian will relay several observations and pieces of information to Unified Command so that the properly equipped and staffed Euthanasia Team can be dispatched to the scene if needed.

This information includes:

- An assessment of the ability of the disease agent involved to spread from the particular infected or contact premises
- Animal species involved
- The location of animals to be euthanized
- The number/size of animals to be euthanized
• The training, experience, and skill of available personnel
• Equipment and supplies available on the farm to assist with the procedure
• Identified hazards impacting personnel safety
• Potential for the public to view euthanasia or disposal procedures, as would be the case if the farm was clearly visible from an interstate highway
• Willingness of the producer and employees to assist in depopulation
• An estimate of the emotional impact of the process on personnel, owners, and observers
• Need for security

Manpower Needs

It is estimated that a disease outbreak in livestock will require extensive human resources comprised of a multitude of skills and abilities. These estimates have been derived from state and federal exercises conducted nationwide involving multiple jurisdictions. The State of Kansas estimated an outbreak in a small cattle herd of 100 head will require a force of 125 personnel ranging from veterinarians to security forces to perform euthanasia, disposal, and surveillance activities in the area surrounding the infected premises. That number increases to 375 such personnel when operations are conducted in an area containing a feedlot housing 30,000 head.

Kansas also estimated that for every ten veterinary responders working on infected farms, 20 veterinarians would be required for surveillance and animal health protection duties outside the infected zone.

Typically a well trained five-person Euthanasia Team equipped with a side-opening chute and a front-end loader can euthanize one animal approximately every two minutes. Exercises have also revealed that such an efficient pace is not sustainable and actual animal throughput under field conditions can be expected to be much lower due to limited human resources.

All human resource needs are acquired through the establishment of Memorandum of Understanding (MOU) or Emergency Management Assistance Compact (EMAC) under the ICS structure.

Implementation of Euthanasia

Protection of the Public and Responder

Public safety and perception are important considerations during euthanasia events. Euthanasia of diseased animals can have an adverse effect on consumer willingness to purchase animal products. Public information officers should be prepared to address public concerns and media questions accurately and in a manner sensitive to the economic impact on the industry. All media requests and public information should be directed and coordinated through the Joint Information Center (JIC).
Farms located along principle travel routes such as popular state or interstate highways might afford casual travelers and media with unintended views of euthanasia or disposal activities. In such cases local law enforcement officials could be asked to close or reroute traffic for the duration of these activities.

**Administering Euthanasia**

Personnel involved in euthanasia operations must have proper training in the specific technique used. State and federal government veterinarians and slaughterhouse workers with prior euthanasia experience will most likely be deployed in the initial phase of operations. In the event an animal disease becomes widespread, non-government veterinarians such as those in private practice who have volunteered for the National Animal Health Emergency Response Corps (NAHERC), the National Veterinary Response Team (NVRT), or state animal response team could be placed on euthanasia teams.

Extreme care should be taken to prevent harm to the person delivering euthanasia and to others. Emergency animal handling and euthanasia are physically demanding tasks. Responders chosen for Euthanasia Team positions must be able to meet the physical requirements to carry out these functions.

**HINT**

It is unlikely that community responders will be asked to administer euthanasia. Those providing euthanasia services will be drawn from the veterinary, veterinary assistant and slaughterhouse professions and have had proper training and experience in the specific technique used.

Local responders, such as members of law enforcement, could be asked to apply their marksmanship skills in certain euthanasia situations or to serve in support and ancillary roles during euthanasia. All responders should be aware of all aspects of this operation, including use and maintenance of firearms and other safety issues.

**HINT**

A gunshot to the heart or neck does not immediately render animals unconscious and thus is not considered to meet the AVMA definition of euthanasia.

**Prioritizing Euthanasia Activity According to Disease Risk**

Euthanasia will occur on infected or suspect farms in a sequence that takes into account the risk the animals pose for the spread of the disease agent and the ability of the responding agency to properly dispose of the carcasses in a timely manner. In general, animals should be euthanized in the following order:

- Animals showing clinical signs of the disease
- Animals that have had contact with the diseased animals
Concluding Euthanasia Activities

Euthanasia activities may last from a matter of hours to several days depending on the number and location of susceptible animals on a given premises. The euthanasia team members and their equipment will most likely be heavily contaminated. Extensive cleaning and disinfection of personnel, non-disposable equipment, vehicles, and restraint equipment will be necessary before the Euthanasia Team can safely depart via public highways.

Details regarding cleaning and disinfection of personnel, equipment, and vehicles leaving the site will be discussed in the C&D lesson.

Introduction to Animal Carcass Disposal

Disposal occurs simultaneously with euthanasia following five steps similar to those discussed previously.

For disposal this includes:

1. Selecting the most appropriate method of disposal
2. Selecting a site for disposal
3. Assessing and requesting needed resources
4. Implementing disposal
5. Securing the site

Euthanasia and animal carcass disposal operations should occur at the same pace. Prompt disposal reduces the potential for disease spread and avoids any negative public relations issues that might arise from accumulations of animal carcasses awaiting disposal.

The goal of disposal is the secure elimination of materials contaminated with an animal pathogen in a timely, safe, aesthetically acceptable, environmentally responsible manner. Disposal options are selected based on characteristics of individual farm premises and the availability of on-site or off-site disposal facilities.

Animal health authorities will arrange for the disposal of a large number of animals in cooperation with federal or state environmental protection officials. Many states have established policies and procedures for determining the best method of disposal based on a host of factors such as topography, resources, demographics, environmental regulations, etc. Responders are encouraged to reference their state or local animal health emergency response plans for specific policies and procedures.

Many response protocols require that carcasses be immediately treated with an external disease-appropriate disinfectant following euthanasia and before carcasses are transported for final disposition. In order to reduce the spread of disease agents, animal carcasses should be immediately secured and disposed of within 24 hours after euthanasia.
Knowledge Check

Some states have preferred methods for carcass disposal based on geography, depth to prevailing water tables, and type of livestock to name a few. Discuss the various factors in the area of each class that may impact the choice of disposal method that would be used in that area. For example, depth to bedrock in Vermont or Kentucky or water tables in Florida may hinder on-farm burial.

HINT

It is important to stress that “disposal” goes far beyond animal carcasses and includes any potentially infective material on the infected premises such as disposable PPE and contaminated medical devices.

Any method of disposal other than “on-site” or “on-farm” risks further spread of the disease during transport to common or mass disposal sites and the return of empty transport vehicles to the infected premises. If on-site burial is not possible, an alternate site within the quarantine zone should be located. Animal carcasses will exude urine, feces, blood, and other fluids that can leak from improperly or ineffectively sealed vehicles. If leakage occurs during transport, the infected premises will be extended to include all public roads upon which insecure carcass-laden vehicles may be operated. Carcass transport trucks must have leak-proof trailers and be tightly covered. An escort with disinfectant may follow and ensure the trucks are not leaking. If there is a leak, the truck must be stopped and the leak controlled. The roadway will be closed to all traffic and the area disinfected immediately. Carcass transport trucks must be disinfected twice: Once before they leave the infected premises and again before they leave the disposal site.

Selecting the Method of Disposal

The method of disposal selected will be specific to each infected premises. Multiple locations involved in a single response effort may be infected with the same disease agent, but require completely different disposal options. These options may be affected by variables such as geography, water tables, volume of animal mass (expressed in cubic yards), site accessibility, or available resources to name a few.
**Burial**

On-site burial is preferred and should be used whenever practical.

Three burial techniques may be used:

- Trench burial
- Commercial or municipal landfill
- Dedicated mass burial sites

*Trench burial* has been the preferred on-site disposal option for animal disease. There are potential logistical and economic advantages for trench burial as it is more expeditious and inexpensive. However, this option is not without challenges. Shallow, hastily, or crudely constructed burial trenches risk negative effects on workers and the environment and subsequent public health. Additionally, stomachs of decomposing ruminant animals expand with fermentation gas, potentially causing the animals to disrupt the soil cover of the trench. To prevent this, the stomachs of such animals are lanced to allow for the escape of accumulated gases.

To put the size of a trench burial operation into perspective and to comply with EPA guidelines, the Washington State Department of Agriculture calculated that burial of 50,000 head of cattle in the dairy-intense area of eastern Washington state would require a trench 9’ deep x 12’ wide x 37,500’ long.

Technical specifications for trench burial can be found in Appendix C.

**HINT**

Many states now require proposed new livestock facilities, or expansions of existing ones, to have on-site carcass disposal areas located and designed by qualified engineers.
**HINT**
The disposal options that follow all require transport of carcasses off the infected farm to a centralized site. NAHEMS requires that carcasses be sprayed with approved disinfectants and placed in leak-proof containers for transport to help prevent disease spread.

*Municipal and commercial landfills* represent a significant means of waste disposal in the United States. Landfills have been used as a means of poultry disposal in several major disease eradication efforts, including the 1984 and 2002 Avian Influenza (AI) outbreaks in Virginia and the 2002 outbreak of Exotic Newcastle Disease (END) in Southern California. Arrangements for such disposal should be made well in advance of an animal disease outbreak, especially in areas where on-site burial cannot be accomplished.

**HINT**
As part of preparedness planning, some states have executed Memorandums of Understanding (MOU’s) with municipal or private landfill operators to accept some animal carcasses resulting from euthanasia during an animal disease emergency. While landfill burial may be an acceptable disposal method for poultry, this may prove problematic when disposing of large numbers of livestock carcasses. Discuss various challenges such as public concern, permitting issues, transportation, and remaining landfill capacity.

*Mass animal burial sites* are engineered and constructed to accept large numbers of animal carcasses from multiple locations. Systems and controls are incorporated to collect, treat, and/or dispose of leachate and gas. Historically, mass burial sites have played a key role in the disposal of animals in outbreaks outside the United States.

**Composting**
Carcass composting is a process that promotes and accelerates natural biological decomposition.

During the first phase of composting:
- The temperature of the compost pile increases.
- The organic materials of carcasses break down into relatively small compounds.
- Soft tissue decomposes.
- Bones partially soften.
In the second phase:

- The remaining materials (mainly bone) degrade (large bones of livestock, such as limbs and skulls, generally do not break down completely. Further physical processing of composted livestock, such as mechanical grinding of the compost pile, is required to reduce bone particle size and allow for land application of the residual matter.)

- The compost turns to a consistent dark brown to black soil or “humus” with a musty odor containing primarily non-pathogenic bacteria and nutrients ideal for plants. Finished compost does not contain the original infectious agent.

Effective carcass composting systems require specific knowledge and understanding of the procedures and materials including carbon sources, bulking agents, biofiltration layers, and sufficient oxygen.

**Composting Poultry**

On-site (including in-house) composting of poultry will likely be a very widespread practice because of proven effectiveness in recent Avian Influenza outbreaks.

**Advantages of In-House Poultry Composting**

There are many advantages to in-house composting. This method:

- Contains the disease and limits off-farm and farm-to-farm disease transmission.

- Limits the risks of groundwater contamination and air pollution.

- Inactivates pathogens in carcasses and litter.

- Limits public concerns over disease exposure.

- Is relatively low in cost and uses readily available farm equipment.

- Is protected from severe weather conditions (frozen ground, etc.).

- Limits transportation costs and fees associated with off-site disposal.

- Produces potentially useful compost.
**HINT**

Avian Influenza virus may be inactivated within three hours after the internal temperature of the compost pile reaches 132ºF or 1/2 hour at 140ºF. Both are well within the temperature range of composting. In the case of the Delmarva Peninsula (Delaware, Maryland, and Virginia) outbreak in 2004, composting in-house occurred for 10 days, after which the material was allowed to continue the composting process over several months elsewhere on the site.

---

**Composting Livestock**

Tightened regulatory requirements regarding prevention of Bovine Spongiform Encephalopathy introduction into the human and animal food chains have changed large animal disposal policies. As a result, large animal composting has become an attractive alternative to rendering that could be implemented for disposal of diseased animals.

Successful composting of numerous cattle or swine carcasses is more difficult than poultry because the unit of biomass of a cow far exceeds that of a chicken. State departments of agriculture and land-grant universities have researched a variety of large animal composting techniques. Responders should consult their respective state departments of agriculture and university environmental specialists for the policies and procedures of large-animal composting in their state.

**Outdoor Compost Site Selection Criteria**

Although specific site selection criteria for composting may vary from state to state, a variety of general site characteristics should be considered. A compost site should:

- Be located in a well-drained area that is at least three feet above the high water table level.
- Be at least 300 feet from sensitive water resources (such as streams, ponds, wells, etc.)
- Have adequate slope (one to three percent) to allow proper drainage and prevent pooling of water.

Proper composting of carcasses requires a variety of ingredients or co-composting materials, including carbon sources, bulking agents, and biofilter layers. The design, including the manner in which animal remains are placed for composting, must allow significant amounts of oxygen to permeate the entire pile.

Some composting system designs call for supplemental air to be pumped in. This is especially true if long plastic enclosures (AgBags) are used to contain composting carcasses. If compost piles are not supplied with supplemental outside air, or are not turned frequently for aeration, the mass becomes “septic” leading to incomplete digestion of the biomass.
Runoff from the composting facility should be collected and directed away from production facilities and treated through a filter strip or infiltration area. Composting facilities should be located downwind of nearby residences to minimize potential odors or dust being carried to neighboring residences by prevailing winds. The location should have all-weather access to the compost site.

Speed of carcass decomposition depends on the size of carcasses, the frequency that the pile is turned, and the ratios of nutrients in the compost pile. Under ideal conditions, most compost material will be free of any infectious agents and suitable for land application in 60 to 180 days.

**Alternative Locations for Composting**

A centralized secure composting facility may have been identified by the agency in charge. If this is the case, biosecurity guidelines must be followed when transporting animal carcasses to such a facility.

**Incineration (Burning)**

Advances in science and technology, increased awareness of public health, growing concerns about the environment, and evolving economic circumstances have all affected the application of incineration to carcass disposal. While this process has played an important role in animal disposal in the past, the use of some methods of incineration has decreased.

There are three broad categories of incineration techniques currently in use:

- Open-air burning
- Air-curtain incineration
- Fixed-facility incineration

Responders (such as firefighters) will play an essential role if burning is implemented. Their knowledge of fire control and safety will be essential in minimizing injury to personnel or damage to equipment and farm buildings. Emergency plans should be reviewed with all staff at regular intervals. These plans should account for site characteristics such as location of proposed pits, fuel storage, and staging areas and should be reviewed with local fire officials. Care must be taken to ensure that no combustible materials remain near open flames.

A lined basin or other water storage capabilities should be available and filled with enough water to ensure safe fire control. The quantity of water stored is dependent upon fire suppression capabilities and site features that might allow any fire to spread uncontrolled.

Care must be taken to assure no significant intermediate combustible source lies between the incineration site and fuel supplies or other significant combustible materials.
**Open-Air Burning**

Open-air carcass burning is resource intensive and has been largely supplemented or substituted by other disposal methods. This process includes burning carcasses in earthen “pits” and in open fields on “pyres.” Both methods combine carcasses to be destroyed with easily combustible materials in large volumes.

**Pyres**

Pyres involve the construction of an above-ground fire bed on which animal carcasses will be placed and burned. Location of the pyre should ideally be on a flat area away from public view, but readily accessible to heavy vehicles. The type and amount of fuel used for incineration depends upon the local fuel availability. Various fuels such as straw or hay, untreated timber, wood, coal, and liquid fuel may be used.

**Pits**

Pits have the advantage of allowing more control over the size of the fire with less risk of spread, particularly in windy conditions. Pits also allow for easier placement of fuels and animals.

Below grade burning pits may not allow adequate airflow. Large tractor mounted snow throwers and air-curtain incinerators (pit burners) have been used successfully to increase airflow at excavated pit-type carcass incineration sites.

**HINT**

Both pit and pyre incineration techniques utilize large amounts of combustible fuels, often impure or treated wood products. Pyres and pits do not burn at temperatures sufficient to fully incinerate particulates and some chemical or biological contaminates. They are aesthetically displeasing both to the eye and to the sense of smell. In the United States these methods would not readily be encouraged by animal health authorities unless other disposal alternatives were unavailable.
Air-Curtain Incineration

Air-curtain incineration involves large capacity fans driven by diesel engines that deliver high volumes of oxygen rich air to the fire through a manifold, thereby creating a turbulence in which incineration is greatly accelerated. These devices can be up to six times more efficient than passive open-air burning. Air-curtain systems vary in size according to the volume and weight of carcasses to be incinerated. Air-curtain incineration technology has traditionally been used to eliminate land clearing and storm damage debris as well as construction wood waste.

Air-curtain incinerators can be used to provide more complete combustion of animal carcasses, substantially reducing the public health threat inherent in any large-scale burning operation. This includes marked reductions in particulates, hydrocarbons, and other hazardous air pollutants.

The use of air curtain incinerators can also significantly reduce the fuel requirements for open-air burning (50 to 80 percent reduction over open pyres depending on fuel used). This fuel savings will become critical in an outbreak or at any large site.

Air curtain incinerators are available in two styles. One is a self-contained above ground firebox similar to a large trash container that is usually lined with firebrick. The other consists of a long plenum placed along one edge of an incineration pit dug into the ground. Both systems function by supplying high volumes of air by use of a high velocity, engine-powered fan.

Like open-air burning and fixed-facility incineration, air-curtain incineration poses a fire hazard and appropriate precautions should always be taken. Air-curtain incineration, like other combustion processes, yields ash, which may remain and be buried in the pit.

Air-curtain incineration is not entirely contained and subject to many variables:

- Human operation
- The weather
- Local community preferences

Knowledge Check

Discuss past uses of air-curtain incinerators such as natural disasters. In the U.S air-curtain incinerators have been used in Colorado and Montana to dispose of animals infected with chronic wasting disease and throughout the U.S., in other livestock disasters.
Fixed-Facility Incineration

Fixed-facility incineration is a general term used to describe a self contained fire box. This type of incinerator is almost exclusively limited to disposal of poultry carcasses. Incinerators are often available as standard equipment on large poultry production facilities. These types of facilities include:

- On-farm incinerators
- Commercial incineration facilities
- Dedicated animal crematoria

Unlike open-air burning and air-curtain incineration, fixed-facility incineration is entirely contained and always highly controlled. Fixed-facility incinerators are typically powered by diesel, natural gas, or propane. Some fixed-facility incinerators are fitted with afterburner chambers designed to completely burn hydrocarbon gases and particulate matter exiting from the main combustion chamber. If off-site incineration is selected, care must be taken in the transport of infected carcasses to eliminate the potential for disease spread.

Other Possible Disposal Options

Rendering

Rendering involves the reduction of moisture, denaturing of animal proteins, and the meltdown of fat. Consideration for the disease agent, suspected or confirmed, as well as the use of barbiturate anesthetics as euthanasia agents may eliminate this method as an option. The movement of carcasses to the rendering plant poses additional risk of disease spread, and ample rendering facilities are not always available. Rendering will most likely be used on a limited basis.

HINT

If burial within the quarantine area is not possible because of environmental or other legitimate reasons, disposal at a rendering plant may only be allowed if the plant is located within the same control zone as the farm of origin. The trucks would need to have leak-proof trailers and be tightly covered. An escort with disinfectant would need to follow the trucks to ensure they are not leaking. If there is a leak, the truck must be stopped and the leak stopped. The roadway and area will need to be disinfected immediately. The trucks would have to be disinfected before they leave the infected premises and before they leave the rendering plant.

Unless a renderer can be absolved of liability for processing diseased animals or rendered product from such animals can be securely disposed of this option may not be available.
Methane Digestion

An increasing number of U.S. dairy farms have built methane co-generation facilities that digest cow manure and other farm wastes, capture the resulting methane, and power electric generators. Depending on size, design, and capacity, some on-farm digesters may be suitable for on-site disposal of animal carcasses produced during euthanasia of that farm’s livestock.

Site Selection: Use of Geographic Information System Maps

State authorities (e.g., Department of Natural Resources) may select burial sites using on-site observation and maps developed by using Geographic Information Systems (GIS). These maps help identify three typical zones:

- An exclusion zone where burial is very limited or impossible.
- A cautionary or limited zone where only limited burial is recommended.
- Acceptable zones where there are no known restrictions for burial.

As part of animal disease emergency planning, many agricultural states have conducted soil surveys to discover the probability of locating acceptable on-farm burial sites in real time during any FAD outbreak.

Assess and Request Disposal Resources Needed

As with euthanasia, the disposal options selected will be unique to each infected premises. The on-site commander will advise Unified Command regarding workable disposal options both on, and away from, the disease scene.

Valuable disposal method and site selection information may come from the producer’s intimate knowledge of his own land, from local extension or soil specialists, and from data available at the county or state levels.

Information required by the Disposal Unit Leader at Unified Command to dispatch a properly staffed and equipped “disposal team” will include:

- Number and size of animals to be disposed.
- Carcass location and disposal site location plotted on a map.
- Inventory of on-farm equipment being made available to assist disposal.
- Estimate of supplementary heavy equipment and operators required.
- Obstacles to ingress/egress of equipment including need for temporary roadways.
Implementing Disposal

Carcass disposal will be implemented by using a site-specific protocol following the best industry, scientific, and regulatory practices for the method selected. Secure disposal activities begin as soon as the need to euthanize animals is identified. Therefore, response plans should identify the probable method and a resource for conducting such activities long before the need arises. Responders must realize that disposal will continue after animals have been removed and throughout the premises cleaning and disinfection phase.

Arrange for Security at the Disposal Site

The biosecure disposal of animal carcasses requires a continuous process of monitoring and securing the disposal site. For example, in the early days of composting, fresh carcasses may still contain infectious material and may be attractive to scavenging wildlife and thus pose a disease-spread hazard. Burial sites likewise need to be back-filled and capped as carcasses are added to prevent unauthorized access and scavenging, particularly by birds. Disposal by burning can take several days to complete. Residues such as ash and non-combusted animal materials represent an environmental hazard, which must be secured before disposal can be declared complete.

Summary

Euthanasia and disposal operations are critical to reducing the spread of disease. Animal restraint and depopulation efforts must follow identified humane practices and assure that personnel safety is paramount in carrying out all activities. Disposal functions occur simultaneously with euthanasia efforts, and available options will depend upon the characteristics of the premises as well as state and federal regulatory requirements.
## APPENDIX A

### Symptoms of Traumatic Stress

<table>
<thead>
<tr>
<th>Physical</th>
<th>Cognitive</th>
<th>Emotional</th>
<th>Behavioral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chills</td>
<td>Confusion</td>
<td>Fear</td>
<td>Withdrawal</td>
</tr>
<tr>
<td>Thirst</td>
<td>Nightmares</td>
<td>Guilt</td>
<td>Antisocial acts</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Uncertainty</td>
<td>Grief</td>
<td>Inability to rest</td>
</tr>
<tr>
<td>Nausea</td>
<td>Hyper vigilance</td>
<td>Panic</td>
<td>Intensified pacing</td>
</tr>
<tr>
<td>Fainting</td>
<td>Suspiciousness</td>
<td>Denial</td>
<td>Erratic movements</td>
</tr>
<tr>
<td>Twitches</td>
<td>Intrusive images</td>
<td>Anxiety</td>
<td>Change in social activity</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Blaming someone</td>
<td>Agitation</td>
<td>Change in speech patterns</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Poor problem solving</td>
<td>Irritability</td>
<td>Loss or increase of appetite</td>
</tr>
<tr>
<td>Weakness</td>
<td>Poor abstract thinking</td>
<td>Depression</td>
<td>Hyper alert to environment</td>
</tr>
<tr>
<td>Chest pain</td>
<td>Poor attention/decisions</td>
<td>Intense anger</td>
<td>Increase alcohol consumption</td>
</tr>
<tr>
<td>Headaches</td>
<td>Poor concentration/memory</td>
<td>Apprehension</td>
<td>Change in usual communications</td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>Disorientation of time, place or persons</td>
<td>Emotional shock</td>
<td>Change in usual libido</td>
</tr>
<tr>
<td>Rapid heart rate</td>
<td>Difficulty identifying objects or people</td>
<td>Emotional outbursts</td>
<td></td>
</tr>
<tr>
<td>Muscle tremors</td>
<td>Heightened or lowered alertness</td>
<td>Feeling overwhelmed</td>
<td></td>
</tr>
<tr>
<td>Grinding of teeth</td>
<td>Increased or decreased awareness of surroundings</td>
<td>Loss of emotional control</td>
<td></td>
</tr>
<tr>
<td>Shock symptoms</td>
<td>Inappropriate emotional response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual difficulties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profuse sweating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

Coping with Traumatic Stress - Guidelines

The following are provided as guidelines and do not substitute for the role of a professional mental health service provider.

- For the responder or producer directly impacted by the event.
- Periods of appropriate physical exercise, alternated with relaxation, will alleviate some of the physical reactions.
- Structure your time - keep busy.
- You are normal and the feelings and reactions you are experiencing are normal – do not label yourself crazy.
- Talk to people - talk is the most healing medicine.
- Be aware of numbing the pain with use of drugs or alcohol, you do not need to complicate this with a substance abuse problem.
- Reach out - people do care.
- Maintain as normal a schedule as possible.
- Spend time with others.
- Help your co-workers as much as possible by sharing feelings and checking out how they are doing.
- Give yourself permission to feel rotten and share your feelings with others.
- Keep a journal; write your way through those sleepless hours.
- Do things that feel good to you.
- Realize those around you are under stress.
- Do not make any big life changes.
- Do make as many daily decisions as possible, which will give you a feeling of control over your life, i.e., if someone asks you what you want to eat – answer, even if you are not sure.
- Get plenty of rest.
- Reoccurring thoughts, dreams or flashbacks are normal – do not try to fight them – they will decrease over time and become less painful.
- Eat well-balanced and regular meals (even if you do not feel like it).

For family members and friends:

- Listen carefully.
- Spend time with the traumatized person.
- Offer your assistance and a listening ear if they have not asked for help.
- Reassure them that they are safe.
- Help them with everyday tasks like cleaning, cooking, caring for the family, minding children.
- Give them some private time.
- Do not take their anger or other feelings personally.
- Do not tell them that they are “lucky it wasn’t worse” – statements such as this do not console traumatized people. Instead, tell them that you are sorry such an event has occurred and you want to understand and assist them.
APPENDIX C

Burial Site Zoning

Burial zones are determined by a variety of factors. The criteria for zoning may include the following exclusion zones:

- Public water supplies - 2500 feet buffers
- Private water supplies - 200 feet buffers (Note: Buffers for wells, tiles, and streams were set based on the idea that virus survival in groundwater is <60 days. These may need to be larger if information on survival indicates a longer lifespan.)
- Existing source water protection zones (variable)
- Surface waters and drainage tiles - 200 feet
- Depth to bedrock - <5 feet
- Depth to groundwater - <6 feet
- Permeability - moderately rapid/moderate to very rapid
- Slope - >14 percent
- Alluvium – all alluvial soils
- Floodplains and stream terraces
- Forested areas
- Incorporated areas

The burial allowed with precautions zones include:

- Public lands
- Slope 9-14 percent
- Permeability – moderate
- Depth to groundwater - > 6 feet
- Depth to bedrock - <25 feet; this zone may be suitable for burial if rock is not encountered within 10 feet of the trench bottom.

The burial allowed with no known restriction zones include:

- Any areas not included in the excluded or precaution zones
Trench Dimensions: Animal Design Basis

Minimum trench design is based on the following:

- One bovine carcass would require 3 feet of trench depth, 2 feet of trench length and 7 feet of width.
- Five hog or five sheep carcasses would be equivalent to one bovine carcass.

Trench Depth

Trench depth will be determined by the layering of carcasses:

- 6 feet if carcasses are buried one layer deep*
- 9 feet if carcasses are buried two layers deep
- 12 feet if carcasses are buried three layers deep

In areas where groundwater depth or soil types are limiting factors, other on site disposal options such as composting may be considered.

Trench Length

Trench length will be depend on site factors but must meet the following:

- Must not exceed 300 feet
- Must follow contour lines as closely as possible
- Must not be placed within 50 (horizontal) feet of another trench
- Cannot pass through any sand seams or pockets.

Cover

The layers of carcasses should not come closer any closer than two to three feet from the original undisturbed ground level. The balance of the trench should be backfilled with soil placed as a cap or cover over the burial trench. All excess soil should be mounded over the trench, but the cover soil should not be compacted.
Appendix D

Safe Handling of Animals

Do NOT chase lone animals!

Direction of Desired Movement

Gate

Handler Movement Pattern

90°
Scope Statement

Identify and explain the various methods of euthanasia and options for disposal of animal carcasses and address the operational, safety, and emotional elements associated with these activities.

Terminal Learning Objective

Identify euthanasia and disposal measures that control, prevent the spread of, and eradicate animal disease.

Enabling Learning Objectives

4-1 List effective methods and resources used for animal carcass disposal during an animal disease event.
4-2 Identify personnel safety concerns associated with euthanasia and disposal procedures.
4-3 Review the process of indemnification based on fair market value of destroyed animals and materials.
4-4 Describe the content of on-site educational materials that will be provided to producers, farmers, and responders.

Euthanasia Activities & Incident Command

Safety Issues

- Walking and working surfaces
- Slips, trips, and falls
- Heavy equipment operations
- Trench operations
- Animal restraint equipment
- Nighttime operations
- Burning operations
- Working with animals
- Euthanasia procedures
- Heat and/or cold stress
- Fatigue
- Mental and physical stress
- Working in inclement weather
**Euthanasia Team Safety**

- Size and body weight of animals
- Temperament of the species
- Animals generally regarded as dangerous
- Obscure operator vision and excessive noise
- Animals’ familiarity with humans
- Presence and demeanor of animal owner

**Coping with Traumatic Events**

- Any person exposed to depopulation and disposal operations may suffer negative impacts and manifest in one or more of the following areas:
  - Physical symptoms
  - Cognitive or thought disturbances
  - Emotional changes
  - Behavioral changes

**Animal Welfare and Handling**

- Euthanasia methods must be humane, safe, and appropriate to the species involved
- Guidance from Section 4 of AVMA Guidelines

**Humane Animal Handling**

- Euthanasia Team Leaders will require additional personnel to accomplish their mission
- Animal handling help may be recruited from the local community
  - Assistants should be briefed in safe work practices and non-abusive animal handling techniques

**How are appraisal and indemnification accomplished?**

- Prior to euthanasia the animals should be appraised
- Confirmed by an animal health authority
- Fair market value utilized

**Euthanasia**

Process uses five common steps:
1. Select most appropriate method
2. Select a site for euthanasia
3. Assess and request resources needed
4. Implement euthanasia
5. Withdraw from premises and prepare C&D and support to producer or farm
Physical Methods Euthanasia

- Captive bolt
  - Most practical in a mass euthanasia situation
- Gunshot
  - Method of choice for loose housed animals
  - Where physical restraint is impractical or unavailable

Chemical Methods

- Carbon dioxide
  - Method of choice for swine and small ruminants
  - Concentrations above 25%
- Water-based foam
  - Rapid and humane
  - Floor-raised poultry
- Anesthetic Overdose
  - Animals closely associated with owners

Euthanasia Site Selection

- Facilitate with carcass removal process
- Located on level ground
  - Animal breaks loose
  - Allow heavy equipment
  - Construction of portable confinement and road access

Assessing Needs

Euthanasia decisions are based on several factors:
- Location of animals to euthanize
- Disease agent involved
- Animal species involved
- Number & size of animals

Assessing Needs

Euthanasia decisions are based on several factors:
- Training, experience, skill of personnel
- Equipment and supplies available
- Emotional impact of euthanasia procedure
- Personnel safety
- Public perception

Implementation of Euthanasia

- Protection of the public and responder
  - Adverse effect on consumers
  - PIO prepared to address public
  - Media requests through JIC
  - Law enforcement reroute traffic
- Administering euthanasia
  - Proper training for personnel
  - Very physically demanding
  - Local assistance such as slaughterhouse


Concluding Euthanasia

- May last hours or several days
- Euthanasia team heavily contaminated
- Extensive cleaning and disinfecting for team, equipment, and premises

Introduction to Animal Disposal

Occurs simultaneously with euthanasia using five common steps
1. Select appropriate disposal method
2. Assess and request resources
3. Site for disposal
4. Implement disposal
5. Secure the site

Common Disposal Methods

Burial onsite is preferred method of disposal
- Trench
  - More expeditious and inexpensive
- Landfill
  - Concern for public opposition
  - Arrangements made in advance
- Mass burial sites
  - Systems to collect gas and leachate

Recommended to lance the stomachs of ruminants allowing gases to escape before burial

Common Disposal Methods

- Composting
  - Requires abundant oxygen
  - Deactivates disease from temperature and pH
  - Requires well drained area away from water source
  - Security from scavenger species
  - Downwind of residences
- Incineration
  - Open air burning
  - Air-curtain incineration

Other Disposal Methods

- Rendering
  - Transportation
  - Capacity
  - Cleaning and Disinfection
- Methane digestion
  - Dairy farms
  - Co-generation facilities

Rendering least used option due to capacity and transportation issues

Site Selection

- Burial site selected using GIS and soil surveys
- Maps identify three typical zones
  - Exclusion zone
  - Cautionary or limited zones
  - Acceptable zones
Assess and Request Disposal Resources

- Information needed to dispatch Disposal Team
  - Number and size of animals
  - Carcass location and disposal site location
  - Inventory of on-farm equipment available to assist
  - Estimate of heavy equipment operators needed
  - Obstacles to ingress and egress on site

Implementing Disposal

- Choose method using best industry, scientific, and regulatory practices
- Plans should identify method long before need arises
- Disposal site security
  - People and animal scavengers
- Environmental impact and continuous monitoring after incident

Summary

- Euthanasia and disposal is critical to reduce spread of disease
- Animal restraint and depopulation must be humane
- Personal safety is paramount in all activities
- Disposal occurs simultaneously with euthanasia
- Disposal options will depend upon characteristics of the premises and regulatory requirements
This page intentionally left blank
ABOUT THIS LESSON

**Scope Statement**
This lesson details the requirements for managing the cleaning and disinfecting (C&D) operations for an animal disease including initial site assessment, required resources, procedures, and the associated health, safety, and biosecurity challenges.

**Duration** 60 Minutes

**Resources**
- Participant Procedure Guide
- Presentation Slides
- Presentation Maps

**Practical Exercise Strategy**
Students will discuss their agency, business or association regular operating procedures impacted by the need for C&D. What essential and non-essential services would this include? How would they mitigate the impact?

**Instructor to Participant Ratio** 1:20

**Terminal Learning Objective**
Describe appropriate cleaning and disinfection (C&D) procedures for people, vehicles, equipment, and property.

**Enabling Objectives**
At the completion of this lesson, the participant will be able to:

- **5-1** Explain the purpose of cleaning and disinfection.
- **5-2** Describe the processes of cleaning and disinfecting of premises and equipment.
- **5-3** List the safety issues associated with performing cleaning and disinfection procedures.
Introduction

The purpose of cleaning and disinfecting is to:

- Prevent the spread of infection by ensuring the effective and efficient decontamination of premises, people, equipment, and vehicles during and after the event.
- Prevent the recurrence of infection after restocking.

This is accomplished by providing cleaning and disinfectant materials for all visitors/workers on arrival and departure from an infected premises or quarantine area. Personal protective equipment and disposal containers should be available for all C&D operations. Cleaning and disinfection activities will occur across the entire incident from discovery and diagnosis through response and recovery. C&D can be broken into broad categories: Operational C&D of personnel, vehicles and equipment used during the diagnostic, euthanasia and disposal phases. Recovery C&D of farm premises prior to restocking with healthy livestock, susceptible to the initial disease agent. The fundamental principles of C&D apply to each category and differ only in degrees of size, time, scope, intensity and cost.

Cleaning and Disinfection

C&D protocols must be implemented to prevent the further spread of a disease agent. Responders may be involved in cleaning activities on premises, in buildings, pens and enclosures.

In addition, thorough cleaning and disinfection of equipment, vehicles and trailers are essential as well as proper disposal or C&D of contaminated personal protective clothing. All rinseates and runoff should be contained and disposed of according to EPA treatment technologies.

Basic Steps of a Cleaning and Disinfection Protocol

There are proper procedures to follow in order to increase the efficiency of the C&D process. If surfaces are not properly cleaned, the disinfection process is ineffective. The basic steps of C&D include:

- Remove all visible gross contaminants from people, vehicles, and all equipment.
- Apply detergent solution onto the surface and allow sufficient time for the detergent to disperse. This allows for the breakdown of the different components of accumulated grime such as fat, protein, and manure.
- Thoroughly rinse the surface using a hose or pressure washer while preventing cross contamination of clean surfaces. Residual detergent may interact unfavorably with the applied disinfectant.
• Apply an EPA-registered disinfectant to inactivate disease agents. Follow all safety precautions and use directions specified on the product label. The disinfectant must be left on surfaces for the required contact time per the label instructions.

**Cleaning**

The purpose of the cleaning process is to remove all manure, dirt, and other organic material increasing the effectiveness of the application process of disinfectants.

Cleaning can be broken down into four basic steps:

• Dry cleaning
• Wet wash
• Rinse
• Dry

**Dry Cleaning**

A shovel or broom should be used to remove all organic matter such as straw, manure, dirt, dust or any other large particles.

**Wet Wash**

All exposed surfaces should be wet washed with a soap solution or detergent. Water is important in cleaning because it acts as a solvent and removes dirt. The soapy solution emulsifies fats. The amount of dirt on a surface and its composition will require increased physical and mechanical action such as scrubbing or pressure spraying to remove it.

The efficiency of the wet wash depends on:

• **Concentration** of the cleaning agent, which must follow manufacturer’s recommendations.

• **Temperature**. Generally, the higher the temperature, the better (up to 176°F) especially with fatty deposits.

• **Contact time**. Sufficient time must be allowed for the cleaning agent to work.

The “hardness” of water is an important consideration in the selection of the suitable cleaning agents or disinfectants. Hard water requires additional conditioning and larger amounts of detergent and can inactivate or reduce the effectiveness of certain disinfectant products.
Rinse

Residual detergent solution left on surfaces will reduce the effectiveness of applied disinfectants. It is important that an adequate amount of water be used to assure the complete removal of detergent solutions.

Dry

Once materials are rinsed they should be allowed to air dry. This assures that the disinfectant will adhere to the surface and increases the contact time and efficacy. Drying time can be reduced using fans or leaf blowers, but hand drying should be avoided as this may reintroduce infecting agents.

Disinfectants

The disinfectant(s) to be used for an animal disease incident will be recommended by the animal health officials in accordance with the state plan and consistent with EPA regulations.

The decision will be based on a variety of factors which include:

- Disease present
- Available application methods
- Contact time required

In addition, environmental factors play a role in determining a choice of disinfectant. These factors include:

- Ambient temperature
- Water hardness
- Organic matter
- Health and safety issues
- Environmental impact

The selected disinfectant should be applied using a low pressure sprayer, beginning at the apex and working downwards. In some circumstances, an additional application of disinfectant is required.
The USDA recommends the following EPA approved disinfectants for field use in a Foot-and-Mouth Disease outbreak.

<table>
<thead>
<tr>
<th>Product</th>
<th>Dilution</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.25% Sodium Hypochlorite (NaOCl household bleach)</td>
<td>3%</td>
<td>Inactivated by organic soiling; unstable in warm, sunny conditions</td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>4-5%</td>
<td>Vinegar is a 4% solution of acetic acid</td>
</tr>
<tr>
<td>Potassium peroxymonosulfate and sodium chloride</td>
<td>1%</td>
<td>Virkon-S</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>4%</td>
<td>The solution is mildly caustic and can dull paint and varnished surfaces</td>
</tr>
<tr>
<td>Sodium hydroxide (NaOH)(lye)</td>
<td>2%</td>
<td>This solution is highly caustic. Use protective rubber clothing, gloves and safety glasses. Warning: Always add the lye to the water. Never pour water over the lye</td>
</tr>
</tbody>
</table>

**Personnel, Vehicles and Property**

Clearly marked cleaning and disinfection stations are an important part of controlling the cleaning and disinfecting process. Personnel and equipment can be moved through these stations to increase the safety and validity of C&D. This is vital to the success of the disease suppression effort.

**HINT**

An established shelter may be used for both weather related issues and privacy.

**C&D Station**

A personal C&D station should be located near access and exit points and set in an area that can be easily and safely disinfected. It should allow for future expansion and be available for use over a considerable period of time. Preferably, stations should be established on hard surfaces and include a water supply, containment measures, and shelter.
It must be possible to leave the infected premises directly from the C&D station without becoming re-contaminated. The station area should not have been previously used by animals or grossly contaminated.

**Personnel**

Personal contamination occurs while working on infected premises or contact premises. Upon entering an infected premises, personnel should be provided with overalls, footwear, head covering, gloves, and goggles as discussed in Lesson 3, Biosecurity and Quarantine. Disinfecting of personnel is essential for reducing further spread of the disease. Personnel leaving an infected premises can transport disease on their clothing, boots, hands, hair, and respiratory tract.

Contamination can occur when:

- There is physical contact with infected animals
- Animals are euthanized
- Disposing of carcasses
- Removing manure, bedding, and debris from equipment, pens, barns, etc.

Personnel should have a clean change of clothes kept in a plastic bag at the outermost point of the C&D station.

**Individual C&D (Bag and Stash)**

Proper cleaning and disinfection in the absence of a C&D station requires specific equipment which includes, but is not limited to:

- Coveralls - Cloth or Tyvek
- Boots - Rubber or disposable plastic
- Inner examination gloves
- Outer nitrile gloves
- Trash bags
- Paper towels
- Spray bottle with water
- Disinfectant
- Liquid and/or gel antibacterial soap
- Respirator (if necessary)
HINT
When responding to any foreign animal disease, particularly FMD, PPE is utilized to prevent responders from carrying the virus away from the infected farm on their personal clothing and footwear. Donning PPE in the clean area outside the infected farm is easily accomplished. Proper doffing of contaminated PPE, however, requires following a step by step process that should be undertaken slowly and painstakingly to make sure that the responder does not unwittingly contaminate his or her street clothes with invisible virus.

Multi-Personnel C&D Station
This station is similar to a conventional HAZMAT decontamination line. It requires a team of personnel dressed in PPE to assist personnel exiting the contaminated area. This involves detailed established procedures for the proper removal of contaminated PPE. All C&D operations are best performed using the buddy system.

Disposal of Contaminated Clothing and Equipment
Disposable suits, gloves, and boots must be disinfected before discarding. Disposable items are placed in heavy gauge plastic bags and the outside of the bag is sprayed with a disinfectant. Disposal options of these bags may include burial on the site or incineration.

Other Personnel on Site
When a disease is suspected or confirmed, anyone on a premises must remain until they undergo disinfecting procedures. Should a person refuse to undergo C&D, they may face prosecution.

Vehicles
All vehicles and trailers must be cleaned and disinfected before entering and leaving a quarantined or infected premises.

All hard-to-reach areas such as the wheels, wheel wells, and mud flaps must be properly cleaned. Ensure the inside of the vehicle is cleaned, including the foot wells, pedals, and mats. Clean all tools and cargo space. Once cleaning is complete, apply the appropriate disinfectant.

Disinfectant mats or wheel baths filled with disinfectant may be used at all vehicle entrances and exits. Vehicles may not leave an infected property without thorough cleaning and disinfecting.
Premises Cleaning and Disinfection

After animals have been euthanized and carcasses disposed, and response personnel have left the scene, animal housing areas such as barns, feed storage units, machine shed and even farm family or employee housing must be cleaned and disinfected. The farm and buildings in contact with infected animals or personnel will remain a source of infection until a rigorous process of cleaning, disinfection and certification has been completed.

For highly automated milking parlors, proper premises C&D requires dismantling the entire facility, a costly and time consuming process. Computerized feeding and monitoring systems are included as part of the farm premises and thus subject to specialized C&D procedures as well.

*Note: It is important to note that the farm will remain under quarantine and will require effective security to prevent unauthorized entry until the entire process has been completed.*

**HINT**

To properly carry out effective premises cleaning and disinfection requires specialized contractors with appropriate equipment and trained personnel.

The construction of the facility determines methods that will be used in the premises cleaning and disinfection process. Porous materials, such as wood, may not be cost effectively cleaned or disinfected necessitating a decision to destroy or remove them rather than attempt to sanitize.

Premises Cleaning

Initial cleaning attempts should remove all organic material that may harbor an infectious agent and lower the efficiency of disinfection agents that are applied later. This process should begin with manual removal of all bedding, manure, feeders, farm equipment, small tools, utensils and trash inside and around farm buildings. Although tedious and labor-intensive, this process prepares the facility for more detailed cleaning.

Any material that is removed and cannot be effectively cleaned, disinfected and/or salvaged must be transported for disposal in a biosecure manner. Animal carcasses not disposed on the farm must also be transported for disposal using biosecurity procedures. Personal protective equipment appropriate to the working environment will be necessary.

Buildings must be painstakingly hand-cleaned down to the original underlying surface such as concrete or steel. This is accomplished by using a grid style work pattern similar to the process implemented during a search for a missing person.
Procedures may require manual scraping, broom cleaning or power washing as appropriate.

Potentially infectious runoff water generated during the cleaning process must be captured and treated. The containment of rinseate allows treatment to inactivate any disease agent, change pH, or remedy toxic chemical constituents before proper disposal. Cleaning can generate large volumes of water necessitating construction of temporary containment structures or holding ponds before work may begin.

**HINT**

Disposal of rinseate may be accomplished by land application, sanitary sewer, incineration or other treatment technology. Local, state and federal clean water statutes will dictate the treatment technology used during an agriculture emergency in conjunction with the response plan.

**Premises Disinfection**

Once a qualified individual has inspected the premises and determined that effective cleaning has been accomplished, the facility will be treated with a disinfecting agent. The disinfectant must be appropriate for the disease agent and will be selected by animal health authorities in consultation with scientific advisors and lead environmental agencies such as the EPA. This is accomplished by careful spraying to thoroughly wet the entire surface and ensure proper contact time. When disinfectant chemicals are applied, contract personnel will be required to use proper PPE, particularly respiratory and eye protection.

Best practices dictate both the cleaning and disinfection steps be carried out in a logical order, often by beginning at the furthest or deepest point within a structure and working carefully to the outside to lessen chances of recontamination of previously cleaned and/or disinfected surfaces.

Depending on the nature of the disease agent, the organic load of the structure, the age, construction materials and other site factors, the entire cleaning and disinfection process may be repeated a second time. A different contract crew should be used in an effort to discover areas that may have been ineffectively prepared and disinfected the first time.
Regaining Disease Free Status

Environmental or surface sampling for biologic agents may be used to monitor the effectiveness of the cleaning and disinfection process. Animal Health officials may not always rely on laboratory analysis of surface samples to determine that a facility is disease free.

The farm may be restocked with epidemiologically significant numbers of animals of the same susceptible species. These animals are called “sentinel animals” and are monitored for up to three known incubation periods of the disease for any signs or symptoms that the illness has returned. If the sentinel animals do not contract the disease, the conclusion will be that the premises has been adequately cleaned and disinfected. In the event sentinel animals become ill, the entire premises cleaning and disinfection process must be repeated.

Restocking

Thorough and reliable cleaning and disinfection of a modern farm premises will not be easy or immediate. Since proper premises C&D requires specialized skills, equipment, materials and follow up testing, many producers will find themselves unable to restock with new animals for several months following the loss of their livestock to a contagious animal disease.

Accident Cases in an IP or CP

The level of initial C&D for injured persons on an infected premises will vary with the extent of the injuries and the infectious agent. Human health, life and safety takes precedence. Every care must be taken to minimize discomfort or pain.

In a medical emergency, if risk of contamination exists because of incomplete C&D procedures, Incident Command must be informed of the situation and hospital authorities must be informed of the disease agent.

The ambulance should remain outside the infected zone when possible to avoid contamination. When unavoidable, wheels, underside, and interior should be treated with approved disinfectant. Personal clothing and boots of the ambulance attendants should be removed for cleaning and disinfection.

Safety Considerations for Cleaning and Disinfecting

The C&D process has the potential to create hazards. Hazards that may be present during C&D operations include:

*Electricity*. Many premises may not meet electrical safety standards. Electrical outlets may not be properly grounded. The risk is greatly increased in wet areas. Be aware of exposed electrical contacts.
Machinery/vehicles. Be aware of hazards inherently present when working around machinery. Read and understand the manufacturers’ safety warning labels on equipment and machinery.

Enclosed tanks/silos/pits. Asphyxiation due to lack of oxygen or poisoning from toxic gases and vapors is a possibility. Confined space regulations may apply in these cases.

Disinfectants/detergents/cleaners. Concentrated product may be corrosive and cause irritation or burns to the eyes, skin, and respiratory tract. In solution, they may be an irritant with prolonged exposure. Personal protective equipment should be worn when mixing and applying any chemicals.

High pressure sprayers. Risk of penetration or injection injuries.

Dust. A particulate risk hazard in old buildings, barns, sheds, and cribs.

Ammonia. A common farm chemical. Exposure may be a problem due to inhalation and skin exposure.

Asbestos. Structures may contain asbestos materials. Asbestos fibers, when airborne present a serious respiratory hazard.

Walking and working surfaces. Surfaces may become hazardous due to water and other debris that accumulate. Additional care should be taken to ensure slips, trips, and fall potential is reduced or eliminated.

Chemicals and explosive material. Gasoline, diesel fuel and propane are present on a farm in addition to agricultural chemicals such as:

- Fertilizer
- Herbicides
- Pesticides
- Disinfectants
Summary

Proper and thorough cleaning and disinfection are critical for the containment, control, and eradication of an animal disease. Responders must wear PPE appropriate for the task they are performing and in a manner that ensures their personal safety is maintained and biosecurity measures are followed. All responders must be familiar with disinfecting stations and follow procedures for the proper cleaning and disinfection of themselves, their equipment and vehicles.
Scope Statement

This lesson details the requirements for managing the cleaning and disinfecting (C&D) operations for an animal disease response including initial site assessment, required resources, procedures, and the associated health, safety and biosecurity challenges.

Terminal Learning Objective

Describe appropriate cleaning and disinfecting (C&D) procedures for people, vehicles, equipment and property.

Enabling Learning Objectives

5-1 Explain the purpose of cleaning and disinfecting.
5-2 Describe the processes of cleaning and disinfecting of premises and equipment.
5-3 List the safety issues associated with performing cleaning and disinfecting procedures.

Cleaning and Disinfecting

- Responders may be involved with cleaning activities on premises, in buildings, pens and enclosures.
- Rinse water and runoff should be contained and disposed of according to EPA treatment technologies.

What are the basic steps?

- Remove all visible gross contaminants
- Apply detergent to surface and allow time to disperse
- Rinse the surface thoroughly
- Apply an EPA registered disinfectant to inactivate disease agents

Cleaning

- Purpose of cleaning process is to remove all manure, dirt, and other organic material increasing the effectiveness of disinfectants
- Four basic steps:
  - Dry cleaning
  - Wet wash
  - Rinse
  - Dry
Dry Cleaning
- A shovel or broom should be used to remove all organic matter such as straw, manure, dirt, dust or any other large particles

Wet Wash
- Efficiency of wet wash depends on:
  - Concentration of cleaning agent
  - Temperature
  - Contact time
  - Hardness of water

Rinse
- Residual detergent left on surfaces will reduce effectiveness of applied disinfectants
- Important to use adequate amount of water

Dry
- A dry surface ensures the disinfectant will adhere and increases the contact time and efficacy
- Drying time can be reduced by using fans or other blowing equipment
- Hand drying should be avoided

Disinfectants
- Recommended by animal health officials
- Decision will be based upon variety of factors:
  - Disease present
  - Available application methods
  - Contact time required
  - Ambient temperature
  - Water hardness
  - Organic matter
  - Health & safety issues
  - Environmental impact

Personnel, Vehicles and Property
- Stations are important in controlling the cleaning and disinfecting process
- Vital to the success of the disease suppression effort
Cleaning and Disinfecting Station

- Arranged near access and exit points
- Easily disinfected and allow for future expansion
- Preferably established on hard surfaces
- Include a water supply, containment measures and shelter

Personnel

- Personnel leaving an infected premises can transport disease on their clothing, boots, hands, and respiratory track
- Contamination can occur when:
  - Physical contact with infected animals
  - Animals are euthanized
  - Disposing of carcasses
  - Removing manure, bedding, and debris

Multi-Personnel C&D Station

- Similar to conventional HazMat decontamination line
- Requires a dressed team to assist personnel leaving the infected zone
- Best performed by using the buddy system

Contaminated Clothing and Equipment

- Disposable items are placed in heavy gauge plastic bags
- Outside sprayed with disinfectant
- Disposal may include burial or incineration

Other Personnel on Site

- Anyone on a premises, suspected or confirmed with a disease, must remain until they undergo cleaning and disinfecting procedures.

Vehicles

- All vehicles must complete C&D before entering and leaving a premises
- All hard to reach areas must be addressed:
  - Wheels
  - Mud flaps
  - Undercarriage
  - Foot wells and mats
- Premises Cleaning and Disinfecting
  - After animals have been euthanized and disposed, the premises must be thoroughly cleaned and disinfected before restocking of animals.

- Premises Cleaning
  - Manual removal of bedding, manure, feeders, etc.
  - Must be cleaned down to original surface
  - Porous building materials may be destroyed
  - Capture rinsate water for treatment

- Premises Disinfection
  - Use disease specific EPA registered disinfectant
  - Thoroughly wet surface, allow proper contact time
  - May be repeated a second time
  - If ineffective the first time, a different contractor may be used

- Disease Free Status and Restocking
  - Sentinel animals monitored for incubation periods
  - Repeat C&D if sentinel animals fall ill
  - Restocking only if disease free status has been achieved

- Accident Cases from an IP or CP
  - Human health, life and safety takes precedence
  - If risk of contamination exists, incident Command and hospital authorities must be informed of disease agent
  - Ambulance should remain outside the infected zone

- C and D Safety Considerations
  - Ammonia
  - Asbestos
  - Walking and working surfaces
  - Chemicals and explosive materials
    - Gasoline, diesel fuel, propane, agricultural chemicals:
      - Fertilizer
      - Herbicides
      - Pesticides
C and D Safety Considerations

- Electricity
- Machinery/vehicles
- Enclosed tanks, silos, pits
- Disinfectants, detergents, surfactants, soap
- High pressure sprayers
- Dust

Summary

Proper and thorough cleaning and disinfecting are critical for the containment, control, and eradication of an animal disease. Responders must wear PPE appropriate for the task they are performing to ensure personal safety and maintain biosecurity procedures.
Animal Disease Response Training

Authority

Glossary

Acronyms
USDA Statutory Authorities

21 U.S.C. 111 authorizes the Secretary to take measures to prevent introduction or dissemination of the contagion of any contagious, infectious, or communicable disease of animals and poultry moving interstate or into the U.S.

21 U.S.C. 114 authorizes the Secretary to prepare rules and regulations for speedy and effectual suppression and extirpation of dangerous, contagious, infectious, and communicable diseases and to invite state authorities to participate in their execution and enforcement.

21 U.S.C. 114a authorizes the Secretary to cooperate with states or political subdivisions, farmers associations, and individuals to control and eradicate any communicable disease of livestock or poultry, incipient or potentially serious minor outbreaks of disease in domestic animals, and contagious or infectious diseases of animals (FMD specified) which in the opinion of the Secretary constitute an emergency and threaten the livestock industry of the country, excluding the payment of losses growing out of destruction of animals and materials affected by or exposed to any such disease.

21 U.S.C. 134a (a) authorizes the Secretary to seize, quarantine, and dispose of:

- Animals that are moving, have moved, or are being handled in interstate or foreign commerce contrary to any law or regulation of the Department for control of livestock and poultry diseases.
- Animals moving into the U.S. or interstate, which are affected with or exposed to a communicable disease of livestock or poultry.
- Any animals that have moved into the U.S. or interstate and at the time of such movement were exposed to a communicable disease of livestock or poultry.

21 U.S.C. 134a(b) authorizes the Secretary to declare an Extraordinary Emergency when any dangerous, communicable disease of livestock or poultry, such as FMD, exists on any premises in the U.S. and adequate measures are not being taken by the state or other jurisdiction to prevent its dissemination. Under an Extraordinary Emergency, the Secretary may seize, quarantine, and dispose of any animals, which are or have been affected with or exposed to the disease and the carcasses of any such animals and any products and articles which she finds were so related to such animals as to be likely to disseminate any such disease.

21 U.S.C. 134(c) authorizes the Secretary to order the quarantine or disposal of animals, carcasses, products, or articles subject to 134a(a) and (b), and, if the owner fails to comply with the order, the Secretary can dispose of the animals and articles and recover the costs of disposal from the owner.

21 U.S.C. 134(d) requires the Secretary to pay fair market value for animals, articles, and materials destroyed by the Department.
Glossary

A

Air Purifying Respirator
Air-purifying respirators cover the face and pass contaminated air through a filter that removes the biological or chemical agent.

Animal
Any member of the animal kingdom, except a human (Animal Health Protection Act, 2002).

Animal Emergency Response Organization (AERO)
A locally/state-based, nationally coordinated model, based on the Incident Command System, for responding to animal health emergencies.

Animal and Plant Health Inspection Service (APHIS)
Agency within USDA responsible for protecting livestock and plant health.

Area Veterinarian in Charge (AVIC)
The lead Federal Veterinarian for APHIS Veterinary Services in an area. Nationwide, there are 42 areas that encompass one or more states.

At-risk premises (ARP)
A premises in a Buffer-Surveillance Zone or Surveillance Zone that has susceptible animals but none that have a compatible clinical illness.

B

Biosecurity
All processes to contain a disease or disease agent within a control area.

Biosecurity plan
A plan or protocol that reflects biosecurity principles and procedures concerning the movement of personnel, vehicles, and equipment; examination of animals (alive or at necropsy); euthanasia; and disposal of animal carcasses, animal products, feed, water, straw, hay, and other materials potentially carrying a disease agent.

Buffer-Surveillance Zone (BSZ)
The zone established outside the Infected Zone or the same distance around a Contact Premises located outside an Infected Zone. Initially set the Surveillance Zone to be large (the entire state or territory). This distance will be reduced as the epidemiological information becomes available but not less than 10 km from the borders of the Infected Zone. Once the extent of the outbreak is understood, susceptible
livestock can move within that zone with a permit but not out of the zone. Non-susceptible livestock or poultry can move within and out of the zone with a permit.

**Buffer-Vaccination Zone (BVZ)**
If vaccination is used, the Buffer-Vaccination Zone (BVZ) will surround the Infected Zone and be immediately inside the Buffer-Surveillance Zone.

**C**

**Case Classification**
- **Suspect** - Animal with clinical signs, which may be consistent with a foreign animal or high consequence disease.
- **Presumptive positive (index case)** - Animal with clinical signs consistent with a foreign animal or high consequence disease plus the following:
  - Sample is positive on initial laboratory testing.
  - Other epidemiological information is indicative of the disease in question.
- **Confirmed positive** - Disease agent is isolated and identified.

**Cervical dislocation**
A method of euthanasia in which the spinal cord is severed by dislocation of cervical vertebrae.

**Cleaning and disinfection (C&D)**
Practices involving a combination of physical and chemical processes that kill or remove pathogenic microorganisms—a combination that is vital for the eradication of disease.

**Closed herd/flock**
Herds and/or flocks that are “closed” to the introduction of new animals (with population increase occurring only from natural additions of offspring), thus decreasing the potential for introduction of disease agents from other animals.

**Compost**
Compost is the semi-stable humus resulting from the biologic degradation of organic matter under aerobic conditions.

**Confirmed positive case**
An animal from which a highly contagious disease agent has been isolated and identified in a USDA laboratory or other laboratory designated by the Secretary of Agriculture.

**Confirmed positive premises**
Any premises with at least one confirmed positive case (animal); an infected premises.
Contact Premises (CP)
A premises that has susceptible animals exposed directly or indirectly to infected animals, contaminated products, materials, people, or air and will be subjected to disease control measures (which may include culling). A CP will be quarantined. If the susceptible animals on a CP are not culled, they will have intense surveillance for two to three incubation periods. If it is outside the Infected Zone, the premises will be treated as an “Infected Zone” and must have a Surveillance Zone.

Control Area (CA)
An area consisting of an Infected Zone and a Buffer-Surveillance Zone established to ensure rapid and effective containment of disease. The control area includes all known infected premises and as many contact premises as possible and will usually be equivalent to the area placed under quarantine.

Decapitation
Removal of the head

Doff
Removal of an article of clothing.

Don
To put on an article of clothing.

Emergency
Any natural or man-caused situation that results in or may result in substantial injury or harm to the population or substantial damage to or loss of property.

Emergency (Under the Stafford Act)
Any occasion or instance for which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.

Emergency Declaration (Under USDA Authorities)
Process by which the Secretary of Agriculture may transfer funds from other agencies or corporations of the Department to reimburse certain federal, state, and local animal health emergency response expenses, including reimbursement of operational costs, such as quarantine enforcement, perimeter control, euthanasia, carcass disposal, and decontamination.
**Epidemiological Information**
Includes tracing all contacts with affected animals and premises including movements of non-susceptible livestock, humans, fomites, animal products or by-products, crops/grains, feedstuffs.

**Euthanasia**
The humane destruction of an animal accomplished by a method that produces rapid unconsciousness and subsequent death without evidence of pain or distress.

**Euthanize**
The act of performing euthanasia.

**Exotic**
Not native or indigenous to a country.

**Exposed premises**
Premises that an epidemiologist has determined to be related by sound epidemiological evidence to a known infected premises, also referred to as contact premises.

**Exsanguination**
The process of draining or losing blood as a result of internal or external hemorrhage.

**Extraordinary Emergency Declaration (Under USDA Authorities)**
Allows the Secretary to use federal authorities to take action within a state if the state is unable to take appropriate action to control and eradicate the disease.

**Fomite**
An inanimate object or material on which disease-producing agents may be conveyed (e.g., feces, bedding, or a harness).

**Foreign Animal Disease Diagnostician (FADD)**
A veterinarian who has taken the APHIS foreign animal disease training course at Plum Island and who receives continuing education in FADs and animal health emergency management.

**Foreign Animal Disease/Emerging Disease Incident (FAD/EDI) Investigation**
On-site assessment conducted by FADDs as part of the national surveillance program for exotic or emerging animal diseases. The assessment includes a history of clinical and epidemiological findings, results of physical examinations, necropsy findings, specimen collection and submission to approved laboratory, reporting, initiating appropriate control measures, et al.
**Free premises (FP)**
A premises in the free zone.

**Free zone (FZ)**
The area outside of a control area.

**G**

**H**

**Highly Contagious Disease (HCD)**
A disease that spreads rapidly from animal-to-animal as well as herd-to-herd or flock-to-flock. Transmission can occur via direct and indirect modes. HCD may be recognized by above normal morbidity or mortality per unit time where morbidity could be characterized as a loss of production.

**I**

**Index premises**
First premises known to have a case of HCD during the outbreak under investigation; the true index is the premises actually having the first case of the outbreak.

**Infected premises (IP)**
A premises on which an HCD or HCD agent is presumed or confirmed to exist, or which meets the current case definition; a premises quarantine is imposed and all susceptible animals are culled.

**Infected Zone**
The initial zone drawn beyond the perimeter of all presumptive or confirmed positive premises. The Infected Zone includes as many contact premises as is logistically practical. The Infected Zone should initially be set at least 6.2 miles (10 kilometers) beyond the perimeters of the presumptive or confirmed infected premises. The boundaries must be modified as new information emerges. The actual distance of the perimeter of the Infected Zone in any one direction is determined by factors such as known characteristics of the agent, terrain, the pattern of livestock movements, livestock concentrations, the weather and prevailing winds, the distribution and movements of susceptible wild and feral animals, processing options (livestock and products), and effect on non-risk commodities. The Infected Zone can be modified as tracing and surveillance results become available and wildlife distributions become better defined.
J

**Joint Information Center (JIC)**
A center established to coordinate the federal public information activities on scene. It is the central point of contact for all news media at the scene of the incident. Public information officials from all participating federal agencies should collocate at the JIC. Public information officials from participating state and local agencies also may collocate at the JIC.

**Joint Operations Center (JOC)**
Established by the lead federal agency under the operational control of the OSC as the focal point for the management and direction of onsite activities, coordination/establishment of state requirements/priorities, and coordination of the overall federal response in the state.

K

L

**Lead Federal Agency (LFA)**
The agency that is responsible for leading and coordinating all aspects of the federal response. The LFA is determined by the type of emergency.

**Local Government**
Any county, city, village, town, district, or political subdivision of any state, and Indian Tribe or authorized Tribal organization, or Alaska Native village or organization, including any rural community or unincorporated town or village or any other public entity.

M

**Major Disaster (Under the Stafford Act)**
Any natural catastrophe (including any hurricane, tornado, storm, high water, wind driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or regardless of cause, any fire, flood, or explosion, in any part of the United States, which, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

**Maximum incubation period**
The longest known or assumed period which elapses between the introduction of a pathogen into a susceptible animal and the occurrence of the first clinical signs of the disease; OIE standards for agent incubation periods should be consulted.
Movement controls
Control of the movement of people, animals, vehicles, and equipment so that biosecurity can be maintained during a disease outbreak. Examples of practices involving movement controls include maintaining a closed herd or flock, identifying all animals, keeping accurate records, and protecting animals from contact with wildlife.

National Response Framework (NRF)
The NRF is a guide to how the nation conducts all-hazards incident management. It is built upon flexible, scalable and adaptable coordinating structures to align key roles and responsibilities across the nation, linking all levels of government and private sector businesses and nongovernmental organizations. It is intended to capture specific authorities and best practices for managing incidents that range from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters. This plan supersedes the NRP 2004, with 2006 revisions and has been approved by the President.

Penetrating captive bolt
A firearm used for euthanasia in which a rod that is a permanent part of the weapon is driven through the skull, damaging the brain.

Poultry
Chickens, ducks, geese, swans, turkeys, pigeons, doves, pheasants, grouse, partridges, quail, guinea fowl, and pea fowl (9 CFR 53).

Premises
A tract of land, including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.

Presumptive positive case
An animal that has clinical signs consistent with a highly contagious FAD/EDI in addition to a positive laboratory result and additional epidemiological information indicative of that FAD/EDI.

Presumptive positive premises
A premises with at least one presumptive positive case (animal); an infected premises.
Public Information Officer (PIO)
The official at headquarters or in the field responsible for preparing and coordinating the dissemination of public information in cooperation with other responding federal, state, and local agencies.

Q

R

Recovery
Includes all types of emergency actions dedicated to the resumption of normal business activities of farms and affiliated industries in the affected area.

Regional Operations Center (ROC)
The temporary operations facility for the coordination of federal response and recovery activities located at the FEMA Regional Office (or at the Federal Regional Center) and led by the FEMA Regional Director or Deputy Regional Director.

Rendering
The processing of animal carcasses or meat wastes into usable products. The wastes are subjected to heat, resulting in the inactivation of most infective agents. (Rendering does not inactivate the agents that cause transmissible spongiform encephalopathies, such as BSE.)

S

Senior FEMA Official (SFO)
The official appointed by the Director of FEMA, or his representative, to initially direct the FEMA response at the scene of an emergency in the absence of a Presidential Declaration. The SFO also acts as the Team Leader for the Advance Element of the Emergency Response Team (ERT-A).

Stamping-out policy
Carrying out under state or federal authority, on confirmation of a disease, the killing of the animals that are affected and those suspected of being affected in the herd/flock and, where appropriate, those in other herds/flocks which have been exposed to infection by direct animal to animal contact, or by indirect contact of a kind likely to cause the transmission of the causal pathogen. All susceptible animals, vaccinated or unvaccinated, on an infected premises should be killed and their carcasses destroyed by burning or burial, or by any other method that will eliminate the spread of infection through the carcasses or products of the animals killed. “Modified stamping-out” is the term applied when the above animal health measures are not implemented in full.
**State Coordinating Officer (SCO)**
An official designated by the Governor of the affected state to work with the Federal Coordinating Officer in coordinating the response efforts of federal, state, local, voluntary, and private agencies.

**State Veterinarian**
The chief animal health official who directs animal health activities for a particular state or territory of the United States.

**Surveillance Zone**
A Surveillance Zone should be established within and along the border of a Free Zone, separating the FZ from the Buffer Surveillance Zone within a Control Area. Surveillance in this zone will focus on sites determined to be at the highest risk of infection.

**Suspect case**
An animal having clinical signs consistent with a highly contagious foreign animal disease or high consequence disease.

**Suspect Premises (SP)**
A premises with susceptible animals that are under investigation for a report of clinical signs with no apparent epidemiological link to an Infected Premises or Contact Premises or is in the Infected Zone and not classified as an IP or CP. These premises are under movement restrictions and intense surveillance for two to three incubation periods. If they prove negative for infection, these premises revert to their previous status. The owners of animals on Suspect Premises in an Infected Zone may elect to depopulate their animals.

**T**

**Traumatic Stress**
Traumatic stress is considered an incident in which an individual perceives actual or threatened death or serious injury, or a threat to the physical integrity of self or others; the individual’s response involves intense fear, helplessness, or horror.

**U**

**USDA State Emergency Board (SEB)**
Exists in each state and Puerto Rico/Virgin Islands comprised of agency officials who coordinate USDA activities at the state level. The SEBs work with state and local governments and community organizations in order to make USDA programs more efficient and responsive to the needs of the people. The Farm Service Agency State Executive Director has been appointed to serve as Chairperson, USDA SEB,
in each state and is responsible for providing leadership and coordination for all USDA emergency pro-
grams at the state level. The Chairperson receives direction, guidance, and assistance relating to emer-
gency programs from the Headquarters unit.

V

Vaccinated premises (VP)
A premises in a buffer-vaccination zone on which vaccination is being, or has been, practiced.

W

X

Y

Z

Zoonotic disease
An infectious disease that can be transmitted from animals, wild or domestic, to humans.
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR</td>
<td>After Action Report</td>
</tr>
<tr>
<td>AEC</td>
<td>Area Emergency Coordinator</td>
</tr>
<tr>
<td>AERO</td>
<td>Animal Emergency Response Organization</td>
</tr>
<tr>
<td>AHT</td>
<td>Animal Health Technician</td>
</tr>
<tr>
<td>AI</td>
<td>Avian Influenza</td>
</tr>
<tr>
<td>APHIS</td>
<td>Animal and Plant Health Inspection Service</td>
</tr>
<tr>
<td>APR</td>
<td>Air-Purifying Respirator</td>
</tr>
<tr>
<td>ARP</td>
<td>At-Risk Premises</td>
</tr>
<tr>
<td>AVIC</td>
<td>Area Veterinarian in Charge</td>
</tr>
<tr>
<td>BSE</td>
<td>Bovine Spongiform Encephalopathy (Mad Cow Disease)</td>
</tr>
<tr>
<td>BSZ</td>
<td>Buffer-Surveillance Zone</td>
</tr>
<tr>
<td>BVZ</td>
<td>Buffer-Vaccination Zone</td>
</tr>
<tr>
<td>CA</td>
<td>Control Area</td>
</tr>
<tr>
<td>CAFO</td>
<td>Concentrated Animal Feeding Operation</td>
</tr>
<tr>
<td>C&amp;D</td>
<td>Cleaning and Disinfection</td>
</tr>
<tr>
<td>CBRNE</td>
<td>Chemical, Biological, Radiological, Nuclear, Energetic/Explosive</td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>CEB</td>
<td>USDA County Emergency Board</td>
</tr>
<tr>
<td>CERT</td>
<td>Citizens Emergency Response Team</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CP</td>
<td>Contact Premises</td>
</tr>
<tr>
<td>DEFRA</td>
<td>Department for Environment, Food, and Rural Affairs</td>
</tr>
<tr>
<td>DVM</td>
<td>Doctor of Veterinary Medicine/Veterinarian</td>
</tr>
<tr>
<td>EDI</td>
<td>Emerging Disease Investigation</td>
</tr>
<tr>
<td>EMA</td>
<td>Emergency Management Agency</td>
</tr>
<tr>
<td>EMS</td>
<td>Emergency Medical Services</td>
</tr>
<tr>
<td>END</td>
<td>Exotic Newcastle Disease</td>
</tr>
<tr>
<td>EOC</td>
<td>Emergency Operations Center</td>
</tr>
<tr>
<td>ESF</td>
<td>Emergency Support Function</td>
</tr>
<tr>
<td>FAD</td>
<td>Foreign Animal Disease</td>
</tr>
<tr>
<td>FADD</td>
<td>Foreign Animal Disease Diagnostician</td>
</tr>
<tr>
<td>FADDL</td>
<td>Foreign Animal Disease Diagnostic Laboratory</td>
</tr>
<tr>
<td>FMD</td>
<td>Foot and Mouth Disease</td>
</tr>
<tr>
<td>FZ</td>
<td>Free Zone</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>HAACP</td>
<td>Hazard Analysis and Critical Control Point</td>
</tr>
<tr>
<td>HSPD</td>
<td>Homeland Security Presidential Directive</td>
</tr>
<tr>
<td>ICS</td>
<td>Incident Command System</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>IP</td>
<td>Infected Premises</td>
</tr>
<tr>
<td>IZ</td>
<td>Infected Zone</td>
</tr>
<tr>
<td>JIC</td>
<td>Joint Information System</td>
</tr>
<tr>
<td>JOC</td>
<td>Joint Operations Center</td>
</tr>
<tr>
<td>LLIS</td>
<td>Lessons Learned Information System</td>
</tr>
<tr>
<td>NAHEMS</td>
<td>National Animal Health Emergency Management System</td>
</tr>
<tr>
<td>NDMS</td>
<td>National Disaster Medical System</td>
</tr>
<tr>
<td>NIMS</td>
<td>National Incident Management System</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute of Occupational Safety and Health</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
</tr>
<tr>
<td>NVOAD</td>
<td>National Voluntary Organizations Active in Disaster</td>
</tr>
<tr>
<td>NVSL</td>
<td>National Veterinary Services Laboratory</td>
</tr>
<tr>
<td>OIE</td>
<td>Office International des Epizooties (World Organization for Animal Health)</td>
</tr>
<tr>
<td>pH</td>
<td>Potential hydrogen (refers to the acidity or alkalinity of substances)</td>
</tr>
<tr>
<td>PIO</td>
<td>Public Information Officer</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SART</td>
<td>State Animal Response Team</td>
</tr>
<tr>
<td>SO</td>
<td>Safety Officer</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedures</td>
</tr>
<tr>
<td>SP</td>
<td>Suspect Premises</td>
</tr>
<tr>
<td>SZ</td>
<td>Surveillance Zone</td>
</tr>
<tr>
<td>TCL</td>
<td>Target Capabilities List</td>
</tr>
<tr>
<td>UC</td>
<td>Unified Command</td>
</tr>
<tr>
<td>UTL</td>
<td>Universal Task List</td>
</tr>
<tr>
<td>VMAT</td>
<td>Veterinary Medical Assistance Team</td>
</tr>
<tr>
<td>VMO</td>
<td>Veterinary Medical Officer</td>
</tr>
<tr>
<td>VOAD</td>
<td>Voluntary Organizations Active in Disaster</td>
</tr>
</tbody>
</table>