

National Animal Health Emergency Management System Guidelines

U.S. Department of Agriculture

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DRAFT

Operational Guidelines

**FAD Investigation Procedures:
A Field Guide**

The National Animal Health Emergency Management System Guidelines provide an operational framework for use in dealing with an animal health emergency in the United States.

The guidelines are produced by the
Veterinary Services Unit of the Animal and Plant Health Inspection Service,
U.S. Department of Agriculture.

These guidelines are under ongoing review. Please send questions or comments to:

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FAD Investigation Procedures

Introduction

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I. Introduction

A. Purpose

This manual is to serve as a quick reference guide to conducting a through foreign animal disease (FAD) investigation. Early detection and rapid response to any possible foreign animal disease is crucial to effectively controlling and eradicating the disease. This manual is intended to serve as a guide only; it is best used when the Foreign Animal Disease Diagnostician (FADD) applies his/her professional judgment coupled with investigation information.

B. Scope

This is a how-to-guide that describes the step-by-step process of responding to an unusual or suspect condition. It was developed to provide the user with checklists, quick tips and other information needed before, during and after an investigation. This guide will;

- A. Describe responsibilities of the AVIC, State Veterinarian, and FADD.
- B. Cover all aspects of conducting an FAD investigation from receiving initial assignment to closing the case.
- C. Describe immediate on-and-off farm actions that an FADD should take if he/she believes that they may have found an FAD.

It is not intended to be a disease outbreak response guide. Please refer to the disease response manuals for particular outbreak actions.

C. Users

This field manual is intended for use by all formally trained State, Federal, Military, Laboratory FADDs (those who took the Plum Island/Ames courses). Other government animal health officials, as well as private practitioners, may use this guide.

D. Related Documents

The following listed documents contain additional information that can assist with doing an FAD investigation. These documents are located in the Federal VS area offices.

- A. The Illustrated Reference Guide for Exotic Diseases

- B. Merck Manual
- C. NVSL Diagnostic Reference Manual
- D. Foreign Animal Disease book by USAHA

III. II. Overview

- A. *Role of Epidemiology*
 - i. *Contagious Diseases*
 - ii. *Non-contagious diseases*
- B. *Investigation Responsibilities*
 - i. *AVIC/State Veterinarian*
 - ii. *FADD*
- C. *Investigation flowchart*

II. OVERVIEW

A. Role of Epidemiology

Epidemiology is the study of disease and its determinants on a population. The interaction between environment, host and agent will influence the epidemiology of the disease involved. Each of these elements is very important. The environment includes factors such as husbandry, housing, climate/season, and vectors. Host factors include species, breed, age, and nutritional and health status. Agent factors include host range, environmental resistance, and tissue affinity. For example, agents that have an affinity for epithelial tissue, such as FMD, can be excreted in great quantities in the saliva, but most vector borne viruses have to be taken up with a blood meal by an arthropod.

The best way of conducting a good investigation is to become a good detective. Detective work entails asking several types of epidemiological questions to obtain information about the source of disease, duration of disease, susceptibility of species, etc. The better the questions to the producer/owner or private veterinarian, the more accurate the picture becomes.

Modes of Transmission

Transmissible diseases are diseases where the agent can be transmitted from one individual to another. There are generally two categories of transmissible diseases: Contagious, and Non Contagious.

A-1 CONTAGIOUS DISEASES

The contagious category can be further divided into “highly” and “not highly” contagious diseases.

- A. Highly contagious diseases are rapidly spreading, affecting many animals, have higher than normal morbidity and mortality, and transmission usually direct or indirect.
- B. Not highly contagious diseases are usually not rapidly spreading, only one or two animals are affected, little evidence of spread via direct contact, and mild to moderate morbidity and/or mortality.

Since diseases in these categories have similar characteristics (such as modes of transmission), but are not similar across categories, it is reasonable to believe that response actions and control/eradication activities would be similar for each category. Highly contagious diseases, whether foot and mouth disease or classical swine fever, would have similar methods of control thereby allowing appropriate disease control responses to occur before the etiologic agent is known. *Note: Some diseases may mimic characteristics of other categories, such as VEE, which is a vector borne disease but may have highly contagious disease characteristics.*

The chart below illustrates some characteristics that each disease group possesses and can aid in category determination.

Checklist to Determine Disease Categories

	Highly Contagious	Not Highly Contagious	Vector Borne
Increased Morbidity / Mortality	X		
Rapidly Spreading	X		
Single Animal Affected		X	
Clustering of Cases	X		X
Multiple Premises / Few Animals		X	
Time of Year / Seasonality			X

A-2

NON- CONTAGIOUS DISEASES

Some non-contagious diseases are vector-borne. Vector borne diseases occur seasonally, during spring/summer months, spread seems sporadic, no evidence of direct or indirect transmission. Many of OIE list A&B diseases are vector-borne diseases.

There are essentially two modes of transmission of vector-borne diseases: biological and mechanical. For biologically transmitted diseases, the disease agent must undergo a biological change from the time it enters the vector to when the vector can successfully transmit the disease agent to another host. The virus level in the blood must be high enough to allow for arthropod contamination. Once contaminated, the arthropod can transmit the disease for the rest of its life.

For mechanically transmitted diseases, the infective disease agent is simply moved from an infected host to a susceptible host mechanically. No biological changes in the infective agent occur when the disease is mechanically transmitted. The period of effective transmission depends on the survival time of the pathogen and the behavior of the arthropod. Examples of this type of transmission are equine infectious anemia, enzootic bovine leucosis.

A third group of vector-borne diseases consists of diseases that are caused by the arthropod itself. These arthropods include screwworms, mites, louse flies. Other invasive species such as the tissue worm have intermediate hosts that serve as vectors.

The chart below lists common vectors and the diseases they can transmit .

Foreign Arthropod Pests of Livestock		
IV. Common Name	V. Scientific Name	VI. Diseases Transmitted
Brown ear tick	<i>Rhipicephalus appendiculatus</i>	East coast fever Bovine babesiosis Louping ill Nairobi sheep disease Kisenly sheep disease
Cattle tick	<i>Boophilus annulatus</i>	Bovine babesiosis Bovine anaplasmosis Benign bovine theileriosis Spirochetosis of cattle, sheep, goats, horses
Southern cattle tick	<i>Boophilus microplus</i>	Benign bovine theileriosis Bovine babesiosis Bovine anaplasmosis
New world screwworm	<i>Cochliomyia hominivorax</i>	Fly myiasis
Sheep scab mite	<i>Psoroptes ovis</i>	Sheep scab
Tropical bont tick	<i>Amblyomma variegatum</i>	Heartwater Nairobi sheep disease
Bont tick	<i>Amblyomma hebraeum</i>	Heartwater
European castor bean tick	<i>Ixodes ricinus</i>	Bovine babesiosis Bovine anaplasmosis Louping ill Tick-borne fever of cattle, sheep, goats
Licking fly	<i>Musca vitripennis</i>	Infectious keratoconjunctivitis Bovine filariasis
Louse fly	<i>Hippobosca longipennis</i>	Fly myiasis

The summary chart below provides examples of contagious and non-contagious diseases.

CONTAGIOUS Highly Contagious	DISEASES Not Highly Contagious	NON-CONTAGIOUS DISEASES Vector borne
Foot-and-Mouth Disease African Swine Fever Avian Influenza Classical Swine Fever Exotic Newcastle Disease Nipah Virus Swine Vesicular Disease Rinderpest Peste des Peste Ruminants	Contagious Bovine Pleuropneumonia Contagious Equine Metritis Dourine Glanders Lumpy Skin Disease Malignant Catarrhal Fever Sheep & Goat Pox Tuberculosis	African Horse Sickness Bluetongue Heartwater Rift Valley Fever Screwworm Myiasis Venezuelan Equine Encephalomyelitis East Coast Fever West Nile Virus Bovine Spongiform Encephalopathy

B. Investigation Responsibilities

There are several ways that a FAD investigation can be initiated, either by request of the owner, private practitioner, county agent, state/private diagnostic lab or by NVSL/FADDL. The initial call may come into the AVIC's or State Veterinarian's office. Regardless of who receives the initial call, it is the responsibility of the AVIC or State Veterinarian or their designees to have the situation investigated. Since many FADDs are State employees, their supervisor, the State Veterinarian, has the same responsibilities as the AVIC. Information on a suspect FAD should be shared between State and Federal offices.

B1. AVIC/State Veterinarian Responsibilities:

He/she should;

- A. Ensure that the investigation is initiated (i.e. a FADD notified) within 8-16 hrs. of initial notification.
- B. Assign the case to a FADD
- C. Provide him/her with preliminary information received from the initial report to include the following:
 - D. The Referral Control Number (See Attachment II);
 - E. Suspected disease condition;
 - F. Date of initial report;
 - G. Species, breed, or type, and number of animals on premises;
 - H. Number of animals affected and duration of illness;
 - I. History of the disease situation;

- J. Name and telephone number of owner and/or manager;
- K. Premises address;
- L. Name and telephone number of person reporting the disease, (e.g. private practitioner) if not the producer;
- M. For State/Military FADDs, provide web site address for access to the FAD/EDI Investigation Report database.

- N. Once the investigation is completed and the findings are reported, the AVIC/State Veterinarian, in consultation with the FADD, will determine the priority of the samples. (see Priority check list). Emergency Programs staff is available for consultation and could provide a national perspective. It is also the AVIC/State Veterinarian's responsibility to ensure that the investigation is properly followed up and closed out.

B-2. FADD Responsibilities

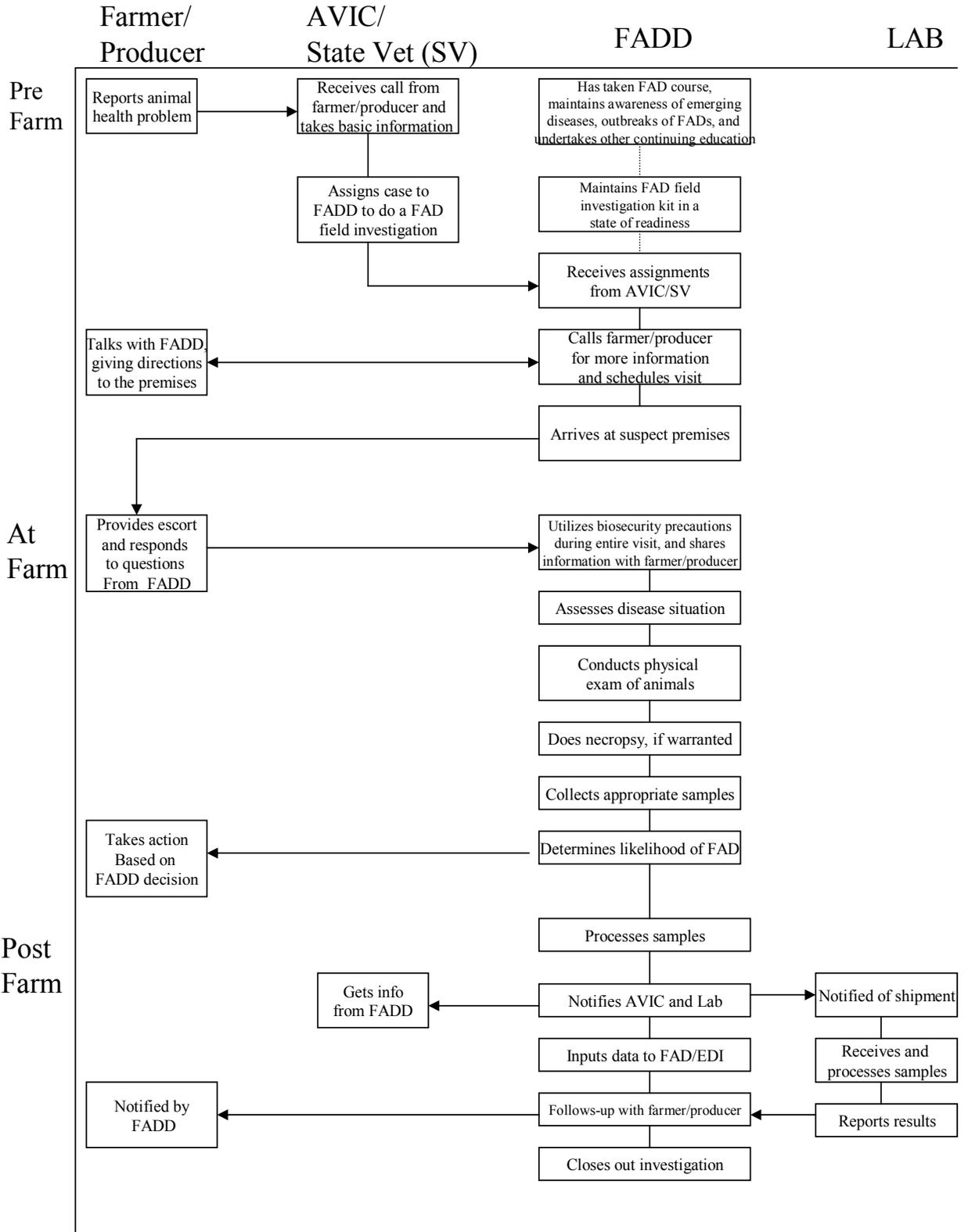
When notified by his/her supervisor with regard to a suspect FAD, the FADD is to arrange for visiting the suspect premises promptly. The person who reported the suspect case (private practitioner, lab, etc.) should be contacted to review the before visiting the premises. Also, the owner should be contacted to obtain pertinent information such as directions to premises, additional questions concerning the disease situation, zoonotic potential and estimated arrival time prior to departure.

Additional responsibilities include;

- A. The FADD should have his/her FAD kit in a ready to go manner and should briefly review possible diseases with which reported clinical signs are compatible. Appropriate media (tris buffer, formalin) should also be maintained.
- B. Reporting initial findings of the investigation as soon as the investigation is completed to the AVIC/State Veterinarian or their designee;
- C. Submitting an electronic FAD/EDI Investigation Report with preliminary information directly to the FAD/EDI Investigation Report mailing group. If electronic notification is unavailable, provide information to the AVIC **before** samples arrive at the designated laboratory.
- D. The FADD, after consultation with the AVIC, will inform the owner/producer and private veterinarian of the laboratory test results.
- E. The FADD will follow up with the owner/producer to find out about disease status and input additional information obtained into the FAD/EDI database.
- F. The FADD will close out the case electronically, once negative test results are known in a timely manner.

Investigation Flowchart

Flow Chart of FAD Field Investigation



III. Investigation Procedures

A. Phases of an Investigation**1. Pre-Farm Activities****1-a. Preparation****2-b. Cautions/Warnings****2. On Farm Activities****2-a. Biosecurity measures on premises****2-b. Assess disease situation****2-c. Physical exam of animals****2-d. Conduct an epidemiological investigation****2-e. Necropsy****2-f. Sample Collection****2-g. Biosecurity measures off premises and for owner****2-h. FAD likelihood determination****3. Post-Farm Activities****3-a. Processing samples****3-b. Subsequent Actions****B. “Highly likely” FAD Procedures**

- a. *highly contagious disease*
- b. *not highly contagious disease*
- c. *vector borne disease*

III. Investigation Procedures**Pre-Farm Activities****Preparation****A. Continuing Education (CE)**

It is important that each FADD be prepared to recognize and respond to a suspect FAD. It is the responsibility of the FADD to participate in any type of continuing education (CE) provided by APHIS. Such CE would include the annual APHIS Satellite Seminar on emergency preparedness, internet conferences, the 4 CD set “Recognition of foreign animal diseases”, and emergency management curriculum for FADDs.

B. Supplies & Equipment

The FAD kit should be kept in a ready to go manner. In addition to the FAD kit, listed below are supplies and equipment needed when planning to visit the premises where a foreign animal disease is suspected:

Supplies and Equipment Needed

Clothing and Safety

Rubber gloves
 Rubber boots
 Extra coveralls
 Ear/eye protection
 Dust mask/respirator
 Disposable plastic boots
 Disposable hood
 Disposable gloves
 Disposable coveralls

Necropsy

Sterile swabs & transport media
 Specimen containers and bags
 Permanent markers
 Mesh gloves
 Masking tape
 Lead pencil/pen
 Ice packs and cooler
 Formalin & specimen containers
 Clipboard
 Tweezers & hemostats

Restraining tools

Rope
 Snares

Cleaning and Disinfection

Water (filled container)
 Spray insecticide
 Soap/detergent
 Paper towels
 Long handled brush
 Large plastic bags
 Duct/electric tape
 Disinfectant
 Cotton towels
 Brush and pail
 Virucidal disinfectant & acetic acid

Clinical Supplies

Thermometer
 Stethoscope
 Test tube rack
 Syringes & hypodermic needles
 Cooler/carrier
 Blood collection tubes with serum
 Blood collection tubes with
 anticoagulant
 Blood collection needles
 Paint stick

To replace old or lost equipment, contact your area office, which is responsible for placing orders.

2. Cautions/Warnings

Because every investigation is an unknown disease situation, the zoonotic potential should be considered. The FADD must ask certain questions in the initial phone interview **before** arriving at the farm.

Questions such as

Is anyone in your family sick?

Are any employees that have had contact with these affected animals sick?

By obtaining such information and using it in addition to the animal information, you should be able to formulate a differential list of possible zoonotic diseases that you should be prepared for. Based on this information, caution owner/producer about biosecurity and personal protection, such as gloves, masks, boots etc.

When doing an investigation, always be aware of your surroundings. State your purpose and actions for the visit logically and diplomatically as to not alarm the producer or onlookers.

On Farm Activities

1. General Procedures

Responding to an unknown condition and deciding whether it is highly contagious, not highly contagious or vector borne disease is an important task. It is vital that you take this responsibility seriously because it may be your routine investigation that becomes “the One”. It is critical that a thorough epidemiological investigation is done to accurately determine the risk to you and to the livestock industry as a whole.

Routine investigations comprise of 4 components;

- A. Complaint call
- B. Investigation findings
- C. Lab results/follow-up
- D. Case close out

Information obtained or omitted can alter the level of response actions of an investigation. For example: An investigation seems to be routine, few animals affected, lesions are two weeks old, but the owner had a visitor that had been in an FMD affected country on an infected farm. This information was never known because the FADD did not ask questions about foreign travel.

The following steps should be taken (in this order) upon arriving at the suspect premises:

- 1. Perform biosecurity measures
- 2. Assess the disease situation
- B. Conduct physical exam of animals
- C. Conduct an epidemiological investigation
- D. Perform necropsy (if warranted)
- E. Collect samples
- F. Perform biosecurity measures

2. Investigation Steps

A. Biosecurity measures

Park on paved surfaces if possible, away from animal housing

Wear protective clothing, i.e. cloth or disposable coveralls and clean rubber boots

Please refer to the appendix section Biosecurity Measures for specific procedures.

B. Assess the disease situation

Take a guided tour with the owner/producer around the facilities to get an idea of the production style.

Ask questions about;

Normal production levels

Morbidity/mortality

Type of feed storage

Evidence of rodents

Type and condition of pastures

Type and condition of animal housing

All of these areas can provide clues in determining if this is a domestic or foreign disease problem.

QUIK TIP- Always visit healthy animals before visiting sick animals.

C. Physical exam of animals

Once you have walked thru the facility, ending at the place where the sick animals are housed,

- A. Observe behavior of sick animals (at rest and in motion)
- B. Differentiate weather-related appearance from possible clinical signs, i.e. rough coat
- C. Check TPR on all of the sick animals (ambient temperature and disposition of animals should be considered)
- D. Check mouth, teats, feet for vesicles, lameness
- E. Check housing for evidence of bloody diarrhea
- F. Check for ectoparasites and collect, if any

QUIK TIP- Have note pad and pen handy to jot down clinical signs, animal TPR and other observations.

Normal Values for Physical Exam

Rectal Temperature

Species	°F \pm 1°	°C \pm 0.5°
Cattle		
Beef cow	101	38.3
Dairy cow	101.5	38.6
Goat	102.3	39.1
Horse		
Mare	100	37.8
Stallion	99.7	37.6
Pig	102.5	39.2
Sheep	102.3	39.1

Heart rates	
Species	Beats/min (range)
Chick	350-450
Chicken (adult)	250-300
Dairy cow	48-84
Goat	70-80
Horse	28-40
Pig	70-120
Sheep	70-80

QUICK TIP- It is important to provide clinical signs and TPR on sick animals in the FAD database, this information helps the lab provide better service in finding a diagnosis.

D. Conduct an epidemiological investigation

Gather as much information from the producer as possible; ask to see production records, movement records, etc. to determine possible source and spread of disease agent.

- A. Try to determine possible sources/exposures
 - B. What were the animal additions in the past 2 weeks?
 - C. Were there any visitors, foreign travel?
 - D. Any neighbors have problems with their livestock?, What species are present?
- E. Determine possible spread
 - F. Where have your animals gone in the past 2 weeks?
 - G. Have any family members/ employees visited other places? (farm shows, state fair, etc.)
 - H. What were the movements of feed/milk trucks, renderers, etc?
- I. Determine possible modes of transmission
 - J. Are all affected animals in close proximity to each other?
 - K. Are any external parasites found?
 - L. Are all animals fed from single feed source?
- M. Compile epidemiological statistics
 - N. How many animals are sick/ dead?
 - O. What is the normal attrition rate?
 - P. When did the producer notice clinical signs?

- Q. Anything unusual occur recently?
- R. When was the first case?
- S. How many sick/dead per day?

Quik Tip- Take good notes on the answers to your questions, for accurate reporting.

E. Necropsy

When to necropsy an animal

Depending on the severity of the disease, necropsies can be performed to collect tissue specimens for diagnosis. Factors such as time of year and safety should be considered. If there is a fresh carcass, samples can be taken from that animal and other specimens from live animals. If necropsy is warranted for a clinically ill animal, be prepared to arrange for payment of the animal. Check with your supervisor on the payment protocol in your state. Euthanasia solution is a controlled substance and only those licensed in that State can euthanise animals. Several VS area offices have a DEA waiver for licensure and this provides these veterinarians with the ability to obtain euthanasia solution. Check to see what the protocol is in your state.

1. *How to do a necropsy on domestic and wild animals*

Cases of an exotic disease do not always run a typical course or have classical lesions. In addition, insidious disease forms may enter a susceptible population and spread without notice because they do not show the expected clinical picture. Therefore, a comprehensive collection of specimens based on species will be the most useful in providing a diagnosis. It is advisable that if a necropsy is done, to take samples from all organs of the body including lymph nodes. The laboratory will determine what is needed based on your epidemiological history and differential disease list. It is better for the lab personnel to discard unneeded samples than for the organ that is needed not be sampled.

Quik Tip- To keep skills sharp, try to periodically help out in the necropsy room of the local veterinary diagnostic lab.

Since necropsies may not be a regular part of your daily routine, the following information is provided.

The 4 stages of necropsy are pre-necropsy, preparation, necropsy procedures, post-necropsy.

1. *Pre-Necropsy*

- A. Do not approach the examination with a preconceived diagnosis.
- B. Examine and collect specimens from live animals not to be necropsied.
- C. Obtain permission from the owner to conduct the necropsy. Be aware of the owner's wishes, and use safeguards necessary for proper disposal of the carcass and any biological hazard it might present.
- D. Arrange for payment of animal(s), if necessary
- E. Disposal options should be discussed and planned prior to necropsy
- F. For necropsy, try to select several animals in various stages of disease.

G. Find a place away from traffic and people; make sure the area has sufficient drainage and can be disinfected.

2. Preparation for the Necropsy

A. Remove from the kit only what will be needed so that unused equipment will not be contaminated.

B. Do not conduct necropsies while wearing street clothes. Wear rubber boots, gloves, and coveralls.

C. A mask and goggles may be used at your discretion.

D. Check the TABLE OF SPECIMEN COLLECTION(see appendix) to see what samples are required for differential diagnosis. Remember, this is a minimum recommended list and is not intended to replace the field diagnostician's judgment concerning collection of additional specimens. In addition to the listed specimens, samples of all lesions should be collected for histological examination.

3. Necropsy Procedures

- a. If the animal is presented for euthanasia, collect blood samples before euthanizing
- b. If the animal is presented dead, collect the blood samples from the heart. Make blood smears, air dry, and fix in methanol.
- c. Cattle, sheep, goats, and pigs are best positioned on their **left side**. Horses should be positioned on their **right side**.
- d. Do a physical examination and collect ecto-parasites and place in 70% alcohol, if indicated.
- e. Collect nasal swabs and skin lesions or swabs, place in transport or growth nutrient media, if indicated.
- f. To prevent contamination, disinfect the skin or use clean instruments to open body cavities. Open the abdominal and thoracic cavities carefully so as to prevent contamination from the outside or from a cut organ.
- g. Observe, but do not disturb, organ placement. Note any abnormalities.
- h. With a syringe, aseptically collect a specimen of any abnormal body fluid.
- i. Aseptically, collect specimens of liver, kidney, spleen and lymph nodes (gastrohepatic node for swine).
- j. Remove the tongue, open the pharynx, and collect the tonsil (swine).
- k. Remove the trachea, lung and heart. Collect tracheal and bronchial swabs if appropriate. Examine the respiratory tract and heart.
- l. Tie off and remove a 3-inch section of ileum just anterior to the ileocecal valve.
- m. Double ligate to prevent spillage of intestinal contents into the abdominal cavity. Do not tie off intestinal segments to be placed in formalin. The fixative should infiltrate lumen of the organ.
- n. The entire digestive tract should be opened and examined. Complete the examination of the abdominal cavity.
- o. Collect specimens from the soft tissue organs.
- p. Decapitate the animal, remove the brain, and collect specimens.

4. Post Necropsy

- A. Dispose of carcass properly
- B. Decontaminate instruments before cleaning them.
- C. Clean and disinfect all work surfaces.
- D. Decontaminate self, e.g., disinfect and remove boots and gloves and remove coveralls.
- E. Record the necropsy findings.

It is best to bury the animal on the premises, away from other animals and deep enough so that predators cannot dig the carcass up. If the owner/producer won't allow burial, double bag the animal and take it to the State Diagnostic lab for incineration.

F. Sample Collection

All fresh samples should be placed on ice/gel packs and packed in the biological box provided by NVSL at the Area office or State Veterinarian office. If such boxes are unavailable, label a regular box with "biological samples" so that the lab personnel can process it properly.

- A. Fresh tissue for microbiological and toxicological examination:
 - Each tissue should be placed **in a separate** container.
 - Keep samples cold with ice/gel packs.
- B. Preserved tissue for histological examination:
 - A. The **recommended** preservative is 10% buffered neutral formalin.
 - B. All tissues can be placed in one container, but allow a ratio of ten volumes
 - C. of formalin to one volume of tissue (10:1).
 - D. Cut the tissue into slices no more than 3-6 mm thick. Cut lesions so that a normal
 - E. area of tissue or organ is included in the section. Lymph nodes or organs with capsules should be incised. The whole brain or half brain should remain intact for fixation.

The initial piece of each organ should be collected aseptically for microbiological examination. A piece for formalin fixation should then be collected. For microbiological examination, flame the instruments before collecting each specimen or use separate sterile instruments for each specimen. Swabs should be placed in transport medium, swirled, and then discarded. For bacteriology investigations, it is critical that the swabs remain in the transport media. Formalin should be a 10% buffered solution that can be prepared by.....

The following table of specimen collection supplies the field diagnostician with lists of specimens based on species. The specimen listings are minimum recommended lists and are not intended to replace the field diagnostician's judgment concerning the collection of additional specimens. The following items were given consideration in compiling the table:

- A. Each species specimen list lends itself to diagnostic confirmation of foreign animal diseases for the species.

- B. The specimen lists include adequate specimens for differential diagnosis of most domestic animal diseases that might be confused with a foreign animal
- C. disease.
- D. These lists represent a minimum of specimens necessary for basic diagnostic testing.

It is ideal to sample all organs and the laboratory will determine what is needed based on your epidemiological history and differential disease list. It is better for the lab personnel to discard unneeded samples than for the organ that is needed not be sampled.

Table of Specimen Collection

Species	Tissues for Microbiological and Histological Examination	Blood Samples	Other
Bovine	Skin and nasal swabs, prescapular lymph node (LN), body cavity fluids, joint fluids, liver, kidney, mesenteric LN, lung, heart, tracheal swab, 3" off section of small intestine and ileum (affected area if present), ½ brain, any specific lesion Brucella: supramammary LN, udder, reproductive tract (all frozen)	Serum, 10 ml Whole blood, 20 ml (heparinized) 6 Blood smears-air dry, fix in methanol	External parasites (alcohol)
Porcine	Skin swab, fluid from any affected joint, body cavity fluids, spleen, liver, kidney, gastrohepatic and mesenteric LN, lung, tonsil, 3" tied-off loop of small intestine and colon, ½ brain, any specific lesion Brucella: Mandibular LN, reproductive tract (all frozen)	Serum, 10 ml Whole blood, 20 ml (heparinized) 6 Blood smears-air dry, fix in methanol	External parasites (alcohol)
Equine	Prescapular LN, mandibular LN, body cavity fluids, spleen, liver, kidney, mesenteric LN, ½ brain, any specific lesion. If contagious equine metritis is suspected, swab clitoral sinuses, clitoral fossa and vaginal discharge of mare; and prepuce, urethral sinus, and fossa glandis of stallion; send refrigerated in Amies transport medium with charcoal overnight. Brucella: swab of fistula (in peptone broth)	Serum, 20 ml Whole blood, 20 ml (heparinized) 6 Blood smears-air dry, fix in methanol	External parasites (alcohol)
Ovine or Caprine	Skin and nasal swab, prescapular LN, mammary tissue, body cavity fluids, spleen, liver, kidney, mesenteric LN, lung, mediastinal LN, tracheal and bronchial swabs, ½ brain, any specific lesion	Serum, 10 ml Whole blood, 10 ml (heparinized) 6 Blood smears-air dry, fix in methanol	External parasites (alcohol)
Avian	Tracheal and nasal swabs, liver, spleen, kidney, lung, trachea, bone marrow, heart, ovary, brain, terminal intestine, bursa of Fabricius, any specific lesion	Serum, 2 ml	External parasites (alcohol)
Vesicular diseases for all species	Vesicular fluid (all that is obtainable), vesicular lesion epithelium, flaps of epithelial tissue, esophageal-pharyngeal fluid (10 ml before dilution with Tris Buffered Tryptose Broth). In addition, if dead—prescapular LN, adrenal, kidney, thyroid, heart, tonsil, mandibular LN	Serum, 10 ml	

G. Biosecurity measures off premises and for owner

- A. Before leaving the premises, inform the owner/producer that you will be reporting your findings to your superior (AVIC or State Veterinarian).
- B. Also inform him/her that since the findings are suggestive of a foreign animal disease, animals should not be moved from the premises and no visitors should come near the livestock.
- C. Let the owner/producer know that you will follow up to get an update on the situation and report any laboratory results.
- D. Show the owner/producer how to implement biosecurity measures for the employees and family to minimize spread to other animals on the premises or to their neighbors.
- E. Be prepared to assist in planning for traffic control, proper disinfectants, etc. if premises is a livestock market or slaughterhouse.
- F. Perform personal biosecurity by washing and rinsing boots and vehicle tires and wheel bases before leaving the premises.

H. FAD likelihood determination

Once the investigation is complete, a decision should be made as to whether it is an “unlikely”, “possible” or “highly likely” of being a FAD. Investigation findings and circumstances should be taken into consideration.

3. Post Farm Activities**a. Processing samples****1. Sample Priority**

When the FADD has completed the initial investigation, he or she must obtain a priority number for laboratory assignment. In consultation with AVIC or State Veterinarian, laboratory priority is determined based on the disease condition, differential diagnosis, species affected, morbidity, mortality, and epidemiologic findings. If a Priority 1 is being considered, call Emergency Programs Staff (EP staff) so that key personnel are notified.

The following checklist should be used as an aid in determining the priority.

Sample Priority Checklist

PRIORITY 1	PRIORITY 2	PRIORITY 3
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“Highly likely” of a FAD	“Possible” Can’t distinguish between FAD and endemic dz	“Unlikely” Considered most likely an endemic condition
Prompt lab information needed ASAP	Rapid testing is needed	Specimen will be tested according to order received
Samples will be hand carried or counter-to-counter air transport	Samples will arrive next business day via FedEx (Saturday arrival w/ prior notification of Lab)	Samples will arrive next business day via FedEx

Priority 1- This priority is used when known investigation information makes it **highly likely** the observed condition is an FAD/EDI and prompt laboratory diagnostic information is required. EP staff is to be notified **prior** to shipping specimens. **Overtime is used as necessary.** Results are reported by telephone to the NVSL Director, Chief of EP Staff, and the AVIC immediately upon completion of initial laboratory results.

Specimens will be unpacked, examined, and diagnostic studies begun immediately at FADDL or NVSL-Ames, including Saturdays, Sundays, and holidays. Counter-to-counter air must be used for Sunday, holiday, and certain Saturday Priority 1 shipments. In extreme cases, samples will be hand carried to the appropriate laboratory.

Priority 2- This priority is used when known investigation information makes it **possible** that the observed condition is an FAD/EDI, but cannot be distinguished from an endemic disease/condition; and rapid laboratory diagnostic information is necessary.

Specimens are unpacked, examined, and diagnostic studies begun immediately if the shipment reaches the laboratory before the close of the workday. **Overtime will be used to finish the examination.** Samples shipped on Fridays (Saturday arrival) are allowed only with prior notification/discussion with the laboratory. Results will be reported by FAX to AVIC and EP immediately upon completion of initial laboratory results.

Priority 3: This priority is used when known investigation information makes it **unlikely** that the observed condition is an FAD/EDI and cannot be distinguished from an endemic disease/condition. It is considered most likely an endemic disease/condition due to other epidemiological factors (e.g. season, previously diagnosed endemic disease in the adjacent area, etc.) and laboratory diagnostic information is used to verify if the condition is an FAD/EDI. Specimens will be processed according to accession order as received. **Overtime will not be used for these investigations.**

3a -2. Packing and Labeling

It is useful to pre-label specimen containers to insure all recommended specimens will be collected.

- A. Use a method of labeling which cannot be lost or easily destroyed.
- B. For example, adhesive tape should go entirely around the vial so that it will not be dislodged by moisture.
- C. Writing should be with pencil or waterproof ink.
- D. Use plastic screw-cap containers instead of glass containers where practical. Tape should be wound around the cap in the same direction as the screw cap is applied.
- E. Use disposable equipment such as cardboard trays and disposable syringes.

All specimens should be packaged according to biosecurity procedures, identified, chilled with freezer gel-packs, and properly boxed for transit to the laboratory. **DO NOT FREEZE SAMPLES or USE DRY ICE**

A completed and legible VS Form 10-4 (Specimen Submission Form) must accompany all diagnostic specimens. Attach the Continuation Sheet for the Specimen Submission Form (VS Form 10-4A) to fully describe findings or other relevant information. Write legibly. Mark the priority number on the label affixed outside the shipping container and on the VS 10-4 submission form.

- The specimen submission form is to be placed on top of the Styrofoam lid under the cardboard top of the “bumble-bee” box, not inside the Styrofoam container with samples.
- **Do not** write “formalin” or “formaldehyde” on the form or shipping container. (The concentrations used do not constitute hazardous materials).

To request extra media, contact the NVSL Shipping Department, at (515) 663-7530.

FAD/EDI Specimen Shipping Information

Specimens being sent to USDA Laboratories must be shipped via FedEx® to the following addresses:

ADDRESSES

Foreign Animal Disease Diagnostic Laboratory:

**FADDL, APHIS at Plum Island
FedEx[®] Distribution Center
579 Edwards Avenue
Calverton, NY 11933**

Use this address for pickup at FedEx. If the sample is picked up at the Center, in the morning by FADDL personnel, testing can begin earlier thus allowing time to run several tests on that day.

**FADDL, APHIS at Plum Island
Orient Point Warehouse
Route 25
Orient Point, NY 11957**

Delivery to Plum Island is usually every afternoon. This allows for only preliminary testing set up that day.

**National Veterinary Services Laboratories-Ames:
USDA, NVSL
1800 Dayton Road
Ames, Iowa 50010**

Note: For all deliveries, mark the “HOLD WEEKDAY” or “HOLD SATURDAY” box. It is important to call FADDL prior to shipping, so that they can arrange for package pick up.

When shipping, please remember the following:

- A. Use the Area billing number for the sender’s FedEx[®] account number obtained from the AVIC;
- B. On the FedEx[®] Form, Internal Billing Reference (Section 2), write the Area accounting code obtained from the AVIC;
- C. Check the FedEx[®] Priority Overnight Box;
- D. Saturday delivery should be marked for Priority 1 and 2 samples sent on Friday, only if FADDL has been notified;
- E. Keep the sender’s copy of the Air bill for your records.
- F. The FADD or AVIC must notify the appropriate laboratory that samples are being sent (FADDL by phone; NVSL-Ames by e-mail/phone). See Appendix “ Sample FedEx airway bill”

3b. Subsequent actions

Once you have done a complete investigation and have samples ready to ship, these additional steps should be done promptly.

- A. Notify AVIC and the lab by phone immediately
- B. Input findings into FAD/EDI database before samples arrive at the lab

- C. Follow up with owner/producer and private veterinarian about disease situation status
- D. Post results and close out investigation in the database once lab results are known

III B. “Highly Likely” FAD Procedures

Highly contagious Diseases

There are certain “triggers” that will alert the FADD of a highly contagious, or rapidly spreading disease. These factors include:

- A. Morbidity/Mortality is high compared to normal attrition rates
- B. Increase in Morbidity/Mortality over short time period
- C. Many barns, pens of animals on premises are affected, either because of close proximity or shared production habits

If these statements are accurate in your particular situation, the assessment should conclude a “highly contagious disease” situation.

Not highly contagious diseases

Although the triggers are not as evident as a “highly contagious” disease, there are epidemiological clues that may lead to a “not highly contagious” disease determination. These factors include;

- Possibly one or two animals affected
- Little evidence of direct contact spread
- Mild to moderate morbidity/mortality

Vector borne diseases

While there are no triggers that point to a vector borne disease, this disease category should remain high on the differential list. Some factors include;

- Cases occur seasonally, during spring/summer months
- Spread seems sporadic
- No evidence of direct or indirect transmission
- Ectoparasites found on physical exam

Once the FADD has determined that the investigation is “highly likely” of a FAD, he/she must take certain response actions both on and off the premises.

These response actions should take place immediately especially since the etiologic agent is unknown. This is the initial response to a possible FAD outbreak. The following action list should be taken regardless of which disease category your differential diagnosis is in. Although the majority of actions are the same, certain actions such as biosecurity will be different for highly contagious diseases than for vector borne diseases.

On Farm activities

- A. Notify AVIC, State Vet- Consult with both the AVIC and State Vet via conference call to inform them of your assessment and recommendations for dx control.
- B. Quarantine the premises (State issued)

- C. Begin to trace animal movements – ask owner for all known animal movements in and out of the premises
- D. Record all animal and people movements on/off the farm in the last 2 weeks, deriving most information from the producer’s official records.
- E. Institute biosecurity measures
 - a. Provide owner with disinfectant, plastic boots, etc. and other materials until additional supplies arrive.
 - b. For highly contagious diseases, emphasize need for all employees and family members to institute these measures
- F. Clean vehicle and tires with hose and leave equipment behind for disinfection

Off farm activities

- A. Pressure wash car and clean vehicle
- B. Take a shower and launder clothing in detergent suitable for destroying most highly contagious diseases.
- C. Arrange for air transport of samples to FADDL/NVSL-Ames
- D. Consult with AVIC and others about future actions

IV. Notification and Reporting Procedures

IVa. Notifications

1. FADD

It is the responsibility of the FADD to provide his/her direct supervisor (AVIC or State Vet) with all pertinent information about the affected premises. All trace information should be imputed into the database as well as informing the supervisor so that new investigations can be initiated promptly. Provide lab results to the private practitioner and owner/producer.

2. AVIC/State Veterinarian

It is the responsibility of the AVIC/State Veterinarian to inform and consult with each other, and with State emergency managers, other industry and tribal representatives, as well as the regional office of the initial local response activities.

3. LABORATORIES

NVSL-Ames and/or FADDL will report preliminary and final laboratory results to AVIC and EP Staff. The AVIC or designee will provide copies of the laboratory report to the FADD, State Veterinarian, and Regional Director.

Presumptive Positive or Suspect Results - NVSL-Ames and/or FADDL will immediately report *positive or suspect* laboratory findings to the VS Deputy Administrator’s Office, NVSL Director, and Chief of EP Staff, even if it was *not* an FAD/EDI investigation. EP Staff will coordinate a conference call with the Deputy

Administrator's Office, RD, AVIC, FADD, State Veterinarian, appropriate laboratory personnel, and the Emergency Management Leadership Team (EMLT) for future action planning.

IVb. Foreign Animal Disease/Emerging Disease Incidents (FAD/EDI) Database Reporting

The nature of the FAD/EDI Investigation Report database allows AVIC/State Vet office, AEO, Regional Epidemiologist, NVSL, FADDL, and EP Staff to monitor investigations daily for possible trends and similar occurrences throughout the country. These official records should provide consistent information that can be retrieved for accurate reporting. For all possible **Priority 1** cases, telephone EP Staff immediately. Otherwise, it is only necessary to notify EP Staff by phone if an electronic FAD/EDI Investigation Report cannot be submitted or if the FADD or AVIC has questions.

FADD Reporting Responsibilities –

The FADD is responsible for:

- A. Reporting initial findings of the investigation to the AVIC/State Veterinarian or their designee as soon as the investigation is complete;
- B. Submitting an electronic FAD/EDI Investigation Report with preliminary information directly to the FAD/EDI Investigation Report mailing group (appropriate laboratory, regional director, direct supervisor (AVIC/SV)) **before** samples arrive at the designated laboratory. If there are no samples, this report should be made immediately after finishing the investigation.
- C. Notifying the appropriate laboratory. Before submitting samples to either NVSL-Ames or FADDL, the FADD should call the appropriate lab. The e-mail notification on the FAD/EDI Investigation Report should include the appropriate lab as well.
- D. Notifying the necessary State or Tribal officials to initiate quarantine, if appropriate.
- E. Provide the following information on the sample submission form (VS-Form 10-4) so that the appropriate laboratory can be properly informed on the investigation findings (e.g., epidemiology, clinical findings, complete history, etc.).
- F. Referral Control Number assigned;
- G. Airway bill tracking number (if samples were sent);
- H. City, county, State of premises under investigation;
- I. Name of owner/producer;
- J. Species, breed or type, and number of animals on premises;
- K. History on the disease situation (the number of affected animals, species affected, morbidity, mortality, signs of disease, duration of disease, number of premises are affected, associated human illness, etc.);
- L. Presumptive Field Diagnosis with differentials;
- M. Planned Priority of the samples (if sent).

If the FADD is unable to input information or e-mail the FAD/EDI Investigation Report, he or she should contact the AVIC or EP to provide investigation findings (see

Attachment II). As additional information is obtained, it must be added to the current electronic FAD/EDI Investigation Report in a “Re-Exam” report.

The FADD, after consultation with the AVIC, will inform the owner/producer and private veterinarian of the laboratory test results. The FADD will enter all laboratory results into the appropriate FAD/EDI Investigation Report “Follow Up” form. If results indicate the need for reexamination, then the FADD will use the “Re-Exam” follow-up form. If the results are negative for an FAD/EDI investigation, then, following consultation with the AVIC, the “Follow-Up” form in the database called “Close Out” will be used to enter those results.

AVIC/State Veterinarian Reporting Responsibilities –

The AVIC/ State Veterinarian or their designee is responsible for:

- A. Ensuring that a completed electronic FAD/EDI Investigation Report is submitted to the FAD/EDI Investigation Report mailing group (appropriate laboratory, regional director, direct supervisor (AVIC/SV)) after the investigation findings are known and **before** samples arrive at the laboratory;
- B. Informing and consulting with their counterpart (AVIC or State Veterinarian) about the investigation.

V. Initial US Response to a FAD

There will be situations where the FADD’s professional judgment indicates a “highly likely” case of a FAD. “Highly contagious” diseases such as FMD , CSF and not highly contagious diseases such as Rinderpest and vector borne diseases such as East coast fever would all have the same initial response goal: to minimize the potential spread from the initial premises and to identify possible direct and indirect contacts to determine the scope of the outbreak. Response activities on the farm are outlined in the section, “highly likely” FAD procedures.

It is crucial that the local response is quick and efficient in handling an unknown highly contagious disease. Actions taken in the first 24-48 hrs of initial reporting can determine the extent of the spread and therefore the level and type of response. When preliminary lab results are known for a highly likely situation, the response actions in communications, control and eradication efforts escalate. Actions are being taken simultaneously at different levels of government. This manual provides a brief overview of these response actions. For a more detailed picture, please refer to the Control and Eradication Strategies manual.

Once samples have been tested by NVSL/FADDL and deemed to be positive, it is considered a presumptive positive case (premises). A **Presumptive Positive (Index Case)** is defined as clinical signs consistent with an FAD/EDI, plus the following: 1) sample is positive (antigen or antibody); 2) other epidemiological information is indicative of the FAD/EDI.

Presumptive Positive Actions

Local Response- Once the laboratory indicates it has a preliminary positive sample, a cascade of events will occur starting with a conference call between the Deputy Administrator, Laboratory, State Veterinarian, AVIC, FADD, and EMLT. This conference call will outline action steps.

- A. Consider stopping movement of susceptible animals within the State
- B. Active case finding will be instituted based on suggestive clinical signs in the States to include the field veterinarians, FSIS, Extension agents, industry partners, and public awareness campaigns
- C. Consider depopulation of affected herd in consultation with USDA, industry and other stakeholders
- D. Notify appropriate contacts (such as Commissioner of Agriculture, State Emergency Management Director, and others deemed necessary) that would be needed to support a response
- E. Notify all AVICs in the region of the presence of an FAD/EDI and trace-back findings
- F. Give the READEO team members notice to be prepared for deployment
- G. Prepare to support the Joint Incident Command in their actions or be Incident Commander in States unable or unwilling to take appropriate actions to control and eradicate the disease

National Response

- A. Conduct isolation and typing of the highly contagious FAD/EDI agent
- B. Initiate National and North American Communication Plans
- C. Place National READEO leaders on high alert
- D. Alert USDA Crisis Management Staff
- E. Activate APHIS Emergency Operation Center
- F. Institute active case finding based on suggestive clinical signs in all States, to include the State Veterinarians, FSIS, Extension agents, industry partners, and public awareness campaigns

These actions are geared toward minimizing the spread of the disease and communicating the accurate information. When lab confirmation is positive, it is considered a confirmed positive case. The response efforts are continued but intensified. This was a sample of the US response to a FAD, more detailed information can be found in the Disease response manuals.

Disease Characteristics and Summaries

Below is a chart outlining several foreign animal diseases with etiologic agents and clinical signs. It is divided by species and subdivided by etiologic agent for quick reference.

Summary of Foreign Animal Disease

Disease	Etiologic Agent	Clinical Signs
VII. Multiple Species		
Viral Diseases		
Foot-and-Mouth Disease *cloven-hoofed animals	Family Picornaviridae, genus Aphthovirus, 7 immunologically distinct serotypes: A, O, C, SAT1, SAT2, SAT3, Asia 1	<p>Cattle: Initial signs are fever (103-105°F), dullness, anorexia, fall in milk production; followed by excessive salivation, drooling, serous nasal discharge, shaking, kicking of the feet or lameness and vesicle formation. Sites of predilection for vesicles are the tongue, dental pad, gums, soft palate, nostrils, muzzle, interdigital space, coronary band and teats. Pregnant cows may abort, and young calves may die without developing any vesicles. Course of infection is 2-3 weeks.</p> <p>Swine: Initial signs are fever (104-105°F), anorexia, reluctance to move and squeal when forced to move; followed by vesicles on the coronary band, on the heels, in the interdigital space and on the snout. Sows may abort. High mortality in piglet.</p> <p>Sheep & Goats: Signs are mild</p>
Pseudorabies *all mammals except the tailless apes (horses rare)	Family Herpesviridae, genus Alphaherpesvirus, <i>porcine herpesvirus 1 (PHV 1)</i>	Intense local pruritus, excitement, bellowing, convulsions, paralysis, death 2-3 days
Vesicular Stomatitis *pig, horse, cattle, sheep	Family Rhabdoviridae genus vesiculovirus, 2 antigenically distinct types, New Jersey, Indiana	All animals develop a fever (104-106°F). Horses: vesicles in the mouth causing chomping of the animal's jaws, drooling, and rubbing its mouth on objects. Lesions on the coronary band can cause lameness. Cattle & Pigs: same signs as foot-and-mouth disease Humans: influenza like illness
Malignant Catarrhal Fever *cattle, buffalo, and deer, wildebeast	Family Herpesviridae, subfamily Gammaherpesvirinae	<p>Peracute form: fever, severe inflammation of the oral and nasal mucosas, hemorrhagic gastroenteritis with a course of 1-3 days.</p> <p>Intestinal form: fever, diarrhea, hyperemia of oral and nasal mucosas with accompanying discharges, lymphadenopathy with a course of 4-9 days.</p> <p>Head and eye form: typical syndrome with fever, nasal, and ocular discharges progressing from serous to mucopurulent and purulent. Encrustation of the muzzle and nares, dyspnea, open-mouth breathing, drooling, intense hyperemia and multifocal/ diffuse necrosis of the oral mucosa. Ocular signs include lacrimation, photophobia, hyperemia and edema of the palpebral conjunctiva, injection of scleral vessels, corneal opacity, and hypopyon. Possible nervous signs including trembling, uncoordinated gait and terminal nystagmus.</p>

<p>Rinderpest</p> <p>cattle, buffalo, swine, antelope</p>	<p>Family <i>Paramyxoviridae</i>, genus <i>Morbillivirus</i></p>	<p>Classic form: four stages—incubation period; febrile period (104-107.6°F) with depression, anorexia, reduction of rumination, increase of respiratory and cardiac rate, mucous membrane congestion (oral, nasal, ocular and genital tract mucosae), intense mucopurulent lacrimation and abundant salivation, anorexia, necrosis and erosion of the oral mucosa (phase lasts 2-3 days). Gastrointestinal signs appear when the fever drops and includes profuse hemorrhagic diarrhea containing mucus and necrotic debris, severe tenesmus, dehydration, abdominal pain, abdominal respiration, weakness, recumbency and death within 8-12 days. Rare cases, clinical signs regress by day 10 and recovery occurs by day 20-25; peracute form--no prodromal signs, high fever (>104°F), sometimes congested mucous membranes, and death. Occurs in highly susceptible young and newborn animals; subacute form--signs limited to one or more of the classic signs. Low mortality rate. atypical form--irregular pyrexia and mild or no diarrhea.</p>
Bacterial Diseases		
<p>Anthrax</p> <p>*all mammals</p>	<p><i>Bacillus anthracis</i></p>	<p>Peracute, acute, subacute, and chronic forms of the disease are reported. Ante-mortem clinical signs may be virtually absent in peracute and acute forms of the disease. Subacute disease may be accompanied by a febrile response, depression, inappetence, weakness, prostration and death. Chronic disease may show localized swelling, fever, enlarged lymph glands and possible death if the airway becomes obstructed.</p>
Rickettsial Diseases		
<p>Heartwater</p> <p>*ruminants</p>	<p><i>Cowdria ruminantium</i>, transmitted by <i>Amblyomma</i> spp ticks</p>	<p>Characterized by a sudden high fever, often an acute gastroenteritis and hydropericardium, respiratory disorders, and in acute and peracute forms, by nervous symptoms and death. Subacute heartwater also occurs, and has a higher recovery rate.</p>
Parasitic Diseases		
<p>Screwworm myiasis</p> <p>*all mammals</p>	<p><i>Cochliomyia hominivorax</i></p>	<p>Young larvae invade the surrounding tissues vigorously and burrow deeply; a profuse brownish exudates pours from the wound; apparent objectionable odor attracting multiple infestations of a single wound; animal shows irritation early after infection and by day 3 shows pyrexia</p>

VIII. Cattle		
<i>Viral Diseases</i>		
Akabane	Arboviruses of the Simbu group of the family Bunyaviridae,	Seasonally sporadic epizootic of abortions, stillbirths, premature births, and deformed fetuses. The pregnant dam has no clinical manifestation. Calves infected late in pregnancy may be born alive but unable to stand, or may be incoordinated and on necropsy show a disseminated encephalomyelitis. Infected 2 nd trimester: rigid fixation of limbs (arthrogryposis) and sometimes torticollis, kyphosis and scoliosis with associated neurogenic muscle atrophy. Infected late in the 1 st trimester: born alive but walk poorly, depressed, blind, have varying degrees of cavitation of cerebral hemispheres,
Bovine Ephemeral Fever	Rhabdovirus	Biphasic or polyphasic fever, shivering, inappetence, lacrimation, serous nasal discharge, drooling, dyspnea, atony of forestomachs, depression, stiffness and lameness, and a sudden decrease in milk yield.
Bovine Spongiform Encephalopathy	Prions (unconventional viruses)	Changes in temperment, apprehension, nervousness or aggression, incoordination (especially hindlimb ataxia), tremor, difficulty in rising, hyperaesthesia to sound and touch; decreased milk production, loss of body condition
Lumpy Skin Disease	Family <i>Poxviridae</i> , genus <i>Capripoxvirus</i>	Fever (104-106.7°F); nodules affecting the whole skin, subcutaneous tissue and sometimes musculature of 1-5 cm in diameter and larger; depression; anorexia; excessive salivation; oculonasal discharge; agalactia; emaciation; painful nodules, especially in the skin of the muzzle, nares, back, legs, scrotum, perineum, eyelids, lower ear, nasal mucosa, oral mucosa and tail (the nodules may become necrotic and sometimes deep scabs form called 'sitfast'); lameness; enlarged superficial lymph nodes draining areas of the infected skin.
Bacterial Diseases		
Contagious Bovine Pleuropneumonia	<i>Mycoplasma mycoides</i> subsp. <i>mycoides</i> SC (bovine biotype)	Adults: moderate fever with respiratory, pulmonary and pleuretic symptoms: polypnea, characteristic attitude (elbows turned out, arched back, head extended), cough (at first dry, slight, and not fitful, becoming moist), labored breathing after exercise, at percussion, dull sounds can be noticed in the low areas of the thorax Calves: arthritis with swelling of the joints
Hemorrhagic Septicemia *cattle & buffalo	serotypes of <i>Pasteurella multocida</i>	Dullness, reluctance to move, and elevated temperature are the first signs. Following are salivation and nasal discharge, edematous swelling in the pharyngeal region then spreading to the ventral cervical region and brisket, congested mucous membranes, respiratory distress, collapse and death.
Parasitic and Protozoan Diseases		
Bovine Babesiosis	protozoan parasites <i>Babesia bovis</i> , <i>B. bigemina</i> , <i>B. divergens</i> ; Principal vectors:	High fever, anorexia and ruminal atony; isolation from the herd, animal becomes uneasy, seeks shade and may lie down; cattle stand with an arched back, have a roughened hair coat, show evidence of dyspnea and tachycardia; injected mucous

	<i>Boophilus</i> spp. for <i>B. bovis</i> and <i>B. bigemina</i> ; <i>Ixodes ricinus</i> for <i>B. divergens</i> . Other vectors, <i>Haemaphysalis</i> and <i>Rhipicephalus</i> spp.	membranes initially then changing to the pallor of anemia; severe hemoglobinemia and hemoglobinuria; after the onset of fever, the crisis will usually pass within a week and if the animal survives, there is usually severe weight loss, drop in milk production, possible abortion and a protracted recovery
East Coast Fever	<i>Theileria annulata</i> and <i>T. parva</i> (tick transmitted, <i>Rhipicephalus appendiculatus</i> is the main vector)	First clinical signs appear 7 to 15 days after attachment of infected ticks—includes swelling of the draining lymph node (usually parotid, with the ear being the preferred feeding site); followed by a generalized lymphadenopathy, fever, anorexia, loss of condition, lacrimation, corneal opacity, nasal discharge, terminal dyspnea, diarrhea. Before death-recumbency, fall in temperature, frothy nasal discharge, severe dyspnea. Death usually occurs 18 to 30 days after infestation.
Parafilaria	<i>Parafilaria bovicola</i> <i>Musca xanthomeles</i> , <i>M. lusoria</i> , <i>M. nevillei</i> (main vectors)	
IX. Sheep and Goats		
Viral Diseases		
Bluetongue *Cattle, goats, wild ruminants (generally inapparent infection)	Family <i>Reoviridae</i> , Genus <i>Orbivirus</i> 24 serotypes have been identified	Acute form (sheep and some species of deer)--Pyrexia up to 107.6°F, depression, inflammation, ulceration, erosion and necrosis of the mucosa of the mouth, swollen and sometimes cyanotic tongue, lameness due to coronitis or pododermatitis and myositis, abortion, complications of pneumonia, emaciation, either death within 8-10 days or long recovery with alopecia, sterility and growth delay
Louping Ill (ovine encephalomyelitis) *sheep	Family <i>Flaviviridae</i> , genus <i>Flavivirus</i> <i>Ixodes ricinus</i> (main vector)	Incubation period, 6-18 days; tick transmitted, sudden onset of high fever (up to 107°F) followed by a return to normal and then a second febrile phase starting about the 5 th day during which nervous signs appear; affected animals stand apart from the herd often with the head held high; marked tremor of muscle groups and rigidity of the musculature-jerky stiff movements and a bounding gait (incoordination most marked in the hindlimbs); hypersensitivity; paralysis and recumbency; fatal cases-animal dies in 7-10 days, young animals, 1-4 days with no nervous signs
Nairobi Sheep Disease	Nairovirus of the family Bunyaviridae	Disease should be suspected when a mortality rate ranging between 40 and 90% occurs in a sheep or goat population, especially when this follows movement from free areas into enzootic areas. The disease is characterized by pyrexia (106.7°F), collapse, and diarrhea. Abortion is also a feature. Infestation with ticks, notably <i>Rhipicephalus appendiculatus</i> , substantiates any suspicion as to the agent involved. There is a low total white cell count in the early febrile stages.
Peste des Petits Ruminants	Morbillivirus	Disease resembles rinderpest in cattle, usually appears as an acute form, incubation period of 4-5 days followed by a sudden rise in body temperature to 104-106°F; characterized by serous ocular and nasal discharges, severe pyrexia (which can last for 3-5 days), erosive lesions (which occur in the mouth), diarrhea and pneumonia

Sheep and Goat Pox	Family <i>Poxviridae</i> Genus <i>Capripoxvirus</i>	Subclinical cases. Clinical cases vary from mild to severe--fever, depression, polypnea, conjunctivitis, lacrimation, rhinitis, edema of eyelids, photophobia, cutaneous eruption beginning with erythematous areas especially noticeable in hair or wool-free parts of the body, such as the perineum, inguinal area, scrotum, udder, muzzle, eyelids and axillae, lesions evolve into papules. Papulo-vesicular form: papules become a white-gray color, desiccate and form crusts that are easy to remove. Rarely, papules may transform into vesicles. After rupture of vesicles, a thick crust covers the lesions. Nodular form ('stone pox'): papules give rise to nodules involving all the layers of the skin and the subcutaneous tissue; necrosis and sloughing of the nodules leaves a hairless scar. In both forms, nodules develop in the lungs causing bronchopneumonia with cough, abundant nasal discharge, depression, anorexia and emaciation. Animals may recover within 20-30 days. Death is frequent when complications occur (abortion, which is rare, secondary infections, fly strike, septicemia, digestive localization)
Bacterial Diseases		
Contagious Agalactia of Sheep and Goats	<i>Mycoplasma agalactiae</i>	Acute onset of mastitis, ophthalmitis and arthritis with painful swelling of affected joints; high mortality rate and the udder is permanently damaged; abortion; kids are more seriously affected than adults; period of illness ranges from one to several months *other mycoplasmas, <i>M. capricolum subsp. capricolum</i> , <i>M. mycoides subsp. mycoides LC(MmmLC)</i> and <i>M. putrefaciens</i> , that have been shown to cause similar diseases, and at times accompanied by pneumonia
Contagious Caprine Pleuropneumonia	<i>Mycoplasma capricolum subsp. capripneumoniae</i> (Mccp)	Incubation period, 6-10 days; cough; dyspnea; lagging; lying down frequently; fever (104.5-106°F); terminal stages-mouth breathing, tongue protrusion, frothy salivation with death in 2 or more days * Respiratory disease in goats may also involve <i>Pasteurella haemolytica</i> , <i>P. multocida</i> , <i>M. ovipneumoniae</i> and <i>M. agalactiae</i> .
Equine		
Viral Diseases		
African Horse Sickness	Viscerotropic virus, family <i>Reoviridae</i> , genus <i>Orbivirus</i>	Subclinical form: fever (104-104.9°F) and general malaise for 1-2 days. Subacute or cardiac form: fever (102.2-105.8°F), swelling of the supraorbital fossa, eyelids, facial tissues, neck, thorax, brisket and shoulders. Death usually within 1 week. Acute respiratory form: fever (104-105.8°F), dyspnea, spasmodic coughing, dilated nostrils with frothy fluid oozing out, redness of conjunctivae, death from anoxia within 1 week. A mixed form (cardiac and pulmonary) occurs frequently: pulmonary signs of a mild nature that do not progress, edematous swellings and effusions, death from cardiac failure, usually within 1 week. In the majority of cases, the subclinical cardiac form is suddenly followed by

		marked dyspnea and other signs typical of the pulmonary form. A nervous form may occur, though it is rare
Hendra Disease	Family <i>Paramyxoviridae</i> , Hendra virus (HeV)	acute respiratory distress then death; there could be a high temperature, depression, then copious nasal discharges that may be bloody; severe damage to the lungs with the accumulation of massive amounts of fluid.
Japanese Encephalitis	mosquito-borne Flavivirus	Initial signs—fever, impaired locomotion, stupor and grinding of teeth. Blindness, coma and death follow in more severe cases. Subclinical infections are far more common than recognizable encephalitis. The infection also results in births of litters of pigs with a high percentage of stillbirths or pig affected with encephalitis.
Venezuelan Equine Encephalomyelitis	genus Alphavirus of the family Togaviridae	Subclinical infection; Moderate—anorexia, high fever, depression; Severe, but nonfatal—anorexia, high fever, stupor, weakness, staggering, blindness and occasionally permanent neurologic sequelae; Fatal—same clinical signs 2 general forms: a. fulminating form—generalized, acute febrile disease signs. b. encephalitic form: CNS signs predominate
Bacterial Diseases		
Contagious Equine Metritis	<i>Taylorella equigenitalis</i>	In the mare, the chief clinical sign is a copious to slight mucopurulent vaginal discharge occurring 10 to 14 days postbreeding to an infected stallion. The effects are limited to the reproductive tract.
Glanders	<i>Burkholderia mallei</i> Formally known as <i>Pseudomonas mallei</i>	Nasal form: unilateral or bilateral yellowish-green nasal discharge, nodules and ulcers on the nasal mucosa Cutaneous form: multiple nodules on the skin of the legs or other parts of the body (the ulcers may rupture leaving ulcers that discharge a yellow exudate to the skin surface and heal slowly); cutaneous lymphatic vessels become distended and firm, filled with tenacious purulent discharge ('farcy pipes') Pulmonary form: range from inapparent infection to mild dyspnea, or severe coughing with lower respiratory tract involvement.
Parasitic Diseases		
Equine Babesiosis	<i>Babesia caballi</i> , <i>B. equi</i>	Same as bovine babesiosis
Dourine	<i>Trypanosoma equiperdum</i>	Fever, local edema of the genitalia and mammary glands, cutaneous eruptions, incoordination, facial paralysis, ocular lesions, anemia, and emaciation may all be observed. Edematous cutaneous plaques, 5-8 cm in diameter and 1 cm thick, are pathognomonic. The clinical signs are marked by periodic exacerbation and relapse, ending in death or possibly, recovery
Fungal Diseases		
Epizootic Lymphangitis	<i>Histoplasma farciminosum</i>	Acute- high fever, cough and nasal discharge with rapidly spreading ulcers appearing on the nasal mucosa and nodules on the skin of the lower limbs or abdomen. Death due to septicemia occurs in a few days. Chronic- (signs related to the lesion site); pulmonary form: chronic cough, frequent epistaxis, labored respiration. Nasal and skin form: lesions on the lower parts of the turbinates and

		the cartilaginous nasal septum, beginning as nodules (1 cm in diameter), ulcerating and becoming confluent; unilateral or bilateral serous nasal discharge later becoming purulent and bloodstained; enlargement of the submaxillary lymph nodes, on healing the ulcers are replaced by a characteristic stellate scar; skin is characterized by subcutaneous nodules (1-2 cm in diameter) which ulcerate and discharge dark honey type pus; thickened fibrous lymph vessels; (predilection site for skin lesion-medial aspect of the hock)
X. Swine		
Viral Diseases		
African Swine Fever	DNA virus not classified to date, has characteristics of an Iridovirus and a Poxvirus	Acute form (highly virulent virus)--fever (104.9-107.6°F), early leukopenia and thrombocytopenia (48-72 hours); reddening of the skin (white pigs) - tips of ears, tail, distal extremities, ventral aspects of chest and abdomen; anorexia; listlessness; cyanosis; incoordination within 24-48 hours before death; increased pulse and respiratory rate; vomiting; diarrhea (sometimes bloody); eye discharges may exist; death within 6-13 days, or up to 20 days; abortion may occur in pregnant sows; survivors are virus carriers for life. In domestic swine, the mortality rate often approaches 100%. Subacute form (moderately virulent virus)--less intense symptoms; duration of illness is 5-30 days; abortion in pregnant sows; death within 15-45 days; mortality rate is lower (e.g. 30-70%, varies widely) Chronic form--various signs: loss of weight, irregular peaks of temperature, respiratory signs, necrosis in areas of skin, chronic skin, ulcers, arthritis, pericarditis, adhesions of lungs, swellings over joints. Develops over 2-15 months. Low mortality
Classical Swine Fever	Family <i>Flaviviridae</i> , genus <i>Pestivirus</i>	Acute form--fever (105.8°F), anorexia, lethargy, multifocal hyperemia and hemorrhagic lesions of the skin, conjunctivitis, cyanosis of the skin especially of extremities, transient constipation followed by diarrhea, vomiting (occasional), dyspnea, coughing, ataxia, paresis and convulsion, pigs huddle together, death occurs 5-15 days after onset of illness. Mortality in young pigs can approach 100% Chronic form--dullness, capricious appetite, pyrexia, diarrhea for up to 1 month, apparent recovery with eventual relapse and death Congenital form--tremor, weakness, runting, poor growth over a period of weeks or months leading to death; clinically normal but persistently viremic pigs, with no antibody response Mild form (sows)--transient pyrexia and inappetence, fetal death, resorption, mummification, stillbirth, birth of live, congenitally affected piglets, abortion (rare)
Swine Vesicular Disease	Family <i>Picornaviridae</i> , genus <i>Enterovirus</i>	Sudden appearance of lameness in several animals in a group in close contact; elevation of body temperature; on hard surfaces, animals may be observed to limp, stand with arched back, or refuse to move even in the presence of food; young animals are more severely affected; vesicles occur on the

		snout and along the coronary band and interdigital spaces of the feet, and rarely on the epithelium of the buccal cavity, the tongue and the teats; vesicle rupture results in erosions on the skin of the limbs and the coronary bands of the feet; loosened foot pads (young stock, may lose the horny hoof); recovery occurs usually within 1 week, with a maximum of 3 weeks
Vesicular Exanthema of Swine	Calicivirus, 13 serotypes	Similar to other vesicular diseases, lesions seem to be deeper and granulation tissue commonly forms especially on the feet; fever; vesicles in the mouth, on the snout and on the feet; lameness
Nipah Virus Disease	Family Paramyxoviridae	Morbidity is usually high but mortality is low; rapid labored breathing; very harsh explosive cough; in sows disease may be more pronounced with severe breathing difficulties; convulsions, death; pneumonia; mucopurulent discharges from the nose; at post mortem the predominant signs are consolidation of the lungs
XI. Avian		
Viral Diseases		
Highly Pathogenic Avian Influenza (fowl plague)	Family <i>Orthomyxoviridae</i> , genus <i>Influenzavirus</i> A, B (to date, all highly pathogenic isolates have been influenza A viruses of subtypes H5 and H7)	Incubation period is 3-5 days; severe depression; inappetence; drastic decline in egg production; facial edema with swollen and cyanotic combs and wattles; petechial hemorrhages on internal membrane surfaces; sudden deaths (mortality can reach 100%)
Exotic Newcastle Disease	Family <i>Paramyxoviridae</i> , genus <i>Rubulavirus</i>	Incubation period is 4-6 days; respiratory and/or nervous signs: gasping and coughing; drooping wings; dragging legs; twisting of the head and neck; circling; depression; inappetence; complete paralysis; partial or complete cessation of egg production; eggs are misshapen, rough-shelled, thin-shelled and contain watery albumen; greenish watery diarrhea; swelling of the tissues around the eyes and in the neck; morbidity and mortality depend on virulence of the virus strain, degree of vaccinal immunity, environmental conditions, and condition of the flock
XII. Lagomorphs		
Viral Diseases		
Rabbit Hemorrhagic Disease	Calicivirus	Sudden death after 6 to 24 hours of fever (up to 105°F) with few clinical signs; show depression in the final hours and may have a variety of neurologic signs; may or may not emit a terminal squeal or produce a serosanguineous, foamy, nasal discharge

Abbreviations

FADD-Foreign Animal Disease Diagnostician
AVIC- Area Veterinarian in Charge
FAD/EDI- Foreign Animal Disease/ Emerging Disease Incident
NVSL- National Veterinary Services Laboratory
FADDL- Foreign Animal Disease Diagnostic Laboratory
USAHA- US Animal Health Association
EP- Emergency Programs Staff, VS
EMLT- Emergency Management Leadership Team

Appendices

A. Maintenance of Manual

This manual will be updated as material becomes either obsolete or changes, policy changes or other situations as deemed necessary. The updated materials either by sections or by separate pages will be sent to the user. It is then the responsibility of the user to update his/her manual.

B. Biosecurity Standard Operating Procedures

Initial Biosecurity

Step 1: The window should be rolled up to prevent insects from entering the vehicle.

Step 2: Go directly to the back of the vehicle so you can put your coveralls and boots on and get your equipment ready before you leave the vehicle area to interview the producer.

Step 3: Clean coveralls should be worn to prevent contamination of your street clothes.

Step 4: Clean boots should be worn to prevent contamination of your street shoes.

Step 5: A known volume of water should be placed in the boot bucket so that the proper amount of disinfectant can be added.

Step 6: A pre-measured amount of disinfectant, based on the volume of water, should be added to the boot bucket.

Step 7: Your boots must be washed, especially the bottoms, prior to leaving your vehicle area to insure that no disease agent is brought onto the premises.

Step 8: Take your cooler containing gel packs for chilling specimens and your bag with all your equipment. Be sure the vehicle doors, windows and tailgate are closed for insect control.

Exit Biosecurity

Step 1: Since the cooler and bag are contaminated, they should not be placed in the vehicle until they have been cleaned and disinfected.

Step 2: All sides, tops, bottoms and handles of the cooler and bag must be cleaned and disinfected, once with a virucidal disinfectant and again with acetic acid. After disinfecting, set the cooler and bag in the vehicle and not back on the ground. Next, clean and disinfect all equipment used to restrain animals and collect samples, once with a virucidal disinfectant and again with acetic acid. Then clean and disinfect your boots.

Step 3: Carefully remove your coveralls by turning them inside out, avoiding contamination of your street clothes.

Step 4: Remove your boot and continue to take the coveralls from each leg and put on your street clothes.

Step 5: Continue to fold your coveralls inside out and place them in the plastic bag without touching the vehicle or your street clothes. Take your cap off and place that in the plastic bag as well. Any glasses or jewelry worn should be disinfected with a vinegar dip (acetic acid). At home, you should wash your coveralls and hat in hot detergent water, with some vinegar added.

Step 6: You should gather up all items such as your water/detergent containers and place them in the plastic bag as well. Either burn them at home or preferably have the farmer burn them.

Step 7: Return your boots to the boot bucket for a final cleaning and disinfecting, once with a virucidal disinfectant and again with acetic acid.

Step 8: Close your vehicle and go directly back to your base. You should not visit any other premises with cloven-hoofed animals for the remainder of the day. You need to call the AVIC or State Veterinarian as soon as possible to discuss the investigations findings.

C. Summary of Foreign Animal Diseases with the Principal Species Affected, Bodily Systems Affected and Major Mode of Transmission

Disease Condition	System Affected	XIII. <u>Transmission</u>	<u>Comments</u>
	Multiple species		
Anthrax *all mammals	Generalized	Ingestion, biological vector	
Foot-and-Mouth Disease *cloven-hoofed animals	Generalized	Direct/indirect contact	Highly contagious
Heartwater *ruminants	Generalized	Direct/indirect contact	
Screwworm Myiasis *all mammals	Integumentary	Biological vector	
Vesicular Stomatitis *many mammals	Generalized	Biological vector	
	Cattle		
African Animal Trypanosomiasis	Circulatory	Biological vector	
Akabane	Generalized	Congenital	
Bovine Babesiosis	Circulatory	Biological vector	
Bovine Ephemeral Fever	Generalized	Biologic vector	
Bovine Spongiform Encephalopathy	Nervous	Ingestion	
Contagious Bovine Pleuropneumonia	Respiratory	Inhalation	
East Coast Fever	Circulatory	Biological vector	
Hemorrhagic Septicemia	Generalized	Direct/indirect contact	
Lumpy Skin Disease	Integumentary	Biological vector	
Malignant Catarrhal Fever	Generalized	Ingestion/inhalation	
Rinderpest	Generalized	Direct/indirect contact	
	Sheep and Goat		
Bluetongue	Generalized	Biological vector	
Contagious Caprine Pleuropneumonia	Respiratory	Inhalation	

Louping Ill	Nervous	Biological vector	
Nairobi Sheep Disease	Generalized	Biological vector	
Peste Des Petits Ruminants	Generalized	Direct contact	
Sheep and Goat Pox	Integumentary	Direct/indirect contact	
Contagious Agalactia of Sheep & Goats	Reproductive	Ingestion	
<i>Equine</i>			
African Horse Sickness	Generalized	Biological vector	
Equine Babesiosis	Circulatory	Biological vector	
Contagious Equine Metritis	Reproductive	Coitus	
Dourine	Circulatory	Coitus	
Epizootic Lymphangitis	Generalized	Wound infection	
Glanders	Generalized	Ingestion	
Hendra Disease	Respiratory	Direct contact	Highly contagious
Japanese Encephalitis	Nervous	Biological vector	
Venezuelan Equine Encephalomyelitis	Nervous	Biological vector	
<i>Swine</i>			
African Swine Fever	Generalized	Direct contact	Highly contagious
Classical Swine Fever	Generalized	Direct contact	Highly contagious
Swine Vesicular Disease	Generalized	Direct contact	Highly contagious
Vesicular Exanthema of Swine	Generalized	Ingestion	
Nipah Virus Disease	Nervous/Respiratory	Direct contact	Highly contagious
<i>Avian</i>			
Avian Influenza	Respiratory	Direct/indirect contact	Highly contagious
Exotic Newcastle Disease	Generalized	Direct/indirect contact	Highly contagious
<i>Lagomorph</i>			
Rabbit Hemorrhagic Disease	Generalized	Indirect/direct contact	Highly contagious

Appendix D

Diseases Causing Vesicular Lesions in Cattle						
Lesions	Foot-and-Mouth Disease	Vesicular Stomatitis	Blue Tongue/EHD	Malignant Catarrhal Fever	Bovine Viral Diarrhea	Oral Trauma
Drooling	✗	✗	✗	✗	✗	✗
Fever	✗			✗		
Anorexia	✗	✗	possible	✗	✗	✗
Vesicles (nares)	✗	✗				
Vesicles (oral)	✗	✗	✗			
Vesicles (feet)	✗	✗	✗			
Erosions (oral)	✗	✗	✗	✗	✗	✗
Erosions (feet)	✗	✗	✗			
Coronitis	✗	✗	✗			
Lameness	✗	✗	✗		possible	
Burnt (crusted) muzzles		possible	✗	✗	possible	
Teat lesions	✗	✗				
Depressed				✗	possible	
High morbidity	✗					
Horses affected		✗				✗
Corneal opacity				✗		
Tearing	✗			✗		
Diarrhea				possible	✗	
Lymphadenopathy				✗		

xv. Vesicular Diseases of Swine					
Lesions	Foot-and-Mouth Disease	Vesicular Stomatitis	Swine Vesicular Disease	Trauma	Vesicular Exanthema of Swine
Fever	✗	✗	✗		✗
Vesicles (snout)	✗	✗	✗		✗
Vesicles (feet)	✗	✗	✗	✗	✗

Oral necrosis	✗	✗	✗	✗	✗
Oral erosions	✗	✗	✗	✗	✗
Erosions (feet)	✗	✗	✗	✗	✗
Coronitis	✗	✗	✗	✗	✗
Lameness	✗	✗	✗	✗	✗
Sloughing of foot wall	✗	✗	✗	✗	✗
Teat lesions	✗	✗	✗	✗	✗
High morbidity	✗	✗	✗	✗	✗

Appendix E

Foreign Animal Zoonoses				
<u>Disease</u>	<u>Causative Organism</u>	<u>Known Distribution</u>	<u>Principal Animals Involved</u>	<u>Probable Means of Spread to Man</u>
Bacterial Diseases				
Anthrax	<i>Bacillus anthracis</i>	Worldwide, common in Africa, Asia, South America, eastern Europe	Cattle, sheep, goats, horses, wild herbivorous animals	Occupational exposure; foodborne in Africa, Russia & Asia; occasionally wounds or insect bites; rarely airborne
Brucellosis	<i>Brucella abortus</i> <i>B. melitensis</i> <i>B. suis</i> <i>B. canis</i>	Worldwide, except North America Worldwide Northern hemisphere Rare	Cattle, bison, elk, caribou Goats, sheep Swine, caribou Dogs, coyotes	Occupational & Recreational exposure Milk, cheese, contact Rarely airborne
Glanders	<i>Pseudomonas mallei</i>	Rare except for some regions in Asia	Equids	Occupational exposure
Melioidosis (Pseudoglanders)	<i>Pseudomonas pseudomallei</i>	Asia, Africa, Australia, South America, USA; rare	Rodents, sheep, goats, horses, swine, nonhuman primates, kangaroos, zoo animals	Wound infection & ingestion; organisms live in soil & surface water
Tuberculosis	<i>Mycobacterium bovis</i>	Worldwide; rare in USA, Canada, Europe	Cattle	Ingestion, inhalation, occupational exposure
Rickettsial Diseases				
Erlinchiosis	<i>Erlinchia chaffeensis</i>	USA	Deer	Ticks
Q-fever	<i>Coxiella burnetii</i>	Worldwide; common	Sheep, cattle, goats, cats, other mammals	Mainly airborne; exposure to placenta; occasionally ticks & milk
Sporotrichosis	<i>Sporothrix schenckii</i>	Worldwide	Horses, other domestic & lab animals	Occupational contact, including with animals

Parasitic Diseases				
Babesiosis	<u>Babesia spp</u>	Worldwide	Wild and domestic animals	Bite of infected ticks
African Trypanosomiasis	XVII. Trypanosoma spp	Africa; common	Wild & domestic ruminants	Bite of infected tsetse fly
Myiasis	<u>Cochliomyia hominivorax</u>	Tropical regions of the world	Mammals	Infestation of living tissues by fly larvae
Viral Diseases				
Eastern Equine Encephalomyelitis	EEE virus (alphavirus)	Western hemisphere	Wild birds, domestic fowl, horses, mules, donkeys	Mosquitoes (<i>Culiseta melanura</i> & <i>Aedes</i> spp)
Foot-and-Mouth Disease	FMD virus (aphthovirus types A, O, C, SAT, & Asia)	Europe, Asia, Africa, South America	Cattle, swine, related cloven-hoofed animals	Contact exposure: people are quite resistant but can be carriers
Hendra Disease	Hendra virus	Australia	Horses	Contact exposure
Influenza	Influenza virus	Worldwide	Swine, horses, birds	Contact exposure
Japanese Encephalitis	Flavivirus	Asia, Pacific Islands	Wild birds, swine, horses	Bite of mosquitoes (<i>Culex</i> spp and <i>Aedes</i> spp)
Louping Ill	Louping Ill virus (flavivirus)	Australia, New Guinea; rare	Sheep, goats, grouse	Bites of ticks (<i>Ixodes ricinus</i>)
Newcastle Disease	Newcastle virus	Worldwide	Fowl	Occupational exposure
Nipah Disease	Nipah virus	South East Asia	Swine	Contact exposure
Rift Valley Fever	RVF virus (phlebovirus)	Africa; common to rare	Sheep, goats, cattle, camel	Bites of mosquitoes (<i>Aedes</i> spp); contact on necropsy or handling fresh meat
Venezuelan Equine Encephalomyelitis	VEE virus (alphavirus)	Western hemisphere; common	Equids, rodents	Bites of mosquitoes (<i>Mansonia</i> , <i>Aedes</i> , <i>Culex</i> spp)
Vesicular Stomatitis	VS virus (Indiana & New Jersey strains)	North & South America	Swine, cattle, horses, bats, rodents, other wild mammals	Contact exposure & insect bites, including mosquitoes & biting flies (<i>Phlebotomus</i> spp)
West Nile Fever	West Nile Virus (flavivirus)	Eastern hemisphere; common	Wild birds, horses	Bites of mosquitoes (<i>Culex univittatus</i> , <i>C. pipiens</i> , <i>C. modestus</i>)
Western Equine Encephalomyelitis	WEE virus (flavivirus)	Western & central USA, Canada, South America	Wild birds, domestic fowl, horses, mules, donkeys, bats, reptiles, amphibians	Mosquitoes (<i>Culex tarsalis</i> in USA, other <i>Culex</i> and <i>Aedes</i> spp outside USA)

Appendix F: Guide to Specimen Submission

Disease	Specimen	Laboratory Procedures	Minimum Time Required for Procedure	Testing Laboratory
African Horse Sickness	Whole blood 10 ml (do not freeze, refrigerate)	VI	1-3 weeks	FADDL
	Spleen Serum, 10 ml	IFA ELISA	2 days 1 day	
African Swine Fever	Serum, 2 ml	IFA VI	1 day	FADDL
	Tissue	FATST	2 wks 1 day	
	Tissue (for histo, preserve in 10% buffered formalin, do not freeze)	VI PI DFA HISTO ELISA	1-2 wks 2 wks 4 hrs 2 days 1 day	FADDL
	Serum, 2 ml	IFA	4 hrs	
African Trypanosoma Virax	Serum, 2 ml Blood smear	IFA	1 day	FADDL
Akabane	Serum, 2 ml	VN	4 days	DVL/EO FADDL
	Tissue	VI	2 wks	
Anthrax	Culture	ISOL ID	1 wk 1 wk	DBL/BI
Avian Influenza (Fowl Plague) (Highly Pathogenic)	Serum, 2 ml	AGID HI NI	1 day 1 day 1 day	DVL/AV PL/GPPI
	Tissue	VI	5-10 days	
	Swab Fixed tissue	VI HISTO	5-10 days 2 days	
Bluetongue	Serum, 2 ml	VN	5 days	

	Tissue, Semen (keep frozen) Heparinized blood (refrigerated) Washed RBC's EDTA blood (refrigerated)	C-ELISA AGID CF VI PCR	1 day 1 day 1 day 4-6 wks 4 days	FADDL or DVL/EO
Bovine Ephemeral Fever	Serum, 10 ml Blood	VN VI	1 wk 4 wks	FADDL
Brucellosis (Bang's Disease) (Brucella spp) B. abortus	Milk, tissue, semen Culture Milk, 5 ml Serum, 2 ml	ISOL IDENT BRT, HIRT CF, BAPA, Card PCFIA, _ELISA, RIV, Plate, Tube	4 wks 2 wks 3 days 1-2 days	DBL/MB DBL/SERO
B. suis B. ovis B. melitensis	Semen, 2 ml Serum, 2 ml Serum, 2 ml Milk	Tube CF, ELISA Tube	2 days 1 day 3 days	
B. canis	Serum, 2 ml	BRT, HIRT ME Tube	3 days 3 days	
Contagious Bovine and Caprine Pleuropneumonia	Serum, 10 ml Tissue Lesion Lesion (preserve in 10% buffered formalin)	CF GI Mycoplasma Isol. DFA HISTO	1 day 2 wks 4 hrs 2 days	FADDL
Contagious Equine Metritis	Serum, 2 ml Swab (must be received refrigerated within 48 hrs of collections; ship in Aimes transport medium with charcoal)	CF ISOL-EM ISOL HISTO	1 day 1 day 2 wks 2 days	DBL PL/GPPI
Dourine	Serum, 2 ml Blood or Blood smear (send whole blood in EDTA)	CF AGID MX of blood	1 day 2 days 1 day	DBL/SERO PL/PCP
East Coast Fever	Buffy coat smear (preserve fixed) LN impression	DFA IDFA	1 day 1 day	FADDL
Epizootic lymphangitis	Lesion Serum, 10 ml Tissue (preserve in 10% buffered formalin)	CULT CF HISTO	2 wks 2 days 2 days 2 days	FADDL

	Smear of Exudate (prepare or preserve fixed)			
Equine Encephalomyelitis (Eastern, Western, Venezuelan)	Serum, 2 ml Blood and tissue Fixed tissue	VN CF HI VI HISTO	4 days 1 day 1 day 2 wks 2 days	DVL/EO PL/GPPI
Foot-and-Mouth Disease	Vesicular epithelium or vesicular fluid Probang specimen of esophageal-pharyngeal fluid Paired serums, 5 ml (take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is collected)x Serum, 5 ml	CF ELISA VI ID CF ELISA AGID VN CF ELISA VN	4 hrs 4 hrs 2 days 2 days 1 day 4 hrs 2 days 1 wk 2 days 2 days 1 wk	FADDL
Glanders	Serum, 2 ml Tissue Culture	CF ISOL ID	1 day 2 wks 2 wks	DBL/SERO DBL/BI
Goat and Sheep Pox	Biopsy of recent skin lesion Respiratory tract lesion Paired serums 5 ml (take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is collected)w Biopsy of recent lesion	VI AI VN IFA HISTO EM	2 wks 4 wks VN IFA 2 days 2 days	FADDL
Heartwater	Heparinized blood, 10 ml plus 10% DMSO (frozen, dry ice) Heparinized blood, 50ml EDTA blood, 20 ml Smears of cerebral cortex Half of brain tissue Serum, 10 ml	AI CULT (buffy coat culture) PCR ID of brain smears DFA PCR HISTO (preserve in 10% buffered formalin) IFA ELISA	4 wks 2 wks 4 days 4 hrs 1 day 4 days 2 days 4 hrs 1 day	DVL/BP PL/GPPI DVL/BP PL/GPPI DVL/BP

Hemorrhagic Septicemia_	Heparinized blood Tissue Serum, 10 ml	ISOL AGID HI	2 wks 1 day 1 day	FADDL
Classical Swine Fever	Serum, 2 ml Tissue Whole blood (clotted) from febrile animal if no animal is available for necropsy Tonsil biopsies when animals not available for necropsy Tissue (preserve in 10% buffered formalin)	IPTVN IPT ELISA VI FATST HISTO	3 days 1 day 1 day 4 days 4 hrs 2 days	FADDL FADDL FADDL PL/GPPI
Japanese Encephalitis	Tissue Serum, 10 ml	VI HI ELISA	2 wks 2 days 2 days	FADDL
Louping Ill	Tissue Serum, 10 ml	VI HI CF AGID VN	2 wks 2 days 2 days 2 days 2 wks	FADDL
Lumpy Skin Disease	Biopsy of recent (acute) skin lesion Respiratory tract lesion Paired serums, 5 ml Biopsy of recent (acute) lesion!"	VI AI VN, IFA HISTO EM	2 wks 4 wks 2 wks 2 days 2 days	FADDL
Malignant Catarrhal Fever	Serum, 2 ml EDTA blood Tissue or blood Fixed tissue	VN IPT PCR VI AI HISTO	5-10 days 1 day 5 days 4-6 wks 4-6 wks 2 days	DVL/BP FADDL PL/GPPI
Melioidosis	Culture Tissue Serum, 2 ml (frozen) Fixed tissue	ID ISOL CF HISTO	2 wks 2 wks	DBL/BI DBL/SERO PL/GPPI
Nairobi Sheep Disease	Heparinized blood (refrigerated, not frozen) Tissue Serum, 10 ml	VI CF HI VN	2 wks 2 days 2 days 2 wks	FADDL

Newcastle Disease	Serum, 2 ml Tissue Swab	HI VI	1 day 5-15 days	DVL/AV
	Fixed tissue Fixed tissue	NECROP HISTO	1 day 2 days	PL/GPPI
Pestes des Petits Ruminants	EDTA Heparinized whole blood Tissue	VI CI	3-30 days 3-30 days	FADDL
	Lacrimal secretion Tissue Lacrimal secretion	CF DFA AGID	18 hrs 3 hrs 1-3 days	
	Paired serums, 5 ml (take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is collected) Tissue	VN FAN ELISA HISTO	7 days 2 days 7 hrs 2 days	
Piroplasmiasis (Babesiosis)	Serum, 2 ml	CF IFA	1 day 1 day	DBL/SERO
	Blood (EDTA) or smears	MX of blood	1 day	PL/PCP
Pseudorabies	Serum, 2 ml	ELISA LAT GPX GI VN	1 day 1 day 1 day 1 day 3 days	DVL/BP
	Tissue	FATST PCR	1 day 5 days	
	Fixed tissue	HISTO	2 days	
Rift Valley Fever	EDTA or heparinized whole blood (refrigerated, not frozen) Tissue	VI CC	1-21 days 2 hrs	FADDL
	Whole blood Tissue	HI CF DFA AGID VN PRNT ELISA HISTO	2 hrs 18 hrs 3 hrs 1-3 days 3 days 3 days 7 hrs 2 days	
	Tissue (preserved in 10 % buffered formalin)			
Rinderpest	EDTA Heparinized whole blood Tissue	CC CI	3-30 days 3-30 days	FADDL
	Lacrimal secretion Tissue Lacrimal secretion	CF DFA	18 hrs 3 hrs	
	Paired serums, 5 ml	HISTO	1-3 days	

	(take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is collected) Tissue (preserve in 10% buffered formalin)	VN FAN ELISA HISTO	1 wk 2 days 7 hrs 2 days	
Screwworm	Parasites	ID of fly larvae to species	1 day	PL/PCP
Swine Vesicular Disease	Vesicular epithelium or vesicular fluid Probang specimen of esophageal-pharyngeal fluid Paired serums, 5 ml (take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is collected) Serum, 5 ml	CF VI ID CF VN	4 hrs 2 days 2 days 1 day 1 wk	FADDL
Vesicular Exanthema of Swine	Vesicular epithelium or vesicular fluid Paired serums, 5 ml (take 2 samples, send 1 to the lab, freeze the other until convalescent serum sample is Collected)_ Serum, 5 ml	CF VI ID IFA-group antigen CF AGID VN	4 hrs 2 days 2 days 1 day 2 days 1 wk	FADDL
Vesicular Stomatitis	Vesicular epithelium or vesicular fluid Probang specimen of esophageal-pharyngeal fluid Insect pools (frozen) Serum, 2 ml	CF VI ELISA VI CF VN	1 day 2 days 4 hrs 7 days 1 day 3 days	FADDL DVL/BP

**Abbreviations

AGID- Agar Gel Immunodiffusion

AI- Animal Inoculation

BAPA- Buffered Acidified Plate Antigen Presumptive Test

BRT- Brucellous Ring Test

CARD- Card Test

CC- Cell Culture

C-ELSIA- Competitive Enzyme- Linked Immunosorbent Assay

CF- Complement Fixation
CI- Cattle Inoculation
CULT- Culture
DFA- Direct Fluorescent Antibody Test
ELISA- Enzyme- Linked Immunosorbent Assay
EM- Electron Microscopy
FAN- Fluorescent Antibody Virus Neutralization
FATST- Fluorescent Antibody Tissues Section Test
GI- Growth Inhibition
HI- Hemagglutination Inhibition
HIRT- Heat Inactivated Ring Test
HISTO- Histopathology
ID- Identification
IFA- Indirect Fluorescent Antibody
IPT- Immunoperoxidase Test Serum Neutralization
ISOL- Isolation
LAT- Latex Agglutination Test
ME- Mercaptoethanol
MX- Microscopic Examination
NECROP- Necropsy
NI- Neuraminidase Inhibition
PCFIA- Particle Concentration Fluorescent Immunoassay
PCR- Polymerase Chain Reaction
PI- Pig Inoculation
PRNT- Plaque Reduction Neuralization Test
PRVGI- Pseudorabies Virus GI Differential Test
PRVGPX- Pseudorabies Virus GPX Differential Test
RIV- Rivanol
VI- Virus Isolation
VN- Virus Neutralization

Appendix G: Relevant Phone numbers**Laboratories**

FADDL: FADDL personnel will pick up samples and transport them to the laboratory. Weekdays (8:30 a.m. to 4:15 p.m., Eastern Time) call **(631) 323-3256 or 3206**. After hours or weekends call Beeper **(888) 228-1399 (leave a message)**.

Dr. Tom McKenna **(240) 508-9882** (cellular) (860) 388-3580 (Home)

NVSL: Weekdays (8:00 a.m. - 4:30 p.m. Central Time)

Virology **(515) 663-7551**

Pathobiology **(515) 663-7521**

Bacteriology **(515) 663-7563**

After-hours, please call the security desk at NVSL-Ames (515)-663-7200, and they will direct your call to the appropriate person.

EP's Main Office Number (301) 734-8073

Business hours 8:00am –5:00pm EST

AFTER BUSINESS HOURS, HOLIDAYS, OR WEEKENDS:

DR. AIDA BOGHOSSIAN (301) 776-3266 (home) (240) 508-9748 (cellular)

DR. RANDALL CROM (202) 659-0321 (home) (240) 508-9753 (cellular)

DR. SHERRILYN WAINWRIGHT (240) 508-9884 (cellular)

DR. JOE ANNELLI (410) 750-9743 (home) (240) 508-9747 (cellular)

Note: Please use cellular phone numbers if parties cannot be reached at home. If after a reasonable amount of time, a response to a phone message is not received, please call another person. Be aware that technical barriers to successful nationwide cell calling exist. Airborne travel or subway travel could prevent a cell call from being received.

**Disinfectants Approved under FIFRA Section 18
for Use Against OIE List A Foreign Animal Diseases**

Foreign Animal Disease	Disinfectant(s) approved for APHIS Use Only	Disinfectants Approved for Use by State Officials and the General Public
African horse sickness	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
African swine fever	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Bluetongue	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Classical swine fever	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Contagious bovine pleuropneumonia	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Foot and Mouth Disease	Sodium Carbonate (4%)	Sodium Hypochlorite (up to 12.5%)
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	Acetic Acid (4-5%)
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Highly pathogenic avian influenza	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Lumpy skin	Sodium Carbonate (4%)	

disease		
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Newcastle disease	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Foreign Animal Disease	Disinfectant(s) approved for APHIS Use Only	Disinfectants Approved for Use by State Officials and the General Public
Peste des petits ruminants	NONE	
Rift Valley fever	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Rinderpest	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Sheep pox and goat pox	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Swine vesicular disease	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	
Vesicular stomatitis	Sodium Carbonate (4%)	
	Sodium Carbonate (4%) and Sodium Silicate (0.1%)	
	Sodium Hydroxide (2%)	
	Sodium Hypochlorite (up to 12.5%)	