Lesson Plan

Livestock and Horses:

Foreign Animal Disease Recognition

SART Training Media

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Lesson Plan

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About Florida SART

SART is a multiagency coordination group consisting of governmental and private entities dedicated to all-hazard disaster preparedness, planning, response, and recovery for the animal and agriculture sectors in the state of Florida.

SART operates at the local level through county SART organizations.

SART utilizes the skills and resources of many agencies, organizations and individuals with its multiagency coordination group structure.

SART supports the county, regional, and state emergency management efforts and incident management teams.

SART Mission

Empower Floridians through training and resource coordination to enhance all-hazard disaster planning and response for animals and agriculture.

SART Goals

- Promote the active engagement of each county coordinator who is responsible for animal and agricultural issues
- Provide assistance in the development and writing of county ESF-17 plans
- Promote the establishment of a county SART to work as a multiagency coordination group to support emergency management and incident management teams
- Provide training for all SART and animal and agriculture personnel
- Identify county resources available for an emergency or disaster
- Work to comply with the National Incident Management System (NIMS) document

Subject: **Foreign animal diseases pose a special danger to Florida agriculture. These dangers are discussed, nine specific diseases are described, and some methods of farm security are recomended.**

Introduction

This lesson plan, together with a workbook and PowerPoint presentation, form a unit in the SART training module for Livestock and Horses entitled Foreign Animal Disease Recognition. This lesson plan guides the instructor in delivering the educational portion of the workshop. For information on planning, organizing and publicizing the entire training event, consult the *Creating a County SART* Toolkit. The toolkit and other SART training materials are available on the Florida SART Web site: <www.flsart.org>.

This lesson plan is structured to identify:

- How a foreign animal disease can be introduced
- Dangers that a foreign animal disease introduction poses
- Nine diseases that pose a risk to Florida
- How foreign animal diseases are diagnosed
- Farm security measures that can help prevent animal disease introduction

Throughout the lesson plan, symbols in the margin indicate that a slide in the PowerPoint presentation is available for that section.

Approximately 60-70 minutes should be allocated for this program.

Session Outline

Part 1—Beginning the Workshop	5 minutes
Part 2—Foreign Animal Diseases	10 minutes
Part 3—Recognition of Specific Diseases	30 minutes
Part 4—Diagnosis and Prevention	10 minutes
Part 5—Highlight Key Resources	5 minutes
Part 6—Summary and Wrap-Up	10 minutes
Total	70 minutes

Learning Objectives

At the end of this unit, participants will be able to:

1. Define what a foreign animal disease is.
2. Explain how foreign animal diseases are introduced.
3 Explain the consequences of foreign animal disease introduction.
4. Name and provide details of nine specific animal diseases.
5. Describe the difficulty in diagnosing foreign animal diseases and who participates in the diagnosis.
6. Explain how to prevent disease spread and introduction.
7. Identify key resources available for more information.

Learning Environment/Aids

To complete this lesson plan, you will need:

- The PowerPoint presentation Foreign Animal Disease Recognition
- Optional: a companion publication, Foreign Animal Disease Recognition: Participant Workbook, is available. It contains copies of the PowerPoint slides and resource information

To conduct this training unit, you will need:

- A means to show the PowerPoint presentation: a computer with a projector. (Note: Master black and white copies of the slides are included at the end of this manual for use as a flipbook or, if you prefer, to make transparencies for use with an overhead projector.)
- Sufficient seating for all participants

Each participant will need:

- A pen or pencil
- Participant workbook or paper for notes

Before the Workshop

On the day of the workshop, check that all equipment needed is in place. Double-check that electronic media works on the equipment you have. Also, make certain that any materials for participants, such as paper, workbooks and pens/pencils, are available in sufficient numbers.

Part 1: Beginning the Workshop

Time: 5 minutes

Focus: Introducing participants to certain foreign animal diseases affecting livestock and horses

SLIDE 2-3

Once all participants have taken their seats and have settled down, welcome them to the Foreign Animal Disease Recognition workshop. Thank them for attending and congratulate them on taking the time to learn about this important threat to Florida's, and America's, animal agriculture. Remind them that the best way to respond to an agricultural emergency situation is to have a foundation of knowledge on which to build.

During this introduction, you may choose to distribute the pre-test included in this manual. Make sure to explain to the participants that the pre-test is only meant to guide them; they will not be graded. Use of pre- and post-tests can help to evaluate how much knowledge participants gain during the session.

SLIDE 4

This lesson plan can be used with agricultural and non-agricultural audiences. Review the learning objectives with the participants. At the end of this training session, participants will be able to define what a foreign animal disease is, explain how foreign animal diseases are introduced, state consequences of the introduction, name and provide details of nine specific animal diseases, describe the difficulty in diagnosing foreign animal diseases, state who is involved in the diagnosis of a foreign animal disease outbreak, explain how to control and prevent disease spread and introduction and identify key resources available for more information.

Remind attendees that the reason they are attending the workshop is because they realize the value of being prepared by having a disaster plan in place. The information they gain in this workshop will enhance their professional performance.

This introduction should not extend past five (5) minutes. (Note: More time may be needed if the pre-test is used.) This is a time when the audience is getting comfortable with the workshop they have decided to attend, the surroundings and you, the presenter. At the same time, the presenter is getting comfortable with the audience, the material to be presented and being a presenter. Pay close attention to time; you may find yourself a bit nervous getting started. These "nerves" can make people ramble or talk faster or slower, while others may forget the time and forget to move on. Even if your audience is enjoying what they are doing, they will appreciate your discipline when the workshop ends on time.

Part 2: Foreign Animal Diseases

Time: 10 minutes

Focus: Define 'foreign animal disease' and explain how foreign animal diseases are introduced and their consequences

[As a way to get your audience in the right frame of mind, you may incorporate the following activity into the beginning of this part of the presentation. Materials needed and assembly instructions are located in the Appendix, *"What Would You Do?" Activity -- Materials and Assembly*. The activity does not address any learning objectives, but enhances the overall program through audience participation.]

> **Activity:** Prior to the start of the workshop fasten the two zipper-lock bags under two chairs in the audience seating. As you begin part 2, ask for everyone to look under their chairs to find the two baggies. Once the bags have been located, have each person who found a bag open it and read the card inside. The goal of this activity is to help the audience realize that foreign animal diseases can come into the country in various, seemingly innocuous ways. After this is completed, continue the program with Part 2.

SLIDE 5

What is a Foreign Animal Disease?

A foreign animal disease (FAD) is an important transmissible livestock or poultry disease believed to be absent from the United States and its territories.

SLIDE 6

"Important" means that FADs have the potential to cause significant health or economic impact, should they be introduced. The World Organization of Animal Health, known by the initials OIE (for Office International des Epizooties), maintains a list of diseases considered the greatest threats to animals and livestock worldwide. (Prior to 2005, these diseases were divided into two categories, List A and List B; they are now grouped together as "Diseases Notifiable to the OIE," and often referred to as "reportable diseases." To view the current list, visit the OIE Web site: <www.oie.int>.)

SLIDE 7

Reportable diseases are transmissible diseases that: 1) have the potential for very serious and rapid spread, possibly across international boundaries, and 2) that are of serious socio-economic or public health consequence. Reportable diseases are of major importance in the international trade of animals and animal products. Disease reports are submitted to the OIE as often as necessary to comply with the International Animal Health Code. During outbreaks, several reports may be issued in one day.

SLIDE 8-10

The current list (October 2006) of OIE reportable diseases contains almost 120 diseases divided into the following categories, according to the animals they affect:

- Multiple species diseases
- Sheep and goat diseases
- Swine diseases
- Lagomorph diseases (rabbits and similar animals)
- Fish diseases
- Crustacean diseases
- Cattle diseases
- Equine diseases
- Avian diseases
- Bee diseases
- Mollusc diseases
- Other diseases

Mollusk, crustacean and fish diseases are covered in more detail in the SART Aquaculture unit, Aquatic Animal Diseases.

SLIDE 11

If an FAD is introduced, several consequences are likely:

- Most immediately, if a single case of an FAD is confirmed, the operation which is the source of the FAD will be quarantined.
- Further, regional or national shipments of the affected species, and possibly

allied species, will be suspended.

- A single confirmed case can cause other countries to impose import bans on the affected species and any products derived from that species to protect their own agricultural industries.
- Millions, or billions, of dollars may be spent in locating the source of infection, in control and eradication.
- Hundreds to millions of animals may be destroyed.
- Availability and price of species products and related products may be seriously affected.

For example, in 2002 and 2003 there was a Newcastle Disease outbreak in California, Arizona, Nevada and Texas. Approximately 932 farms were identified as infected. Eradication of all affected birds cost taxpayers about $168-million dollars according to the USDA-APHIS Veterinary Services division. The potential spread of the disease into a susceptible wildlife population could complicate disease eradication or even make it impossible.

How Are FADs Spread?

SLIDE 12-14

It might seem obvious that FADs could come into the U.S. with the hundreds of thousands of livestock and poultry that are imported every year. However, there are many possible ways for diseases to be carried into the country.

- Non-mammalian animal carries disease host – A tick, Amblyomma variegatum, which can carry Heartwater bacteria, was discovered on some tortoises imported into Florida.
- Each year the United States also imports millions of tons of edible animal products.
- Biologics, which are products such as vaccines, embryos/ova for embryo transfer, and semen for artificial insemination, must be screened to ensure freedom from harmful infectious agents.
- Smuggled psittacine birds (primarily parrots and cockatoos) carrying Exotic Newcastle Disease have caused many outbreaks of the disease over the last twenty years.
- Humans can also bring livestock diseases into the United States. The Foot and Mouth Disease virus, for instance, can survive on clothing or shoes for weeks after contact.
- Classical Swine Fever, present in both the Dominican Republic and Cuba,

could easily enter the United States through a carelessly discarded sausage or ham sandwich brought in by a traveler.

- A human returning from a visit in an infected part of the world could be carrying Rift Valley Fever. Upon their return to the United States, mosquitoes could bite them, then pick up the virus, and transmit to nearby ruminant livestock.
- Traveling pets can bring disease-carriers like ticks into the country when they return with their owners from vacation or after living abroad. Animals returning to the country after travel should be screened thoroughly to ensure that diseases are not entering the country as hitchhikers on the family pet(s).

Wildlife movement and migration is often overlooked as a source of disease introduction. Obviously, wild animals and birds do not stop at border inspection stations. A migratory bird carrying a bit of rabbit feces on its feet could easily stop in the United States, depositing Viral Hemorrhagic Disease in the vicinity of susceptible lagomorphs (rabbits, hares, and picas). Wild birds with exotic poultry diseases can fly freely across national borders and transmit the disease themselves or bring a "vector" of the disease, like a tick or other pest which carries the disease agent.

Disease and disease vector introduction can also be products of bioterrorism or other intentional introduction. Anthrax can be introduced rather easily into human or animal populations. Proper biosecurity protocols, including limiting and screening those entering and exiting agricultural facilities, can help prevent

Part 3: Recognition of Specific Diseases

Time: 30 minutes

Focus: Describe nine foreign animal diseases that are important to Florida

SLIDE 15

This section provides detailed information on nine diseases, starting with Foot and Mouth Disease. Pictures of characteristic clinical signs are provided for many of the diseases on accompanying slides. These pictures may be shocking or objectionable to some, so please advise participants of the nature of the photographs.

Foot and Mouth Disease

[Two videos about FMD are available for your use. The first is from USDA and provides a helpful description of FMD, especially to see FMD's symptoms and effects. The second is from PBS. This piece describes the 2001 FMD outbreak in Britain and discusses spread of FMD and primary and secondary economic impacts. Access these clips through the Florida SART Training Materials page.

> Foreign Animal Diseases: Foot and Mouth Disease. USDA. Length: 7:22.
> Foot-and-Mouth Disease (originally broadcast March 30, 2001 on the News Hour with Jim Lehrer). PBS Online. Length: 14 min.]

SLIDE 16

Foot and Mouth Disease (FMD) is one of the most important and destructive foreign animal diseases. It is highly contagious, and its initials, FMD, can be used to describe that foot and mouth disease is a fast moving disease. FMD can produce serious economic losses. Although death rate in adult animals is low (usually less than 5%), animals that survive are often debilitated, resulting in lower milk and meat production. A high death rate (up to 90%) is often seen in younger animals due to myocarditis, an inflammation of the walls of the heart.

FMD is caused by a virus. Vaccines are available, but like influenza, there are several main types and many subtypes of the FMD virus. A vaccine is only effective against one specific virus type. If an animal is exposed to the FMD virus, chances are almost 100% that the animal will develop a case of the disease.

SLIDES 17-18

There are several sources of the virus that causes FMD. Animals with the virus can transmit it to other animals during the incubation period, that is the period between when they are infected and when they show clinical symptoms. Certainly, animals with symptoms can transmit the disease. Meat and by-products which have a neutral to alkaline pH (above 6.0) are also a source. Carriers include cattle and water buffalo. Animals that are recovering from the disease (convalescent animals) and animals which have been recently vaccinated (called "vaccinates") and have been exposed to the virus may also act as carriers. The virus can persist in the rear of the throat (oropharynx) of exposed vaccinates for up to 30 months in cattle, longer in buffalo, and 9 months in sheep. African Cape buffalo are a major reservoir of the virus.

FMD is endemic to parts of Asia, Africa, and the Middle East, and appears in sporadic outbreaks in areas of South America. Known hosts for FMD are cattle, zebu, domestic buffalo, yaks, sheep, goats, swine and all wild ruminants and

swine. Members of the genus Camelidae, like camels and llamas, have lower susceptibility to the disease.

FMD can be transmitted by contact with breath (droplets), saliva, feces or urine. Milk and semen can transmit the disease up to four days before clinical signs are exhibited. Humans, other animals, and inanimate objects like vehicles and equipment can efficiently transmit FMD. Infectious droplets can be carried up by the air up to 35 miles over land or 185 miles over water.

FMD has an incubation period of 2 to 14 days with recovery generally occurring within 8 to 15 days.

SLIDE 19-21

Cattle with Foot and Mouth Disease exhibit the following clinical signs:

- High temperature
- Anorexia, or lack of appetite
- Shivering
- Reduction in milk production for two to three days
- Smacking of the lips
- Teeth grinding
- Drooling
- Lameness
- Stomping or kicking their feet
- Vesicles, or blisters, in the mouth and nose, and/or between the hooves on their feet and at the coronary band. These blisters typically rupture after 24 hours leaving draining raw erosions or ulcers.

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Sheep and goats afflicted with Foot and Mouth Disease have less obvious blisters that are easier to miss than those on cattle. Blisters on the feet may go unrecognized. Sheep may develop blisters on their dental pads. Sheep and goats with FMD may stop producing milk (agalactia), and the death of young stock is a sign of FMD. Due to the less pronounced signs that sheep exhibit, they are often referred to as “silent spreaders” of the disease.

SLIDE 23

Swine with FMD show less severe vesicles than cattle, but may develop severe foot vesicles particularly when housed on concrete. High death rate in piglets is a frequent occurrence.

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FMD can be mistaken for several other diseases, including:

- Mucosal disease
- Infectious bovine rhinotracheitis
- Bluetongue
- Bovine mammillitis
- Bovine popular stomatitis
- Bovine viral diarrhea

Heartwater

SLIDES 25-26

Heartwater is also known as Cowdriosis. It is not contagious; instead it is spread by specific kinds of ticks. Heartwater is a very serious disease and is often fatal. In areas of the world where heartwater is endemic, it limits livestock production. USDA has estimated that a heartwater outbreak in the US could cost over $750 million.

Heartwater is a disease of ruminants caused by the rickettsial bacteria *Ehrlichia ruminantium* (formerly *Cowdria ruminantium*). It is carried by certain ticks in the species *Amblyomma*. There are several ticks of this species in the United States, such as the Lone Star tick (*A. americanum*) and the Gulf Coast tick (*A. maculatum*). The latter could become a vector of heartwater. The most important carrier of heartwarer is the Bont tick (*A. hebraeum*), which is widely distributed in Africa and also occurs in the West Indies. There is continuing concern that this tick and the disease it often carries will be brought into the US on pet tortoises, egrets, or other species.

Heartwater is a disease of both domestic and wild ruminants. Hosts for this disease include domestic cattle, sheep and goats. Deer are also susceptible, and they are abundant and widely distributed in Florida. *Bos indicus* cattle breeds (European breeds, such as Angus, Hereford, etc.) typically have a less severe disease than *Bos taurus* breeds (Brahman breeds and zebu). Wild ruminants like eland, springbok, blesbock, and black wildebeest can all get the clinical disease, but rarely die from it; these species may act as reservoirs of the disease. Other wild animals such as helmeted guinea fowl, leopard tortoises and scrub hares play an important role as vector hosts and disease carriers. It is important to remember that many animals, including humans, can carry the tick, and the tick often carries the disease.

Heartwater occurs in nearly all sub-Saharan countries of Africa, in Madagascar, and in some Caribbean islands, threatening the American mainland. Concern for Florida exists because there are native tick vectors. Two worrisome reservoir hosts of the disease are birds that migrate between Florida and Caribbean islands where heartwater is endemic and reptiles, both indigenous and exotic.

Primary vectors for Heartwater are *Amblyomma* ticks. Larvae and nymphs pick up *E. ruminantium* while feeding on infected ruminants, other game animals and reptiles. Replication of *E. ruminantium* occurs in the tick with adults transmitting the disease to susceptible host animals.

The incubation period of heartwater is between ten days and two weeks, but the onset of symptoms may be sudden and appear too late for effective treatment.

Clinical signs of Heartwater include:

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- A sudden rise in body temperature exceeding 106°F (41.1°C) within one to two days, fluctuating then dropping shortly before death
- Lack of appetite
- Listlessness
- Respiratory distress
- Diarrhea is common in cattle, but not common in small ruminants

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- Nervous system signs develop over time. Signs include but are not limited to:
  - Walking in circles
  - Making sucking movements or motions
  - Standing rigidly with tremors of the superficial muscles
  - Cattle may push their head against a wall or fence, act aggressively or anxiously
  - Finally the animal falls to the ground, pedaling their feet, exhibiting opisthotonos (backward arching of the spine), nystagmus (involuntary movement of the eyes), and chewing movements. The animal usually dies during or following such an attack
- Subacute Heartwater with less pronounced signs and peracute Heartwater with sudden death, can also occur according to the breed of ruminant and to the strain of *Ehrlichia*

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Heartwater can be mistaken for several other diseases, including:

- Rabies
- Bacterial meningitis and encephalitis
- Chlamydiosis
- Toxic plants
- Mycotoxin exposure
- Heavy metal toxicity
- Pulpy kidney disease and Bluetongue in sheep

African Horse Sickness

SLIDES 31-33

African Horse Sickness (AHS) is a severe disease with a high death rate. According to the OIE, death rate is 70-95% in horses, 50% in mules, and around 10% in donkeys.

African Horse Sickness is not contagious. It requires a biological vector such as midges or mosquitoes (*Culicoides*, *Culex*, *Anopheles* and *Aedes* species). Occasionally, ticks like *Hyalomma* and *Rhipicephalus* species become vectors. Internal tissues of infected animals, as well as their blood, semen, and urine are sources of the virus.

AHS affects horses, mules, donkeys and zebra normally, but occasionally elephants, camels and dogs that eat infected blood or horsemeat may become hosts, too. The reservoir host for this disease is believed to be the zebra.

AHS is endemic in the central, tropical regions of Africa, and regularly appears in southern and northern Africa. Outbreaks have occurred in the Near and Middle East, in Spain, and in Portugal.

The incubation period is usually 7 to 14 days, but can be as short as two days. Virus particles may remain in the blood (viremia) in horses for as long as 18 days, but usually this lasts for fewer days, about four to eight. In zebras and donkeys, viremia may last up to 28 days.

Several forms of African Horse Sickness exist: subclinical, subacute or cardiac, acute respiratory, a mixed cardiac and respiratory form and a rare nervous form. Some signs of infection for each form of AHS are:

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- Subclinical
    - Fever of 104 to 104.9°F (40 to 40.5°C)
    - General weakness and discomfort (malaise) for one to two days
- Subacute
    - Fever of 102 to 105.8°F (38.9 to 41°C)
    - Swelling of the supraorbital fossa (the area just above the eyes), eyelids, facial tissues, neck, thorax, chest muscles and/or shoulders
    - Death within one week
    - In the majority of cases, the subacute cardiac form is suddenly followed by marked labored breathing and other signs typical of the pulmonary form.
- Acute respiratory
    - Fever of 104 to 105.8°F (40 to 41°C)
    - Labored breathing (dyspnea)
    - Spasmodic coughing
    - Dilated nostrils with frothy fluid oozing out
    - Redness of the eyes and lining of the eyelids (conjunctiva)
    - Death within one week
- Mixed cardiac and pulmonary form
    - Mild pulmonary signs that do not progress
    - Swelling (edema) with possible oozing (effusion)
    - Death from cardiac failure within one week
- Nervous form
    - Very rare

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African Horse Sickness can be mistaken for several other diseases. These diseases include:

- Anthrax
- Equine infectious anemia

- Equine viral arteritis
- Trypanosomosis
- Equine encephalosis
- Piroplasmosis
- Pupura haemorrhagica

Venezuelan Equine Encephalomyelitis

SLIDES 37-38

Venezuelan Equine Encephalomyelitis (VEE) is a severe disease with a high death rate in horses, often 50 to 90%. Humans infected with VEE rarely develop symptoms. Experience in South America indicates that approximately 4% of infected individuals developed severe neurological symptoms;, fewer than 1% died.

SLIDES 39-40

VEE is caused by a virus and is not directly contagious. It is transmitted from infected animals by mosquitoes. It is very similar to Eastern and Western Equine Encephalomyelitis diseases (EEE and WEE). VEE has several types and numerous subtypes which can be divided into two groups, called, endemic and epidemic. Endemic subtypes of VEE are diseases generally limited to specific areas. These subtypes are associated with the rodent-mosquito transmission cycle. Endemic VEEs can cause human illness, but generally do not affect equine health. Epidemic subtypes can spread rapidly through large populations. Horses are the primary reservoir host for the epidemic VEE subtypes. It is this fact that makes VEE different from EEE and WEE. Endemic and epidemic forms of the virus are very likely to cause illness to both horses and humans. If infected, humans may experience flu-like symptoms.

VEE, EEE, and WEE can all infect rodents, birds, humans and horses. EEE can also infect bats, reptiles and amphibians. VEE infects bats and marsupials in addition to the hosts previously noted. Cattle, swine and dogs can become infected, but generally do not show signs of illness and do not spread the disease. Blood of VEE infected horses and the rodent-mosquito infection cycle are sources of the VEE virus. The EEE and WEE virus is principally maintained in a bird-mosquito infection cycle. Humans are dead-end hosts for VEE, EEE, and WEE.

VEE is endemic in Central and northern South America. The last reported U.S. outbreak of VEE occurred in 1971, but now there are less dangerous strains, such as Everglades virus, which are endemic to southern Florida.

The incubation period for VEE is from two to six days, whereas EEE and WEE can be anywhere from 5 to 15 days.

The virus causing Venezuelan Equine Encephalomyelitis is transmitted by mosquitoes that had a blood meal from animals possessing sufficient viral load in the blood stream. Subsequent feeding on healthy animals then transmits the virus from the saliva of the mosquito.

Horses afflicted with some form of VEE may exhibit various clinical signs, all similar to those of EEE and WEE. Mild, vague signs of fever, anorexia and depression may occur. Less or more responsive to external stimuli, unusual behavior and appearing blind and ataxic or walk in small circles are some other clinical signs that may be exhibited. Nervous signs may progress until the horse is down and there are violent and uncontrolled movements of the limbs, head, mouth and eyes. Death without any of the preceding signs is possible, as well. Humans typically have headaches, fever and other flu-like symptoms.

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Venezuelan Equine Encephalomyelitis can be mistaken for several other diseases, including:

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- West Nile Virus
- Eastern Equine Encephalomyelitis
- Western Equine Encephalomyelitis (and related viruses)
- Equine Herpes Virus 1 Encephalomyelitis
- African Horse Sickness
- Rabies
- Toxins
- Botulism
- Trauma

Rift Valley Fever

SLIDES 43-44

Rift Valley Fever (RVF) is an acute disease that affects a wide variety of animals and humans. The disease is often fatal in ruminants and some rodents, especially the very young, and causes almost 100% of pregnant ruminants to abort. RVF can cause disease in humans, sometimes severe, but the death rate in humans is less than 1%.

The disease is caused by a virus. It is primarily transmitted by mosquitoes, but it can also be acquired through direct contact with contaminated materials or surfaces.

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Hosts for RVF include cattle, sheep, goats, dromedaries, several rodents and wild ruminants like buffalo, antelope and wildebeest. Humans are very susceptible to Rift Valley Fever. African monkeys and domestic carnivores present a transitory viremia. Mosquitoes of many genera (*Aedes*, *Anopheles*, *Culex*, *Eretmapodites*, *Mansonia*, etc.) can act as competent biological vectors. Mosquitoes (*Aedes*) are the reservoir hosts.

The disease has been recognized exclusively in African countries, with an underlying association of high rainfall and dense population of vector mosquitoes.

Virus sources for animals are wild fauna and vectors. Sources for humans include contact with nasal discharge, blood and vaginal secretions after abortion in animals infected with RVF, mosquitoes and infected meat. Infection of humans is also possible by breathing in airborne particles or consumption of raw milk. Direct contamination can occur in humans when handling infected animals and meat.

Incubation period in newborn ruminants is as little as 12 hours. In most animals, the incubation period ranges from one to six days.

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Adult cattle, calves, sheep, goats, swine and humans all experience different clinical signs when affected by Rift Valley Fever.

Adult cattle may experience:

- Fever of 104 to 105.8°F (40 to 41°C)
- Excessive salivation
- Lack of appetite or anorexia
- Weakness
- Fetid diarrhea
- Yellowing of the skin or eyes (icterus, or jaundice)
- Drop in milk production
- Abortion may reach 85% in the herd
- Death rate usually less than 10%
- Inapparent infections quite frequent

Calves may exhibit:

- Fever of 104° F to 105.8° F (40° C to 41° C)
- Depression
- Marked yellowing of the skin and eyes (jaundice) may be present
- Death rate 10 to 70%

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Adult sheep, goats and swine may experience:

- Fever of 104 to 105.8°F (40 to 41°C)
- Increased respiratory rate
- Bloody nasal discharge
- Vomiting
- In pregnant ewes, abortion may reach 100%
- Inapparent infections in goats and swine quite frequent

Lambs have different signs from adult sheep. These signs include:

- Fever of 104–107.6°F (40 to 42°C)
- Increased respiratory rate
- Lack of appetite
- Weakness
- Death within 36 hours after initial infection
- Death rate
- Under one week of age – up to 90%
- Over one week of age – up to 20%

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Humans exhibit an influenza-like syndrome accompanied by its typical symptoms like fever of 100 to 104°F (37.8 to 40°C), headache and muscular pain or weakness. Nausea, abdominal (epigastric) discomfort and an aversion to light (photophobia) are also symptoms that humans may exhibit. Recovery generally occurs within four to seven days. Inapparent infection is quite frequent

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Rift Valley Fever can be mistaken for several other diseases. These diseases include:

- Bluetongue

- Wesselsbron disease
- Enterotoxemia of sheep
- Ephemeral fever
- Brucellosis
- Vibriosis
- Trichomonosis
- Nairobi sheep disease
- Heartwater
- Endemic abortion of sheep
- Toxic plants
- Bacterial septicemia

Exotic Newcastle Disease

SLIDES 50-51

Exotic Newcastle Disease (END) is a highly contagious disease that affects most and perhaps all bird species. It is highly lethal and many birds may die without exhibiting any clinical signs. Because it is highly infectious and quick-acting, END can be devastating in high density poultry operations. END can infect humans, in whom it can cause a range of flu-like symptoms and generally conjunctivitis. Symptoms usually last only 24 hours. In fact, END may have some applications as a cancer therapy.

END is caused by a virus and is usually spread when healthy birds come into contact with droppings or other secretions form diseased birds. The virus can survive for several weeks in a warm, humid environment on feathers or in manure or other materials. It is rapidly killed by dehydration or the ultraviolet light in sunshine.

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Hosts for END include many species of birds, both domestic and wild. Chickens are the most susceptible poultry; ducks and geese are the least susceptible. The number of animals that get sick or die varies depending on the animal species and the strain of virus. Some parrots, parakeets, and some other wild birds may carry the virus without getting sick.

END is endemic throughout much of the world. Some European countries are considered free of the disease. END is not considered endemic to the United States but there have been several localized outbreaks, and some have been

quite severe.

Transmission occurs by direct contact with feces and other secretions from infected birds. The virus can persist in the environment and infection can be spread by contaminated feed, water, implements, premises, human clothing, etc. Respiratory discharges, feces and other bodily secretions and all parts of an infected bird's carcass are sources of the END virus. Frequent outbreaks do occur in the United States due to illegal importation and transportation of birds, such as exotic pets and fighting cocks.

The incubation period is four to six days. The virus is shed during the incubation period and for a limited period during convalescence. Some parrots and parakeets (psittacine birds) have been demonstrated to shed the virus intermittently for over a year.

SLIDE 53

END produces severe neurologic and gastrointestinal signs. Birds infected with Exotic Newcastle Disease may exhibit:

- Gasping and coughing are common respiratory clinical signs
- Nervous system signs include
- Drooping wings
- Dragging legs
- Twisting of the head and neck
- Circling
- Depression
- Lack of appetite
- Complete paralysis
- Partial or complete cessation of egg production with misshapen, rough or thin-shelled eggs that contain watery whites
- Greenish watery diarrhea
- Swelling of the tissues around the eyes and in the neck

SLIDE 54

Exotic Newcastle Disease can be mistaken for several other diseases, including:

- Fowl cholera
- Avian influenza

- Laryngotracheitis
- Fowl pox (diptheric form)
- Psittacosis (chlamydiosis in psittacine birds)
- Mycoplasmosis
- Infectious bronchitis
- Pacheco's parrot disease (psittacine birds)
- Management errors such as deprivation of water, food, air, etc. can cause similar clinical signs

Highly Pathogenic Avian Influenza

SLIDES 56-57

Highly Pathogenic Avian Influenza (HPAI) is a highly contagious and generally fatal disease. "Highly pathogenic" means that the virus causes disease in a very high portion of infected animals. It is believed to have the potential to infect all bird species, but it is especially notable and deadly in chickens and turkeys. It is uncommon for humans to become infected with avian influenza viruses, but many individual cases are known, usually in persons who have close contact with infected poultry.

HPAI is caused by a virus. As with other influenza viruses, there are many subtypes of avian influenza, and less pathogenic strains can modify to become highly pathogenic. More than one strain of avian influenza is highly pathogenic. Many people may now be familiar with the "HN" designations of influenza subtypes. HPAI is generally identified with the H5N1 strain. There are 16 H types and 9 N types which can combine to form the many flu virus subtypes. Some of these subtypes have important implications for human health, such as the H1N1 strain that caused the 1918 flu pandemic or H3N2 that caused the "Hong Kong" flu pandemic of 1968.

SLIDES 57-58

Avian influenza produces diseases in many species of animals including humans. Because the genetic make-up of the virus can change easily, there are many subtypes of the virus. Therefore, it is difficult to know exactly what vaccine to produce, and the vaccine must match the subtype. Highly pathogenic avian influenza (HPAI) is of particular importance due to its high death rate and extreme contagiousness. Recent outbreaks of HPAI in the United States have been demonstrated to be of different strains than those found in the 2004 Asian epidemic. However, there is evidence that even the lower pathogenic strains may have the ability to mutate and become highly pathogenic.

Highly pathogenic avian influenza isolates have been obtained primarily from chickens and turkeys. It is reasonable to assume that all avian species are susceptible to infection. Pigs have long been considered the "mixing vessel" for influenza viruses and should be considered when examining any influenza outbreak. Virus sources include feces and respiratory secretions. Highly pathogenic viruses can live for long periods of time in infected feces, but also in tissues and water.

Influenza is a worldwide disease, but not many influenza subtypes have the combination of high contagiousness and high death rate. Such subtypes develop periodically and then move quickly through susceptible animal populations. When this happens, a pandemic may result. The World Health Organization coordinates a global effort that monitors for potential pandemic outbreaks.

Transmission of HPAI virus occurs through direct contact with secretions from infected birds, especially feces and through contaminated feed, water and equipment. Waterfowl and sea birds may carry the disease without showing any symptoms, and introduce the virus into flocks. Broken, contaminated egg shells may infect chicks in the incubator.

Incubation period for HPAI virus is 3-5 days.

SLIDE 60

Poultry afflicted with HPAI may show some of the following clinical signs:

- Severe depression
- Lack of appetite
- Nasal and oral cavity discharge
- Drastic decline in egg production
- Facial swelling (edema) with swollen and cyanotic combs and wattles (cyanotic means a bluish condition caused by lack of oxygen in the tissue)
- Tiny blood blisters (petechiae) on internal membrane surfaces
- Sudden deaths (death rate can reach 100% of flock)

SLIDE 61

Highly Pathogenic Avian Influenza can be mistaken for several other diseases. These diseases include:

- Acute fowl cholera
- Velogenic Newcastle disease

- Other respiratory disease, especially infectious laryngotracheitis

African Swine Fever

SLIDES 62-63

African Swine Fever (ASF) is a highly contagious disease which can appear in several forms ranging from debilitating to highly lethal. Humans are not susceptible to ASF. This disease is indistinguishable from Classical Swine Fever except through laboratory analysis of diseased tissues.

ASF is caused by a virus. There are several strains, but at present, they are identified only by the different symptoms they cause. Strains are described as follows:

- Peracute (rapidly causes death)
- Acute (1-2 days of symptoms usually followed by death)
- Subacute (mild symptoms may last for 3 weeks)
- Chronic (long-term, recurring illness usually with secondary complications)

Hosts for ASF include pigs, warthogs, bush pigs, European wild boar and American wild pigs. African wild swine, warthogs and bush pigs do not usually show symptoms of the disease.

ASF is present in most of sub-Saharan Africa, and it has been reported in Spain and Porutgal and in Sardinia. At one time, it was present in four South American and Caribbean countries, but has since been eradicated. Outbreaks have occurred in several European countries.

SLIDE 64

ASF can be transmitted in several ways. Healthy animals can contract the disease by direct contact with sick animals. Indirect transmission occurs if an animal feeds on garbage containing infected meat. Contaminated premises, vehicles, implements and clothes can also transmit the disease. Soft ticks of the genus Ornithodoros act as biological vectors and virus sources. Blood, tissues, secretions and excretions of sick and dead animals are another source of the virus. A carrier state exists, especially in African wild swine, and in domestic pigs in endemic areas.

Incubation period for ASF appears to be 5-15 days. Virus can persist in animal tissues for many weeks after symptoms have passed.

Clinical signs exhibited by animals with African Swine Virus vary depending on

SLIDE 65

the strain of virus infecting the animal. A highly dangerous form of the virus, or acute form, may produce:

- Fever between 104.9 and 107.6°F (40.5 to 42°C)
- Reddening of the skin, visible in white pigs
- Tips of the ears, tail, limbs and underside of the chest and abdomen
- Lack of appetite, listlessness, cyanosis and incoordination within 24 to 48 hours before death
- Increased pulse and respiratory rate
- Vomiting
- Diarrhea (sometimes bloody)
- Eye discharges
- Increased abortions
- Death within a few days
- Survivors are carriers for life.
- In domestic swine afflicted with these strains, death rate reaches 100 %.

SLIDE 66

A moderately dangerous form of the virus, or subacute form, may produce the following clinical signs:

- Less intense symptoms than the acute strain
- Increased abortion
- Duration of illness is 5 to 30 days
- Death rate for moderate strains vary widely, but can be anywhere between 30% and 70%.

Chronic forms of the disease have the lowest death rate and may present the following symptoms:

- Various signs, including loss of weight, irregular peaks of temperature, respiratory signs, cell death (necrosis) in areas of skin, chronic skin ulcers and arthritis
- Pericarditis (an inflammation of the sac that contains the heart)
- Adhesions of the lungs
- Swelling over joints
- Develops over months

In swine afflicted with a chronic form of the virus, focal caseous necrosis and mineralization of the lungs may exist. Additionally, the lymph nodes may be enlarged.

SLIDE 67

African Swine Fever can be mistaken for several other diseases, including:

SLIDE 68

- Erysipelas
- Salmonellosis
- Pasteurellosis and all septicemic conditions
- Classical Swine Fever, or hog cholera

It is not possible to differentiate Classical and African Swine Fever by clinical or post-mortem examination. It is essential to send samples for laboratory evaluation.

Classical Swine Fever

Classical Swine Fever (CSF), also known as swine fever or hog cholera, is a highly contagious disease. CSF is a serious disease that often results in animal death. CSF does not affect human beings.

SLIDE 69

CSF is caused by a virus, and appears in three forms:

- Acute (5-14 days of illness followed by death)
- Chronic (moderate symptoms persist for up to 3 months, usually followed by death)
- Mild (periods of illness with mild or no symptoms lead up to a terminal period of illness)

Domestic pigs and wild boar are the only known animal hosts of CSF.

CSF occurs in much of Asia, Central and South America and parts of Europe and Africa. Many countries are free of the disease. CSF was eradicated in the United States in 1978 after a 16-year effort by industry and government.

SLIDES 70-71

Transmission occurs by direct contact between animals' secretions, excretions, semen and blood. Disease is also spread by farm visitors, veterinarians and pig traders. Indirect contact through the premises, implements, vehicles, clothes,

instruments and needles can spread CSF. Pigs can acquire the virus by eating insufficiently cooked waste food. Unborn piglets may acquire the virus from their mothers through the placenta. Congenitally infected piglets are persistently viremic and may shed the virus for months.

The incubation period for CSF is 2-14 days.

SLIDES 72-73

Clinical signs for Classical Swine Fever vary depending on the virus strain acquired. In pigs afflicted with the acute form:

- Fever of about 105.8°F (41°C)
- Anorexia (reduced appetite or aversion to food)
- Lethargy
- Multiple accumulations of blood (multifocal hyperemia) and bloody lesions of the skin, the eyes and the lining of the eyelids (conjunctiva)
- Cyanosis of the skin especially of the extremities like ears, limbs, tail and snout
- Transient constipation followed by diarrhea
- Vomiting (occasionally)
- Labored breathing (dyspnea), coughing
- Loss of muscle control (ataxia), partial paralysis (paresis) and convulsion
- Pigs huddle together
- Death occurs 5 to 15 days after onset of illness
- Death rate in young pigs can approach 100%

Pigs with a chronic form of this illness may experience dullness, a capricious appetite, fever and diarrhea for up to one month. Apparent recovery occurs with eventual relapse then death.

Congenital forms of CSF express congenital tremor, weakness, runting and poor growth over a period of weeks or months leading to death. These pigs appear clinically normal, but persistently are viremic with no antibody response.

Sows can be afflicted with a mild form that may exhibit transient fever and lack of appetite, fetal death, fetal reabsorption or dehydration (mummification), and stillbirth of piglets. Sows may give birth to live, congenitally affected piglets and, rarely, abortion.

SLIDE
74

Classical Swine Fever can be mistaken for several other diseases, including:

- African Swine Fever: CSF is clinically indistinguishable from ASF. It is essential to send samples to a laboratory for evaluation.
- Infection with bovine viral diarrhea virus
- Salmonellosis
- Erysipelas
- Acute pasteurellosis
- Other viral encephalomyelitis
- Streptococcosis
- Leptospirosis
- Coumarin poisoning

Part 4: Diagnosis and Prevention

Time: 10 minutes

Focus: Identify difficulties of diagnosing foreign animal diseases, confirmation of diagnoses, and list steps to prevent disease introduction and spread

SLIDES 75-77

Foreign animal diseases can be difficult to recognize because many diseases appear with similar sets of symptoms. Diagnosis can even be difficult for professionals.

Owners are at the front line in identifying a foreign animal disease outbreak, and the key to performing that task effectively is "Know Your Animals. Owners and anyone who handles or tends animals should pay attention to animals' behaviors and appearance. Owners and managers should teach employees to speak up if they notice anything unusual.

Pay particular attention for vesicles or blisters on the mouth, nose and feet of ruminants and swine, sudden death in livestock and abortions in otherwise healthy, well vaccinated herds. High fevers are always a warning sign, and the sudden death of a single animal should set off an alarm.

When an abnormality is spotted, contact a veterinarian immediately. The veterinarian can make a tentative diagnosis and proceed to the next step if they believe a foreign animal disease has been detected. The vet may then call one or more of the following individuals: a local foreign animal disease diagnostician (FADD), the state veterinarian's office or the USDA-APHIS Veterinary Services Area Veterinarian in Charge (AVIC).

Once the AVIC becomes involved, they will assign a FADD to investigate the matter further. The FADD contacts the owner and the regular vet for relevant historical facts and to schedule a site visit. He/She will also make a tentative diagnosis at this time.

From the moment an abnormal situation is noticed, it is imperative to observe strict facility/farm/ranch biosecurity to prevent the spread of the disease agent.

Once the FADD arrives at the facility, he/she will examine the animal(s), take

tissue, blood and/or fluid samples, and compile historical and epidemiological data. The FADD may issue a hold order or quarantine if necessary and as appropriate.

Owners should never be more concerned about a quarantine than they are about the liability of starting on outbreak.

The FADD may also investigate neighboring premises to attempt to trace the source or progress of the disease agent. Samples are sent to the National Veterinary Services Laboratories (NVSL). Results are reported to the AVIC, to the FADD and then to owner and owner's veterinarian. If the tests were positive for a foreign animal disease, the incident command system would be activated and response would commence immediately. If the tests were negative for a foreign animal disease, no further action is taken by the state or federal authorities.

Foreign Animal Disease Diagnosticians or FADDs have special training and experience in diagnosing foreign animal diseases. They are trained to conduct on-farm investigations and collect biological samples for laboratory analysis.

SLIDE 78

Prevention is the best way to limit a farm's exposure to foreign animal diseases. Some examples of methods to control all diseases, not just foreign animal diseases, are:

- Maintain good biosecurity practices on the farm(s)
- Establish insect and rodent control procedures
- Vaccinate regularly
- Provide parasite control for the animals
- Isolate and quarantine new animals
- Limit contact between animals of different species
- Limit contact between livestock and wildlife
- Restrict the number of visitors allowed on the farm and their access to certain parts of the facility
- Maintain vigilance over deliveries to the farm site

Staying involved by following these tasks is a sure way to not only prevent disease introduction, but to notice if something is out of the ordinary. Developing a written biosecurity protocol with an action plan for the facility will substantially aid in the commitment to performing these tasks consistently. A biosecurity protocol is not only helpful in the event of disease outbreak, but in the event that any emergency occurs.

[Before moving on, ask the audience if there are any tasks/practices that they

follow at their facilities/farms/ranches that differ from those listed above or were not mentioned.]

Part 5: Highlight Resources

Time: 5 minutes

Focus: Identify key resources that participants can easily access for additional information

SLIDES
79-84

The following are sources of information, including agencies mentioned in this unit that may be helpful.

- Florida Department of Community Affairs, Div. of Emergency Management
  Web site: http://www.floridadisaster.org
- United States Department of Agriculture (USDA)
  Web site: http://www.usda.gov
- Florida Department of Agriculture and Consumer Services (FDACS)
  Web site: http://www.doacs.state.fl.us
- FDACS Division of Animal Industry
  Web site: http://www.doacs.state.fl.us/ai/
- USDA Animal and Plant Health Inspection Service (USDA-APHIS)
  Web site: http://www.aphis.usda.gov
- World Organisation for Animal Health (OIE)
  Web site: http://www.oie.int
- APHIS Center for Emerging Issues (CEI) has various worksheets available on animal health and diseases of concern as well
  Web site: http://www.aphis.usda.gov/vs/ceah/cei/worksheets.htm
- University of Florida Institute of Food and Agricultural Sciences Extension publication resource (EDIS) offers many fact sheets for various veterinary and animal health
  Web sites: http://edis.ifas.ufl.edu/DEPARTMENT_VETERINARY_MEDICINE
  http://edis.ifas.ufl.edu/TOPIC_Livestock_by_Animal
  http://edis.ifas.ufl.edu/TOPIC_Livestock_Health_by_Animal
- The University of Florida IFAS Extension Disaster Handbook
  Web site: http://disaster.ifas.ufl.edu
- United States Animal Health Association (USAHA) web address and animal

disease information links
Web sites: http://www.usaha.org/index.shtml
http://www.usaha.org/links.shtml#disease

- USDA-APHIS Veterinary Services division publication, "Animal Health Hazards of Concern During Natural Disasters," published in February 2002 is available at the following link. The goal of the publication is to "describe some of the natural disasters that have occurred in the U.S. during recent years and to review some infectious and noninfectious hazards that, at the very least, are perceived to be related directly to natural disasters."
Web site: http://www.aphis.usda.gov/vs/ceah/cei/EmergingAnimalHealthIssues_files/hazards.PDF

- USDA-APHIS fact sheets for various animal diseases are available at the following Web address
Web site: http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html

- The Animal and Plant Health Inspection Service has veterinarians serving as Area Veterinarian's in Charge (AVICs) who are part of the chain to whom foreign animal diseases are reported. The list of all states' AVICs are found on the following Web site: http://www.aphis.usda.gov/vs/area_offices.htm

- State Veterinarian Office contact information for each state
Web site: http://www.aphis.usda.gov/vs/sregs/official.html

- Saunders Comprehensive Veterinary Dictionary 2nd edition, written by D. C. Blood and V. P. Studdert. Published in 1999 by W. B. Saunders.

- Iowa State University Center for Food Security and Public Health
Web site: http://www.cfsph.iastate.edu

- Web-based Training: Recognizing and Rsponding to Foreign Animal Diseases. Florida Department of Agriculture and Cosumer Services; available for continuing education credit. http://www.sarttraining.com/courses/FADS_Beta/

- Video Resources:

  Foreign Animal Diseases: Foot and Mouth Disease. USDA. Length: 7:22 (Download). Provides a helpful description of FMD, especially to see FMD's symptoms and effects.

  Foot-and-Mouth Disease (originally broadcast March 30, 2001 on the News Hour with Jim Lehrer). PBS Online. Length: 14 min. (Streaming). Describes the 2001 FMD outbreak in Britain and discusses spread of FMD and primary and secondary economic impacts.

  Access these clips through the Florida SART Training Materials page.

Part 6: Summary and Wrap-Up

Time: 10 minutes

Focus: Review the learning objectives that have been accomplished and encourage a commitment to SART

SLIDE 85

You and your audience have had a stimulating and practical hour, but it is almost over. Prior to answering any audience questions or comments, provide a summary to the participants of what they just learned:

- What a foreign animal disease is
- How foreign animal diseases are introduced and consequences of the introduction
- Names and details of nine specific animal diseases
- The difficulty in diagnosing foreign animal diseases and who confirms diagnosis
- How to prevent disease spread and introduction
- Valuable resources available for more information

SLIDE 86

Thank the audience for their attention and participation. Congratulate them for their commitment to the SART endeavor and on their desire to be part of the solution.

At this point, you may elect to have the participants take the Post-Test provided in the Resources section of this lesson plan. Remember to review the answers to the test questions after all participants complete the test.

A content-specific Evaluation is provided in the Resources section of this lesson plan. The generic Evaluation available in the Toolkit for Planning a Community-Based SART Training Event can be utilized as well. As the presenter, you should decide which evaluation best meets the needs of your situation. Please have participants complete an evaluation at the conclusion of this unit. Encourage participants to be as honest and forthright as possible as it helps you, the presenter, make adjustments to future presentations.

Appendix

What Would You Do? Mini-Activity

Materials

2 plastic, zipper lock bags
2 index cards
1 small piece of dog cookie (or similar)
1 small piece of yellow cheese (or similar)
Tape

Assembly

1. Write the following sentence(s) on card 1:

   "This is a West African aphrodisiac prepared as an air dried product from bull cremaster muscle. Said to be better than Viagra."

2. Write the following sentence(s) on card 2:

   "This dried pellet is prepared in Central South America from raw cow placenta and when reconstituted in water is said to be better than Botox for wrinkle removal."

3. Place card 1 and the cheese into a bag, seal the bag and tape under a randomly chosen seat in the audience.

4. Place card 2 and the dog cookie into the other bag, seal the bag and tape under randomly chosen seat in the audience.

Conducting the Activity

Prior to the start of the workshop fasten the two zipper-lock bags under two chairs in the audience seating. As you begin part 2, ask for everyone to look under their chairs to find the two baggies. Once the bags have been located, have each person who found a bag open it and read the card inside. The goal of this activity is to help the audience realize that foreign animal diseases can come into the country in various, seemingly innocuous ways. After this is completed, continue the program with Part 2.

Participant's Evaluation of *Preparing an Action Plan*

Please circle the number that best expresses your opinions about the following statements.

		FULLY DISAGREE	DISAGREE	NEUTRAL	AGREE	FULLY AGREE
1.	The training unit's format was appropriate.	1	2	3	4	5
2.	The information presented was useful to me.	1	2	3	4	5
3.	The time it took to complete this unit was acceptable.	1	2	3	4	5
4.	I understand what a foreign animal disease is.	1	2	3	4	5
5.	The method and consequences of introduction of a foreign animal disease was fully explained.	1	2	3	4	5
6.	I can name and describe nine important foreign animal diseases.	1	2	3	4	5
7.	I understand the process of diagnosing foreign animal diseases.	1	2	3	4	5
8.	Steps for preventing the introduction and spread of foreign animal diseases was clearly explained.	1	2	3	4	5
9.	We welcome your comments about this program:					

_____

_____

_____

_____

_____

Please use the back of this sheet for any further comments.

Thank you for your time!

Foreign Animal Disease Recognition Participant Pre-Test

This pre-test is intended to gauge the level of knowledge that you have before participating in the *Foreign Animal Disease Recognition* training. Please answer all the following questions to the best of your ability.

1. A _____ _____ _____ is an exotic, important transmissible livestock or poultry disease believed to be absent from the United States that has potential to cause significant health or economic impact should it be introduced.

2. Name two practical consequences of a disease introduction.
   _____
   _____

3. A disease list is maintained by the World Organisation for Animal Health; diseases on this list are called _____.

4. Name five reasons why Florida is susceptible to foreign animal disease introduction.
   1._____
   2._____
   3._____
   4._____
   5._____

5. Foot and Mouth Disease is a highly contagious disease. What is its most visible symptom? _____

6. Heartwater is primarily carried by _____.

7. Name one form of African Horse Sickness. _____

8. Venezuelan Equine Encephalomyelitis is similar to _____ and _____.

9. List three practices that are examples of effective biosecurity to prevent and control foreign animal diseases.
   _____
   _____
   _____

Foreign Animal Disease Recognition Participant Post-Test

This pre-test is intended to gauge the level of knowledge that you have after participating in the *Foreign Animal Disease Recognition* training. Please answer all the following questions to the best of your ability.

1. A _____ _____ _____ is an exotic, important transmissible livestock or poultry disease believed to be absent from the United States that has potential to cause significant health or economic impact should it be introduced.

2. Name two practical consequences of a disease introduction.
   _____
   _____

3. A disease list is maintained by the World Organisation for Animal Health; diseases on this list are called _____.

4. Name five reasons why Florida is susceptible to foreign animal disease introduction.
   1._____
   2._____
   3._____
   4._____
   5._____

5. Foot and Mouth Disease is a highly contagious disease. What is its most visible symptom? _____

6. Heartwater is primarily carried by _____.

7. Name one form of African Horse Sickness. _____

8. Venezuelan Equine Encephalomyelitis is similar to _____ and _____.

9. List three practices that are examples of effective biosecurity to prevent and control foreign animal diseases.
   _____
   _____
   _____

Answer Key to *Foreign Animal Disease Recognition* Pre- and Post-Tests

1. A **foreign animal disease** is an exotic, important transmissible livestock or poultry disease believed to be absent from the United States that has potential to cause significant health or economic impact should it be introduced.

2. Name two practical consequences of a disease introduction. **Answers will vary: Potential to devastate livestock/poultry populations through high morbidity and/or mortality; Potential for import/export bans; Substantial money spent for eradication and/or containment; or any others that qualify.**

3. A disease list is maintained by the World Organisation for Animal Health; diseases on this list are called **reportable**.

4. Name five reasons why Florida is susceptible to foreign animal disease introduction. **Answers will vary: Geographic location; Climate; Numerous ports of entry; Legal/Illegal importation of animals for trade; International travel of people/pets; Wildlife migration; Animal products; Bioterrorism; or any others that qualify.**

5. Foot and Mouth Disease is a highly contagious disease, What is its most visible symptom? **Vesicles or blisters on tongues, nostrils and between hooves on afflicted animals**

6. Heartwater is primarily carried by **ticks.**

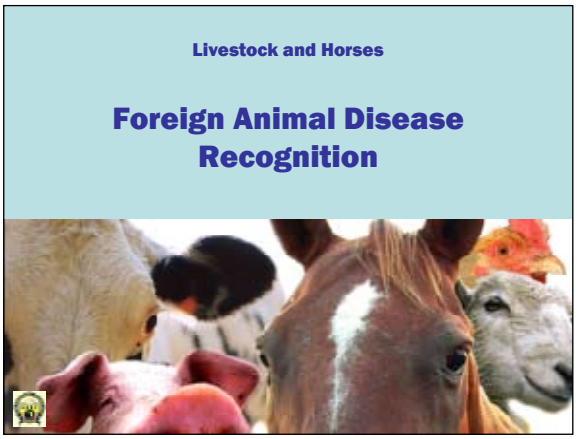
7. Name one form of African Horse Sickness. **Answers will vary: Sub clinical form; Sub acute or cardiac form; Acute respiratory form; Mixed form (cardiac and respiratory); Nervous form.**

8. Venezuelan Equine Encephalomyelitis is similar to **EEE** and **WEE**. [Note: Participants may write out Eastern Equine Encephalomyelitis (EEE) or Western Equine Encephalomyelitis (WEE).]

9. List three practices that are examples of effective biosecurity to prevent and control foreign animal diseases. **Answers will vary: Insect/rodent/parasite control; Vaccination schedule; Quarantine new animals; Limit contact between different species of animal; Limit contact between animals and wildlife; or any others that qualify.**

PowerPoint Slides

Slides 1-6



Foreign Animal Disease Recognition

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The authors wish to express their appreciation to the various agencies and individuals that have supplied images for this presentation.

Learning Objectives

- Define foreign animal disease
- Explain how foreign animal diseases (FADs) are introduced
- Explain consequences of FAD introduction
- Name and provide details of nine specific FADs
- Describe the difficulty in diagnosing foreign animal diseases and how diagnosis is confirmed
- Explain how to prevent disease spread and introduction
- Identify key resources that participants can easily access for more information

What is a FAD?

A foreign animal disease, or FAD, is:

- An exotic, important, transmissible livestock or poultry disease
- Believed to be absent from the United States and its territories
- Has potential to cause significant health or economic impact, should it be introduced

OIE List of Reportable Diseases

- The World Organization for Animal Health, or OIE*, maintains a list a reportable diseases
- Diseases listed by OIE are considered the greatest threats to animals and livestock worldwide
- More information on these diseases is available on the OIE Wb site <www.oie.int>

*The organization was previously called Office International des Epizooties.

PowerPoint Slides

Slides 7-12

What is reportable?

- Transmissible diseases with potential for very serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequence and that are of major importance in the international trade of animals and animal products.
- Reports are submitted to the OIE as often as necessary to comply with the International Animal Health Code. Reports are submitted by national delegate. In the US, this is USDA-APHIS International Services.
- During outbreaks, several reports can be filed each day.

State Agricultural Response Team 07

Multiple Species Diseases

- Anthrax
- Aujeszky's disease
- Bluetongue
- Brucellosis (*Brucella abortus*)
- Brucellosis (*Brucella melitensis*)
- Brucellosis (*Brucella suis*)
- Crimean Congo hemorrhagic fever
- Echinococcosis/hydatidosis
- Foot and mouth disease
- Heartwater
- Japanese encephalitis
- New world screwworm (*Cochliomyia hominivorax*)
- Old world screwworm (*Chrysomya bezziana*)
- Paratuberculosis
- Q fever
- Rabies
- Rift Valley fever
- Rinderpest
- Trichinellosis
- Tularemia
- Vesicular stomatitis
- West Nile fever

State Agricultural Response Team 08

Some Reportable Mammalian Diseases

Cattle diseases
- Bovine anaplasmosis
- Bovine babesiosis
- Bovine genital campylobacteriosis
- Bovine spongiform encephalopathy

Equine diseases
- African horse sickness
- Contagious equine metritis
- Dourine
- Equine encephalomyelitis (Eastern and Western)

Swine diseases
- African swine fever
- Classical swine fever
- Nipah virus encephalitis

Sheep and goat diseases
- Caprine arthritis/encephalitis
- Contagious agalactia
- Contagious caprine pleuropneumonia

Lagomorph diseases
- Myxomatosis
- Rabbit haemorrhagic disease

State Agricultural Response Team 09

Some Reportable *Non*-Mammalian Diseases

Bird diseases
- Avian chlamydiosis
- Avina infectious bronchitis
- Avian infectious laryngotracheitis
- Avian mycoplasmosis
- Duck virus hepatitis

Bee diseases
- Acarapisosis of honey bees
- American foulbrood of honey bees
- Small hive beetle infestation
- Varroosis of honey bees

Fish diseases
- Epizootic haemotpoietic necrosis
- Spring viremia of carp
- Viral haemorrhagic septicemia

Mollusc diseases
- *Bonamia ostreae*
- *Martellia refringens*
- *Mikrocytos mackini*

Crustacean diseases
- Taura syndrome
- White spot disease

State Agricultural Response Team 10

Consequences of Introduction

- Could devastate livestock or poultry populations through high morbidity or mortality
- Other countries ban import of animals and related animal products to protect their agriculture industry
- Millions, possibly billions, of dollars spent to control or eradicate the disease
  - 2002–2003 Newcastle Disease outbreak in CA, NV, TX and AZ
    - 932 farms identified as infected
    - Taxpayer cost $168-million for eradication
- Spread of disease into a susceptible wildlife population could complicate or prevent disease eradication

State Agricultural Response Team 11

How are FADs introduced?

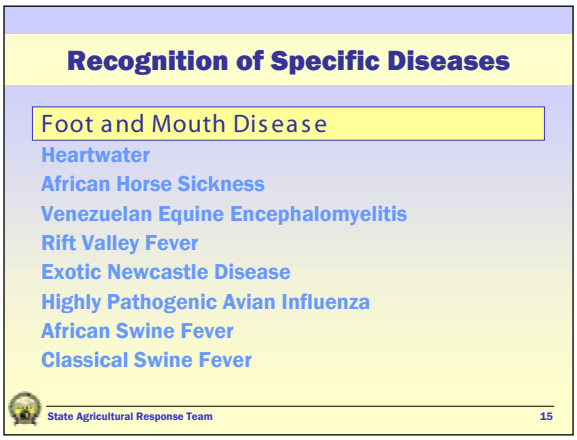
Florida's vast and diverse agricultural system is susceptible to many FADs due to:

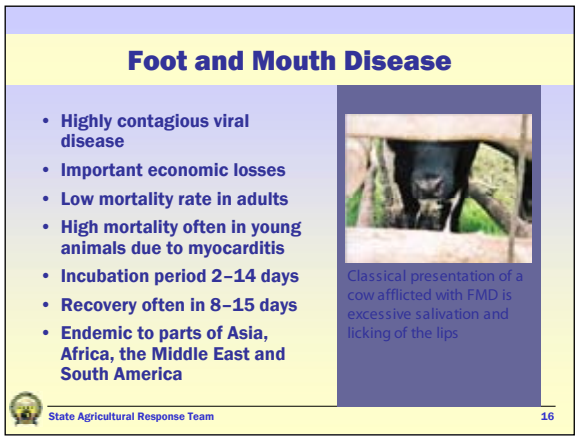
- Geographical location
- Climate
- Numerous ports of entry
- Legal importation of animals for trade
- Smuggling of animals
- International travel by people
- International travel by pets
- Wildlife movement and migration
- Animal products
- Bioterrorism or other malicious introduction

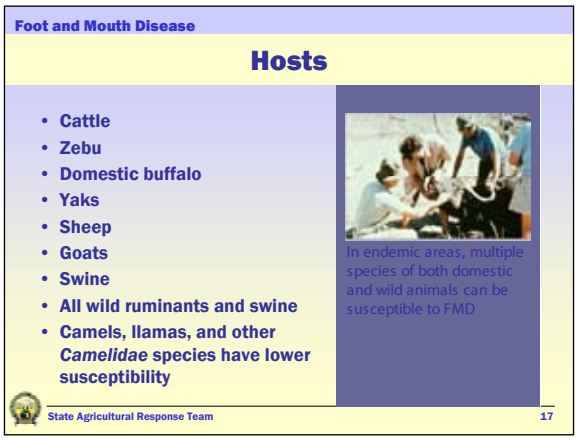
State Agricultural Response Team 12

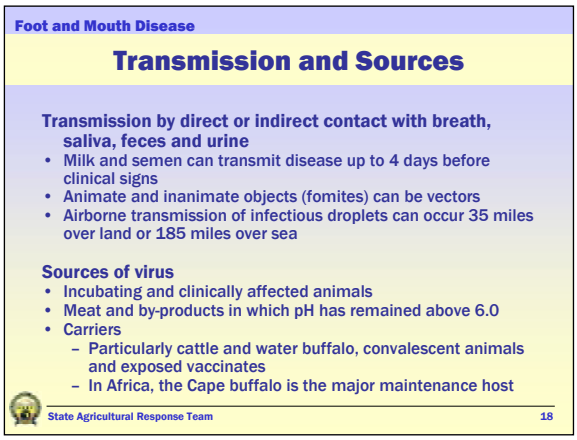
PowerPoint Slides

Slides 13-18









PowerPoint Slides

Slides 19-24

Foot and Mouth Disease

On-Farm Disease Recognition

Cattle

- High temperature
- Lack of appetite
- Shivering
- Reduced milk production for 2–3 days
- Smacking of the lips
- Teeth grinding
- Drooling
- Lameness
- Stomping or kicking
- Vesicles (blisters) in mouth and nose, between hooves, at coronary band – Rupture typically after 24 hours

State Agricultural Response Team 19

Foot and Mouth Disease

Recognizing FMD in Cattle

Ruptured vesicle covers large portion of cow tongue

This cow has visible blister ruptures on the nose and signs of drooling

Over time, healing of ruptured vesicles is obvious

State Agricultural Response Team 20

Foot and Mouth Disease

Recognizing FMD in Cattle

A new vesicle that has yet to rupture; about 1-2 days old

Vesicles and erosions can occur on the mammary glands resulting in lowered milk production and nursing problems

Erosion left after vesicle ruptures disrupts foot health; leads to lameness

State Agricultural Response Team 21

Foot and Mouth Disease

Recognizing FMD in Sheep and Goats

- Vesicles less pronounced, easier to miss
  - On dental pad and feet in sheep
- Agalactia in milking sheep and goats
- Death in young stock

Vesicles in small ruminants are often less severe

This sheep has a large erosion on the dental pad

State Agricultural Response Team 22

Foot and Mouth Disease

Recognizing FMD in Swine

- Swine housed on concrete can develop severe foot vesicles as a result of FMD
- Frequently see high mortality in piglets

Early blisters hard to notice; vesicles have not ruptured

Couple days later vesicles become more obvious

Vesicles at healing stage at or over one week old

Lameness resulting from interdigital vesicles

State Agricultural Response Team 23

Foot and Mouth Disease *in Cattle*

Diseases with Similar Symptoms

- Mucosal disease
- Infectious bovine rhinotracheitis
- Bluetongue
- Bovine mammillitis
- Bovine papular stomatitis
- Bovine viral diarrhea

State Agricultural Response Team 24

PowerPoint Slides

Slides 25-30

Recognition of Specific Diseases

Foot and Mouth Disease
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Venezuelan Equine Encephalomyelitis
Rift Valley Fever
Exotic Newcastle Disease
Highly Pathogenic Avian Influenza
African Swine Fever
Classical Swine Fever

Heartwater

- Also known as Cowdriosis
- Rickettsial disease of ruminants
- Caused by a bacteria, *Ehrlichia ruminantium (formerly Cowdria ruminantium)*
- Occurs in nearly all sub-Saharan African countries, Madagascar and some islands in the Caribbean
- Concern for Florida exists because
  - Native tick vectors
  - Migratory bird paths between Florida and Caribbean
  - Indigenous and exotic reptiles can be reservoir hosts
  - Large, susceptible deer population

On-Farm Disease Recognition

Primary vectors: *Amblyomma* ticks
- Larvae and nymphs pick up *E. ruminantium* while feeding
- Adults transmit disease to susceptible animals

Hosts
- Domestic cattle, sheep and goats: *Bos indicus* breeds typically have less severe disease than *Bos taurus* breeds
- Wild ruminants like eland, springbok, blesbock and black wildebeest

Other wild animals act as vector hosts and disease carriers, e.g., helmeted guinea fowl, leopard tortoise, scrub hare

Ticks of varying sizes and at varying stages within their life cycles play an important role in the transmission of Heartwater and other diseases

On-Farm Disease Recognition

- Body temperature suddenly rises to more than 106˚F within 1-2 days, fluctuates, then drops before death
- Lack of appetite
- Listlessness
- Respiratory distress
- Diarrhea common in cattle
  - Not common in small ruminants
- Subacute Heartwater with less pronounced signs, and peracute Heartwater with sudden death, can also occur
  - Depends on ruminant breed and *Ehrlichia* strain

Signs of Nervous System Impairment

- Walk in circles
- Make sucking movements
- Stand rigidly with tremors of superficial muscles
- Cattle may push head against wall, act aggressive or anxious
- Animal falls to ground, pedals, exhibits opisthotonos (arching), nystagmus (eye movements), and chewing movements
  - Usually die during or after this nervous attack

Nervous signs start with aggression and mania

Cattle die quickly once they fall; only option is euthanasia

Diseases with Similar Symptoms

- Rabies
- Bacterial meningitis and encephalitis
- Chlamydiosis
- Toxic plants
- Mycotoxin exposure
- Heavy metal toxicity
- Pulpy kidney disease and Bluetongue in sheep

PowerPoint Slides

Slides 31-36

Recognition of Specific Diseases

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African Horse Sickness

Mortality rates
- Horses 70–95%
- Mules ~50%
- Donkeys ~10%

Usual hosts are horses, mules, donkeys and zebra
- Occasionally elephants, camels and dogs (after eating infected blood or horsemeat) may become hosts

Zebra believed to be reservoir host

Incubation period
- Usually 7–14 days, but can be as short as 2 days

African Horse Sickness

Transmission and Sources

Not directly contagious

Requires a biological vector
- Midges and mosquitoes
  - *Culicoides*, *Culex*, *Anopheles* and *Aedes* spp.
- Ticks (occasionally)
  - *Hyalomma* and *Rhipicephalus* spp.

Virus sources
- Viscera and blood of infected horses

Viremia (virus in blood stream)
- Horses: up to 18 days, often 4–8 days
- Zebra and donkeys: up to 28 days

Wildlife often host or carry viral diseases; this often makes eradication very difficult

Midges (*Culicoides sp.*) are efficient vectors of AHS

African Horse Sickness

On-Farm Disease Recognition

Subclinical form
- Fever (104–104.9°F)
- General malaise for 1–2 days

Subacute or cardiac form
- Fever (102–105.8°F)
- Swelling of eyelids and above, facial tissues, neck, thorax, brisket and/or shoulders
- Death usually within one week

Acute respiratory form
- Fever (104–105.8°F)
- Difficulty breathing (dyspnea)
- Spasmodic coughing
- Dilated nostrils with frothy fluid oozing out
- Redness of conjunctiva
- Death within one week

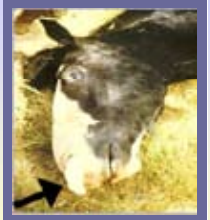
Swollen eyelids and area above eye (supraorbital fossa)

African Horse Sickness

On-Farm Disease Recognition

Mixed form (cardiac and respiratory) occurs frequently
- Pulmonary signs of a mild nature that do not progress
- Edematous swellings and effusions
- Death from cardiac failure usually in one week

Nervous form is rare



Severe case with collapse and frothy discharge from nose; indicates pulmonary failure due to fluid buildup

African Horse Sickness

Diseases with Similar Symptoms

- Anthrax
- Equine infectious anemia
- Equine viral arteritis
- Trypanosomosis
- Equine encephalosis
- Piroplasmosis
- Purpura hemorrhagica

PowerPoint Slides

Slides 37-42

Recognition of Specific Diseases

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Venezuelan Equine Encephalomyelitis

- Mosquito-borne virus
- Similar to Eastern and Western Equine Encephalomyelitis (EEE and WEE)
  - Similar clinical signs
  - Ultimately fatal in many cases
- Endemic in Central and northern South America
- Last reported U.S. outbreak in 1971
  - Lower virulence strains endemic to southern Florida

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Venezuelan Equine Encephalomyelitis

Hosts and Sources

Hosts
- Rodents, birds, humans and horses (VEE, EEE, WEE can infect all)
- Bats, reptiles, and amphibians (EEE)
- Bats and marsupials (VEE)
- Humans are dead-end hosts for VEE, EEE, WEE
- Cattle, swine and dogs can be infected, often do not show signs of illness and do not spread the disease

Virus sources
- Blood of VEE infected horses
- Rodent-mosquito infection cycle
- Bird-mosquito infection cycle for EEE and WEE

Incubation period
- VEE: 2–6 days
- EEE and WEE: 5–15 days

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Venezuelan Equine Encephalomyelitis

Transmission and Subtypes

Transmission
- VEE virus transmitted by mosquitoes that had blood meal from animal with sufficient blood levels of virus (viremia)
  - Subsequent feeding on animals transmits virus via mosquito saliva

Subtypes
- Endemic
  - Disease endemic to a specific area
  - Associated with rodent-mosquito transmission cycle
  - Can cause human illness, but not affect equine health
- Epidemic
  - Spread rapidly through large populations
  - Highly pathogenic to humans and horses
  - Horses are primary reservoir (not true for EEE and WEE)

State Agricultural Response Team 40

Venezuelan Equine Encephalomyelitis

On-Farm Disease Recognition

- Mild, vague signs of fever, lack of appetite, depression
- Increased or decreased response to external stimuli
- Unusual behavior
- Appear blind and ataxic, or walk in small circles with progressive lose of motor control
- Nervous signs may progress until collapse with violent and uncontrolled movements of limbs, head, mouth and eyes
- Death without preceding signs is possible
- Humans typically have headaches, fever and other flu-like symptoms

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Venezuelan Equine Encephalomyelitis

Diseases with Similar Symptoms

- West Nile Virus
- Eastern Equine Encephalomyelitis
- Western Equine Encephalomyelitis (and related viruses)
- Equine Herpes Virus 1 Encephalomyelitis
- African Horse Sickness
- Rabies
- Toxins
- Botulism
- Trauma

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PowerPoint Slides

Slides 43-48

Recognition of Specific Diseases

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Rift Valley Fever

- Acute hepatic and hemorrhagic disease
- Caused by mosquito-borne virus
- Affects domestic ruminants and humans
- Very high mortality rate in young animals
- High abortion rate in ruminants
- Hosts
  - Cattle, sheep, goats
  - Dromedaries
  - Several rodents
  - Wild ruminants, buffaloes, antelopes, wildebeest, etc.
  - Humans very susceptible
  - African monkeys and domestic carnivores present a transitory viremia

Rift Valley Fever

Transmission and Sources

- Mosquitoes of many genera are effective biological vectors
  - *Aedes*, *Anopheles*, *Culex*, *Eretmapodites*, *Mansonia*, etc.
  - *Aedes* mosquitoes are reservoir hosts
- Direct contamination can occur in humans when handling infected animals and meat
- Incubation period ranges from 1–6 days
- Recognized exclusively in African countries; enhanced by high rainfall and dense populations of vector mosquitoes
- Sources of virus...

For animals: Wild fauna and vectors

For human: Nasal discharge
Blood and vaginal secretions after abortion in animals
Mosquitoes
Infected meat
Possibly aerosols and consumption of raw milk

Rift Valley Fever

Disease Recognition in Animals

Adult Cattle
- Fever (104–105.8°F)
- Excessive salivation
- Lack of appetite
- Weakness
- Fetid diarrhea
- Jaundice
- Drop in milk production
- Abortion may reach 85% in the herd
- Mortality rate usually <10%
- Inapparent infections quite frequent

Calves
- Fever (104–105.8°F)
- Depression
- Jaundice
- Mortality rate 10–70%

Rift Valley Fever

Disease Recognition in Animals

Adult sheep, goats and swine
- Fever (104–105.8°F)
- Increased respiratory rate
- Bloody, mucopurulent nasal discharge
- Vomiting
- In pregnant ewes, abortion may reach 100%
- Inapparent infections in goats and swine quite frequent

Lambs have different signs from adult sheep
- Fever (104–107.6°F)
- Increased respiratory rate
- Lack of appetite
- Weakness
- Death within 36 hours after inoculation
- Mortality rate: Under 1 week of age: up to 90%
  Over 1 week of age: up to 20%

Rift Valley Fever

Disease Recognition in Animals

- Influenza-like syndrome in humans
  - Fever (100–104°F)
  - Headache
  - Muscular pain
  - Weakness
  - Nausea
  - Epigastric discomfort
  - Photophobia
- Inapparent infection quite frequent
- Recovery occurs within 4–7 days

PowerPoint Slides

Slides 49-54

Rift Valley Fever *in Sheep*

Diseases with Similar Symptoms

- Bluetongue
- Wesselsbron disease
- Enterotoxemia of sheep
- Ephemeral fever
- Brucellosis
- Vibriosis
- Trichomonosis
- Nairobi sheep disease
- Heartwater
- Ovine enzootic abortion
- Toxic plants
- Bacterial septicemias

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Recognition of Specific Diseases

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Classical Swine Fever

State Agricultural Response Team 50

Exotic Newcastle Disease

- **Highly contagious avian disease producing severe neurologic and gastrointestinal signs in poultry**
- **High mortality rates possible**
- **Not endemic to U.S., but outbreaks occur due to illegal importation of exotic birds**
- **Economic losses can be significant**
- **Mortality and morbidity rates vary among host species and with strains of virus**
- **Sources of virus**
  - Respiratory discharges, feces and other bodily secretions
  - All parts of carcass

State Agricultural Response Team 51

Exotic Newcastle Disease

Hosts and Transmission

Hosts
- Many species of birds, both domestic and wild
- Chickens are the most susceptible poultry
- Ducks and geese are the least susceptible poultry
- A carrier state may exist in psittacine and some other wild birds

Transmission by direct contact with feces and other secretions from infected birds

Virus shed during the incubation period, convalescence
- Some psittacine birds shed END virus off and on for >1 year

Virus persists in the environment
- Infection can be spread by Contaminated feed, Water, Implements, Premises, Human clothing, etc.

Incubation period is 4–6 days

State Agricultural Response Team 52

Exotic Newcastle Disease

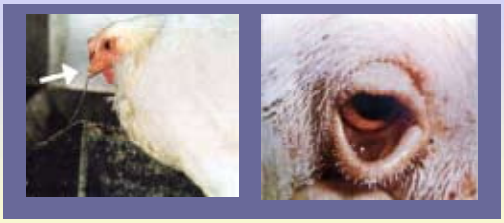
On-Farm Disease Recognition

- **Gasping and coughing are common respiratory signs**
- **Nervous system signs include**
  - Drooping wings
  - Dragging legs
  - Twisting of the head and neck
  - Circling
  - Depression
  - Lack of appetite
  - Complete paralysis
- **Partial or complete cessation of egg production with misshapen, rough or thin-shelled eggs that contain watery albumen**
- **Greenish watery diarrhea**
- **Swelling of the tissues around the eyes and in the neck**

State Agricultural Response Team 53

Exotic Newcastle Disease

On-Farm Disease Recognition



Example of profuse respiratory discharge that may be present with END in chickens

Eyelids and conjunctiva are swollen, edematous and inflamed

State Agricultural Response Team 54

PowerPoint Slides

Slides 55-60

Exotic Newcastle Disease

Diseases with Similar Symptoms

- Fowl cholera
- Avian influenza
- Laryngotracheitis
- Fowl pox (diphtheritic form)
- Psittacosis (chlamydiosis in psittacine birds)
- Mycoplasmosis
- Infectious bronchitis
- Pacheco's parrot disease (psittacine birds)
- Management errors such as deprivation of water, air, and/or feed

State Agricultural Response Team 55

Recognition of Specific Diseases

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Highly Pathogenic Avian Influenza

- Capable of producing disease in many species of animals, including humans
- Ability for genetic shift
  - Difficult to develop vaccine
- High mortality rate and extremely contagious
- Recent U.S. outbreaks have been different strains than the 2004 > Asian epidemic
  - Lower pathogenic strains may have ability to mutate and become highly pathogenic

State Agricultural Response Team 57

Highly Pathogenic Avian Influenza

Hosts and Sources

Hosts
- Assume all avian species are susceptible to infection
- Highly pathogenic avian influenza isolates obtained primarily from chickens and turkeys
- Pigs considered as "mixing vessel" for influenza viruses and should be considered when examining any influenza outbreak

Sources of virus
- Feces and respiratory secretions
- Highly pathogenic viruses may remain viable for long periods of time in infected feces, but also in tissues and water

State Agricultural Response Team 58

Highly Pathogenic Avian Influenza

Transmission and Incubation

Transmission
- Direct contact with secretions from infected birds, especially feces
- Contaminated feed, water, equipment and clothing
- Clinically normal waterfowl and sea birds may introduce the virus into flocks
- Broken, contaminated eggs may infect chicks in the incubator

Incubation period is 3–5 days

State Agricultural Response Team 59

Highly Pathogenic Avian Influenza

On-Farm Disease Recognition

- Severe depression
- Lack of appetite
- Nasal and oral cavity discharge
- 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%)

The comb and wattle on this chicken are swollen and cyanotic

State Agricultural Response Team 60

PowerPoint Slides

Slides 61-66

Highly Pathogenic Avian Influenza

Diseases with Similar Symptoms

- Acute fowl cholera
- Velogenic Newcastle disease
- Respiratory diseases, especially infectious laryngotracheitis

State Agricultural Response Team 61

Recognition of Specific Diseases

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African Swine Fever

- Endemic in most sub-Saharan Africa
  - Reported in Europe, Iberian Peninsula, and Sardinia
  - Now eradicated from four South American and Caribbean countries
- Hosts
  - Pigs
  - Wart hogs, Bush pigs (often show no symptoms)
  - American wild pigs

State Agricultural Response Team 63

African Swine Fever

Transmission and Sources

Transmission
- Contact between sick and healthy animals
- Indirect transmission
  - Example: Feeding on garbage containing infected meat
- Biological vectors
  - Soft ticks of the genus *Ornithodoros*
- Contaminated premises, vehicles, implements and/or clothes

Incubation period is 5–15 days

Sources of virus
- Blood, tissues secretions and excretion of sick and dead animals
- A carrier state exists
  - Especially in African wild swine and domestic pigs in endemic areas
- Soft ticks of genus *Ornithodoros*

Soft ticks are the main method of virus maintenance

State Agricultural Response Team 64

African Swine Fever

On-Farm Disease Recognition

Acute form (highly virulent virus)
- Fever (104.9–107.6°F)
- Reddening of the skin (visible in white pigs)
  - Tips of ears, tail, limbs and underside of chest and abdomen
- Lack of appetite
- Listlessness
- Cyanosis
- Incoordination within 24–48 hours of death
- Increased pulse and respiratory rate
- Vomiting
- Diarrhea (sometimes bloody)
- Eye discharges
- Death within a few days
- Abortions
- Survivors are carriers for life
- In domestic swine, mortality approaches 100%

State Agricultural Response Team 65

African Swine Fever

On-Farm Disease Recognition

Sub acute form (moderately virulent virus)
- Less intense symptoms
- Duration of illness is 5–30 days
- Abortion
- Mortality rate is lower
  - Varies widely
  - Between 30–70%

Chronic form
- Various signs: weight loss, irregular peaks of temperature, respiratory signs, necrosis in areas of skin, chronic skin ulcers, arthritis
- Pericarditis
- Adhesions of lungs
- Swelling over joints
- Develops over months
- Low mortality

State Agricultural Response Team 66

PowerPoint Slides

Slides 67-72

African Swine Fever

On-Farm Disease Recognition

Skin of pig severely inflamed, reddened

Depressed piglet also with signs of erythema

State Agricultural Response Team 67

African Swine Fever

Diseases with Similar Symptoms

- Classical swine fever
  - It is not possible to differentiate African and Classical Swine fever by clinical or post-mortem exam; must send samples to laboratory
- Erysipelas
- Salmonellosis
- Pasteurellosis
- All septicemic conditions

State Agricultural Response Team 68

Recognition of Specific Diseases

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Classical Swine Fever

- Occurs in much of Asia, Central and South America, and parts of Europe and Africa
  - Many countries free of the disease
- Hosts
  - Pigs and wild boar are the only natural reservoir
- Transmission
  - Direct contact between animals: Secretions, excretions, semen and/or blood
  - Spread by farm visitors, veterinarians, pig traders
  - Indirect contact through premises, implements, vehicles, clothes, instruments and needles
  - Insufficiently cooked waste food fed to pigs
  - Transplacental infection to unborn piglets

State Agricultural Response Team 70

Classical Swine Fever

Sources of Infection

Incubation period is 2–14 days

Sources of virus

- Blood, all tissues, secretions and excretions of sick and dead animals
- Congenitally infected piglets persistently viremic, may shed virus for months
- Infection routes are
  - Ingestion
  - Contact with the conjunctiva, mucous membranes, skin abrasions
  - Insemination

State Agricultural Response Team 71

Classical Swine Fever

On-Farm Disease Recognition

Acute form

- Fever (105.8° F)
- Lack of appetite
- Lethargy
- Multifocal hyperemia and hemorrhagic lesions of the skin and conjunctiva
- Cyanosis of the skin especially the extremities
- Transient constipation followed by diarrhea
- Vomiting (occasionally)
- 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%

State Agricultural Response Team 72

PowerPoint Slides

Slides 73-78

Classical Swine Fever

On-Farm Disease Recognition

Chronic form
- Dullness
- Capricious appetite
- Fever
- Diarrhea for up to one month
- Apparent recovery with eventual relapse then death

Congenital form
- Congenital 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
- Transient fever
- Lack of appetite
- Fetal death, mummification, resorption, still birth
- Birth of live, congenitally affected piglets
- Abortion (rare)

State Agricultural Response Team 73

Classical Swine Fever

Disease with Similar Symptoms

- African Swine fever
  - Indistinguishable clinicopathologically, must send samples to laboratory
- Bovine viral diarrhea virus infection
- Salmonellosis
- Erysipelas
- Acute pasteurellosis
- Other viral encephalomyelitis
- Streptococcosis
- Leptospirosis
- Coumarin poisoning

State Agricultural Response Team 74

Diagnosing, Controlling, and Reporting FADs

State Agricultural Response Team 75

A Difficult Diagnosis

- FADs often resemble many other diseases
- Attention to clinical signs and ruling out other diseases is often the first step to making an accurate diagnosis
- Some clinical signs are more suggestive of a FAD
  - Vesicles/blisters on the mouth, nose and feet of ruminants or swine
  - Sudden death in livestock
  - Abortions in otherwise healthy and well vaccinated herds

State Agricultural Response Team 76

Reporting a Suspected FAD

- Cases of suspected FADs must be reported to federal and state authorities
- Federal
  - Area Veterinarian in Charge or AVIC (See Web site)
- State
  - State Veterinarian (See Web site)
- Federal and State authorities work together to obtain appropriate samples for FAD diagnosis
  - Samples are handled with special processing and handling
- Movement of people and animals should be restricted to limit the potential spread of infection

State Agricultural Response Team 77

Controlling FADs

- Maintain good biosecurity practices on farms
- Insect, rodent and parasite control
- Up-to-date vaccination schedule
- Isolate and quarantine new animals
- Limit contact between animals of differing species
- Limit contact between livestock and wildlife

State Agricultural Response Team 78

PowerPoint Slides

Slides 79-84

Key Resources 1

- Florida Department of Community Affairs, Division of Emergency Management
  http://www.floridadisaster.org
- United States Department of Agriculture (USDA)
  http://www.usda.gov
- Florida Department of Agriculture and Consumer Services (FDACS)
  http://www.doacs.state.fl.us

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Key Resources 2

- FDACS Division of Animal Industry
  http://www.doacs.state.fl.us/ai/
- USDA Animal and Plant Health Inspection Service (APHIS)
  http://www.aphis.usda.gov
- Iowa State University Center for Food Security and Public Health
  http://www.cfsph.iastate.edu

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Key Resources 3

- USDA-APHIS fact sheets
  http:///www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html
- World Organisation for Animal Health (OIE)
  http:///www.oie.int
- APHIS's Center for Emerging Issues worksheets
  http://www.aphis.usda.gov/vs/ceah/cei/worksheets.htm

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Key Resources 4

- UF-IFAS EDIS fact sheets on veterinary and animal health topics
  http://edis.ifas.ufl.edu/DEPARTMENT_VETERINARY_MEDICINE
  http://edis.ifas.ufl.edu/TOPIC_Livestock_by_Animal
  http://edis.ifas.ufl.edu/TOPIC_Livestock_Health_by_Animal
- UF-IFAS Extension Disaster Handbook
  http://disaster.ifas.ufl.edu
- United States Animal Health Association (USAHA) home page and animal disease information links
  http://www.usaha.org/index.shtml
  http://www.usaha.org/links.shtml#disease

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Key Resources 5

- USDA-APHIS Veterinary Services publication, "Animal Health Hazards of Concern During Natural Disasters"
  http://www.aphis.usda.gov/vs/ceah/cei/EmergingAnimalHealthIssues_files/hazards.PDF
- USDA-APHIS fact sheets for various animal disease are available on the World Wide Web
  http://www.aphis.uda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html
- USDA-APHIS Area Veterinarians in Charge (AVICs) office locations
  http://www.aphis.usda.gov/vs/area_offices.htm

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Key Resources 6

- State Veterinarian list
  http://www.aphis.usda.gov/vs/sregs/official.html
- Saunders Comprehensive Veterinary Dictionary, 2nd edition by D.C. Blood and V. P. Studdert, 1999
- Recognizing and Responding to Foreign Animal Diseases, web-based training from Florida Dept. of Agriculture and Consumer Services; available for continuing education credit
  http://www.sarttraining.com/courses/FADS_Beta/

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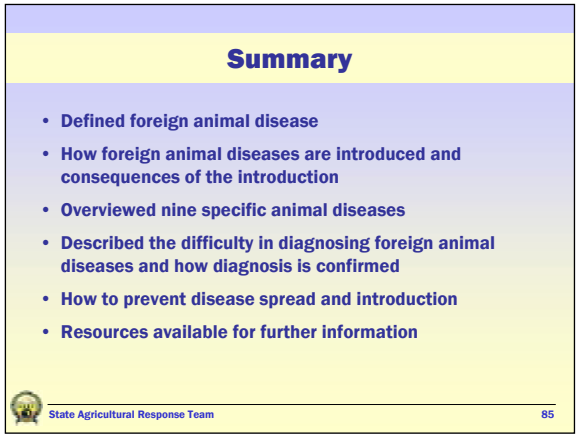
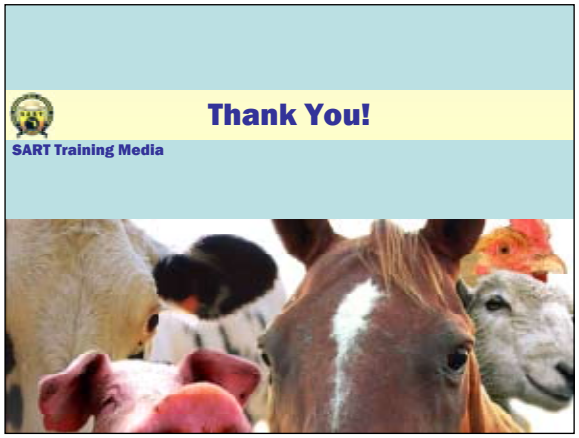
PowerPoint Slides

Slides 85-86





PowerPoint Slides — Handout Pages

The *Foreign Animal Disease Recognition* PowerPoint slides are reproduced on the following pages at reduced size with space for participant notes.

(Also included in the participant workbook for *Foreign Animal Disease Recognition*, available on the SART Web site:

<www.flsart.org>

Slides 1-3

Livestock and Horses

Foreign Animal Disease Recognition

Foreign Animal Disease Recognition

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The authors wish to express their appreciation to the various agencies and individuals that have supplied images for this presentation.

Slides 4-6

Learning Objectives

- Define foreign animal disease
- Explain how foreign animal diseases (FADs) are introduced
- Explain consequences of FAD introduction
- Name and provide details of nine specific FADs
- Describe the difficulty in diagnosing foreign animal diseases and how diagnosis is confirmed
- Explain how to prevent disease spread and introduction
- Identify key resources that participants can easily access for more information

What is a FAD?

A foreign animal disease, or FAD, is:

- An exotic, important, transmissible livestock or poultry disease
- Believed to be absent from the United States and its territories
- Has potential to cause significant health or economic impact, should it be introduced

OIE List of Reportable Diseases

- The World Organization for Animal Health, or OIE*, maintains a list a reportable diseases
- Diseases listed by OIE are considered the greatest threats to animals and livestock worldwide
- More information on these diseases is available on the OIE Wb site <www.oie.int>

* The organization was previously called Office International des Epizooties.

Slides 7-9

What is reportable?

- **Transmissible diseases with potential for very serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequence and that are of major importance in the international trade of animals and animal products.**
- **Reports are submitted to the OIE as often as necessary to comply with the International Animal Health Code. Reports are submitted by national delegate. In the US, this is USDA-APHIS International Services.**
- **During outbreaks, several reports can be filed each day.**

State Agricultural Response Team 07

Multiple Species Diseases

- Anthrax
- Aujeszky's disease
- Bluetongue
- Brucellosis (*Brucella abortus*)
- Brucellosis (*Brucella melitensis*)
- Brucellosis (*Brucella suis*)
- Crimean Congo hemorrhagic fever
- Echinococcosis/hydatidosis
- Foot and mouth disease
- Heartwater
- Japanese encephalitis
- New world screwworm (*Cochliomyia hominivorax*)
- Old world screwworm (*Chrysomya bezziana*)
- Paratuberculosis
- Q fever
- Rabies
- Rift Valley fever
- Rinderpest
- Trichinellosis
- Tularemia
- Vesicular stomatitis
- West Nile fever

State Agricultural Response Team 08

Some Reportable Mammalian Diseases

Cattle diseases
- Bovine anaplasmosis
- Bovine babesiosis
- Bovine genital campylobacteriosis
- Bovine spongiform encephalopathy

Equine diseases
- African horse sickness
- Contagious equine metritis
- Dourine
- Equine encephalomyelitis (Eastern and Western)

Swine diseases
- African swine fever
- Classical swine fever
- Nipah virus encephalitis

Sheep and goat diseases
- Caprine arthritis/encephalitis
- Contagious agalactia
- Contagious caprine pleuropneumonia

Lagomorph diseases
- Myxomatosis
- Rabbit haemorrhagic disease

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Slides 10-12

Some Reportable *Non*-Mammalian Diseases

Bird diseases
- Avian chlamydiosis
- Avina infectious bronchitis
- Avian infectious laryngotracheitis
- Avian mycoplasmosis
- Duck virus hepatitis

Bee diseases
- Acarapisosis of honey bees
- American foulbrood of honey bees
- Small hive beetle infestation
- Varroosis of honey bees

Fish diseases
- Epizootic haemotpoietic necrosis
- Spring viremia of carp
- Viral haemorrhagic septicemia

Mollusc diseases
- *Bonamia ostreae*
- *Martellia refringens*
- *Mikrocytos mackini*

Crustacean diseases
- Taura syndrome
- White spot disease

State Agricultural Response Team 10

Consequences of Introduction

- Could devastate livestock or poultry populations through high morbidity or mortality
- Other countries ban import of animals and related animal products to protect their agriculture industry
- Millions, possibly billions, of dollars spent to control or eradicate the disease
  - 2002–2003 Newcastle Disease outbreak in CA, NV, TX and AZ
    - 932 farms identified as infected
    - Taxpayer cost $168-million for eradication
- Spread of disease into a susceptible wildlife population could complicate or prevent disease eradication

State Agricultural Response Team 11

How are FADs introduced?

Florida's vast and diverse agricultural system is susceptible to many FADs due to:

- Geographical location
- Climate
- Numerous ports of entry
- Legal importation of animals for trade
- Smuggling of animals
- International travel by people
- International travel by pets
- Wildlife movement and migration
- Animal products
- Bioterrorism or other malicious introduction

State Agricultural Response Team 12

Slides 13-15


Current Issues
Exotic reptiles such as this tortoise may harbor vectors of a FAD or be carriers of a FAD themselves
For 20 years, many outbreaks of Newcastle disease have been caused by psittacine birds illegally imported into the U.S.
Orlando International Airport saw over 26 million passengers in 2002, including 1.7 million internationals
State Agricultural Response Team
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Current Issues
The migratory flight path of these cattle egrets is often directly through Florida
Dogs can also carry ticks or other parasites that could introduce a FAD when they travel with their owners
People can intentionally release diseases or agents of disease
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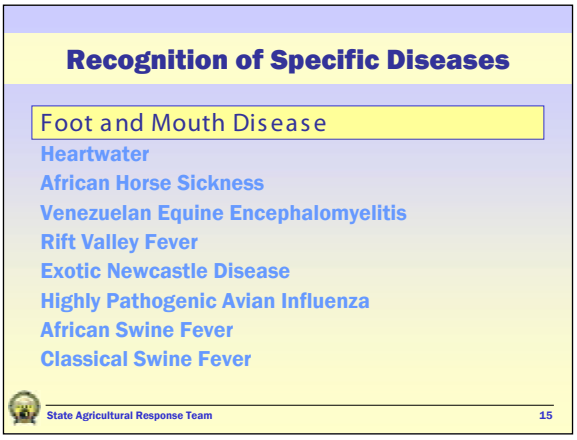
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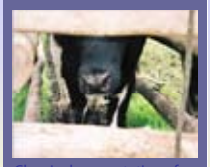
Slides 16-18

Foot and Mouth Disease

- Highly contagious viral disease
- Important economic losses
- Low mortality rate in adults
- High mortality often in young animals due to myocarditis
- Incubation period 2–14 days
- Recovery often in 8–15 days
- Endemic to parts of Asia, Africa, the Middle East and South America



Classical presentation of a cow afflicted with FMD is excessive salivation and licking of the lips

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Foot and Mouth Disease

Hosts

- Cattle
- Zebu
- Domestic buffalo
- Yaks
- Sheep
- Goats
- Swine
- All wild ruminants and swine
- Camels, llamas, and other *Camelidae* species have lower susceptibility

In endemic areas, multiple species of both domestic and wild animals can be susceptible to FMD

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Foot and Mouth Disease

Transmission and Sources

Transmission by direct or indirect contact with breath, saliva, feces and urine

- Milk and semen can transmit disease up to 4 days before clinical signs
- Animate and inanimate objects (fomites) can be vectors
- Airborne transmission of infectious droplets can occur 35 miles over land or 185 miles over sea

Sources of virus

- Incubating and clinically affected animals
- Meat and by-products in which pH has remained above 6.0
- Carriers
  - Particularly cattle and water buffalo, convalescent animals and exposed vaccinates
  - In Africa, the Cape buffalo is the major maintenance host

State Agricultural Response Team 18

Slides 19-21

Foot and Mouth Disease

On-Farm Disease Recognition

Cattle

- High temperature
- Lack of appetite
- Shivering
- Reduced milk production for 2–3 days
- Smacking of the lips
- Teeth grinding
- Drooling
- Lameness
- Stomping or kicking
- Vesicles (blisters) in mouth and nose, between hooves, at coronary band – Rupture typically after 24 hours

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Foot and Mouth Disease

Recognizing FMD in Cattle

Ruptured vesicle covers large portion of cow tongue

This cow has visible blister ruptures on the nose and signs of drooling

Over time, healing of ruptured vesicles is obvious

State Agricultural Response Team 20

Foot and Mouth Disease

Recognizing FMD in Cattle

A new vesicle that has yet to rupture; about 1-2 days old

Vesicles and erosions can occur on the mammary glands resulting in lowered milk production and nursing problems

Erosion left after vesicle ruptures disrupts foot health; leads to lameness

State Agricultural Response Team 21

Slides 22-24

Foot and Mouth Disease

Recognizing FMD in Sheep and Goats

- Vesicles less pronounced, easier to miss
  - On dental pad and feet in sheep
- Agalactia in milking sheep and goats
- Death in young stock

Vesicles in small ruminants are often less severe

This sheep has a large erosion on the dental pad

Foot and Mouth Disease

Recognizing FMD in Swine

- Swine housed on concrete can develop severe foot vesicles as a result of FMD
- Frequently see high mortality in piglets

Early blisters hard to notice; vesicles have not ruptured

Couple days later vesicles become more obvious

Vesicles at healing stage at or over one week old

Lameness resulting from interdigital vesicles

Foot and Mouth Disease *in Cattle*

Diseases with Similar Symptoms

- Mucosal disease
- Infectious bovine rhinotracheitis
- Bluetongue
- Bovine mammillitis
- Bovine papular stomatitis
- Bovine viral diarrhea

Slides 25-27

Recognition of Specific Diseases

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Classical Swine Fever

Heartwater

- Also known as Cowdriosis
- Rickettsial disease of ruminants
- Caused by a bacteria, *Ehrlichia ruminantium (formerly Cowdria ruminantium)*
- Occurs in nearly all sub-Saharan African countries, Madagascar and some islands in the Caribbean
- Concern for Florida exists because
  - Native tick vectors
  - Migratory bird paths between Florida and Caribbean
  - Indigenous and exotic reptiles can be reservoir hosts
  - Large, susceptible deer population

Heartwater

On-Farm Disease Recognition

Primary vectors: *Amblyomma* ticks
- Larvae and nymphs pick up *E. ruminantium* while feeding
- Adults transmit disease to susceptible animals

Hosts
- Domestic cattle, sheep and goats: *Bos indicus* breeds typically have less severe disease than *Bos taurus* breeds
- Wild ruminants like eland, springbok, blesbock and black wildebeest

Other wild animals act as vector hosts and disease carriers, e.g., helmeted guinea fowl, leopard tortoise, scrub hare

Ticks of varying sizes and at varying stages within their life cycles play an important role in the transmission of Heartwater and other diseases

Slides 28-30

Heartwater

On-Farm Disease Recognition

- Body temperature suddenly rises to more than 106°F within 1-2 days, fluctuates, then drops before death
- Lack of appetite
- Listlessness
- Respiratory distress
- Diarrhea common in cattle
  - Not common in small ruminants
- Subacute Heartwater with less pronounced signs, and peracute Heartwater with sudden death, can also occur
  - Depends on ruminant breed and *Ehrlichia* strain

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Heartwater

Signs of Nervous System Impairment

- Walk in circles
- Make sucking movements
- Stand rigidly with tremors of superficial muscles
- Cattle may push head against wall, act aggressive or anxious
- Animal falls to ground, pedals, exhibits opisthotonos (arching), nystagmus (eye movements), and chewing movements
  - Usually die during or after this nervous attack

Nervous signs start with aggression and mania

Cattle die quickly once they fall; only option is euthanasia

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Heartwater

Diseases with Similar Symptoms

- Rabies
- Bacterial meningitis and encephalitis
- Chlamydiosis
- Toxic plants
- Mycotoxin exposure
- Heavy metal toxicity
- Pulpy kidney disease and Bluetongue in sheep

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Slides 31-33

Recognition of Specific Diseases

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African Horse Sickness

Mortality rates
- Horses 70–95%
- Mules ~50%
- Donkeys ~10%

Usual hosts are horses, mules, donkeys and zebra
- Occasionally elephants, camels and dogs (after eating infected blood or horsemeat) may become hosts

Zebra believed to be reservoir host

Incubation period
- Usually 7–14 days, but can be as short as 2 days

African Horse Sickness

Transmission and Sources

Not directly contagious

Requires a biological vector
- Midges and mosquitoes
  - *Culicoides*, *Culex*, *Anopheles* and *Aedes* spp.
- Ticks (occasionally)
  - *Hyalomma* and *Rhipicephalus* spp.

Virus sources
- Viscera and blood of infected horses

Viremia (virus in blood stream)
- Horses: up to 18 days, often 4–8 days
- Zebra and donkeys: up to 28 days

Wildlife often host or carry viral diseases; this often makes eradication very difficult

Midges (*Culicoides sp.*) are efficient vectors of AHS

Slides 34-36

African Horse Sickness

On-Farm Disease Recognition

Subclinical form
- Fever (104–104.9°F)
- General malaise for 1–2 days

Subacute or cardiac form
- Fever (102–105.8°F)
- Swelling of eyelids and above, facial tissues, neck, thorax, brisket and/or shoulders
- Death usually within one week

Acute respiratory form
- Fever (104–105.8°F)
- Difficulty breathing (dyspnea)
- Spasmodic coughing
- Dilated nostrils with frothy fluid oozing out
- Redness of conjunctiva
- Death within one week

Swollen eyelids and area above eye (supraorbital fossa)

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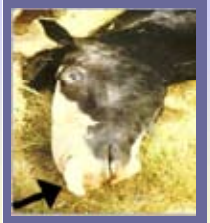
African Horse Sickness

On-Farm Disease Recognition

Mixed form (cardiac and respiratory) occurs frequently
- Pulmonary signs of a mild nature that do not progress
- Edematous swellings and effusions
- Death from cardiac failure usually in one week

Nervous form is rare



Severe case with collapse and frothy discharge from nose; indicates pulmonary failure due to fluid buildup

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African Horse Sickness

Diseases with Similar Symptoms

- Anthrax
- Equine infectious anemia
- Equine viral arteritis
- Trypanosomosis
- Equine encephalosis
- Piroplasmosis
- Purpura hemorrhagica

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Slides 37-39

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Venezuelan Equine Encephalomyelitis

- **Mosquito-borne virus**
- **Similar to Eastern and Western Equine Encephalomyelitis (EEE and WEE)**
  - Similar clinical signs
  - Ultimately fatal in many cases
- **Endemic in Central and northern South America**
- **Last reported U.S. outbreak in 1971**
  - Lower virulence strains endemic to southern Florida

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Venezuelan Equine Encephalomyelitis

Hosts and Sources

Hosts
- Rodents, birds, humans and horses (VEE, EEE, WEE can infect all)
- Bats, reptiles, and amphibians (EEE)
- Bats and marsupials (VEE)
- Humans are dead-end hosts for VEE, EEE, WEE
- Cattle, swine and dogs can be infected, often do not show signs of illness and do not spread the disease

Virus sources
- Blood of VEE infected horses
- Rodent-mosquito infection cycle
- Bird-mosquito infection cycle for EEE and WEE

Incubation period
- VEE: 2–6 days
- EEE and WEE: 5–15 days

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Slides 40-42

Venezuelan Equine Encephalomyelitis

Transmission and Subtypes

Transmission

- VEE virus transmitted by mosquitoes that had blood meal from animal with sufficient blood levels of virus (viremia)
  - Subsequent feeding on animals transmits virus via mosquito saliva

Subtypes

- Endemic
  - Disease endemic to a specific area
  - Associated with rodent-mosquito transmission cycle
  - Can cause human illness, but not affect equine health
- Epidemic
  - Spread rapidly through large populations
  - Highly pathogenic to humans and horses
  - Horses are primary reservoir (not true for EEE and WEE)

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Venezuelan Equine Encephalomyelitis

On-Farm Disease Recognition

- Mild, vague signs of fever, lack of appetite, depression
- Increased or decreased response to external stimuli
- Unusual behavior
- Appear blind and ataxic, or walk in small circles with progressive lose of motor control
- Nervous signs may progress until collapse with violent and uncontrolled movements of limbs, head, mouth and eyes
- Death without preceding signs is possible
- Humans typically have headaches, fever and other flu-like symptoms

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Venezuelan Equine Encephalomyelitis

Diseases with Similar Symptoms

- West Nile Virus
- Eastern Equine Encephalomyelitis
- Western Equine Encephalomyelitis (and related viruses)
- Equine Herpes Virus 1 Encephalomyelitis
- African Horse Sickness
- Rabies
- Toxins
- Botulism
- Trauma

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Slides 43-45

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Rift Valley Fever

- Acute hepatic and hemorrhagic disease
- Caused by mosquito-borne virus
- Affects domestic ruminants and humans
- Very high mortality rate in young animals
- High abortion rate in ruminants
- Hosts
  - Cattle, sheep, goats
  - Dromedaries
  - Several rodents
  - Wild ruminants, buffaloes, antelopes, wildebeest, etc.
  - Humans very susceptible
  - African monkeys and domestic carnivores present a transitory viremia

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Rift Valley Fever

Transmission and Sources

- Mosquitoes of many genera are effective biological vectors
  - *Aedes*, *Anopheles*, *Culex*, *Eretmapodites*, *Mansonia*, etc.
  - *Aedes* mosquitoes are reservoir hosts
- Direct contamination can occur in humans when handling infected animals and meat
- Incubation period ranges from 1–6 days
- Recognized exclusively in African countries; enhanced by high rainfall and dense populations of vector mosquitoes
- Sources of virus...

For animals: Wild fauna and vectors

For human: Nasal discharge
Blood and vaginal secretions after abortion in animals
Mosquitoes
Infected meat
Possibly aerosols and consumption of raw milk

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Slides 46-48

Rift Valley Fever

Disease Recognition in Animals

Adult Cattle
- Fever (104–105.8°F)
- Excessive salivation
- Lack of appetite
- Weakness
- Fetid diarrhea
- Jaundice
- Drop in milk production
- Abortion may reach 85% in the herd
- Mortality rate usually <10%
- Inapparent infections quite frequent

Calves
- Fever (104–105.8°F)
- Depression
- Jaundice
- Mortality rate 10–70%

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Rift Valley Fever

Disease Recognition in Animals

Adult sheep, goats and swine
- Fever (104–105.8°F)
- Increased respiratory rate
- Bloody, mucopurulent nasal discharge
- Vomiting
- In pregnant ewes, abortion may reach 100%
- Inapparent infections in goats and swine quite frequent

Lambs have different signs from adult sheep
- Fever (104–107.6°F)
- Increased respiratory rate
- Lack of appetite
- Weakness
- Death within 36 hours after inoculation
- Mortality rate: Under 1 week of age: up to 90%
  Over 1 week of age: up to 20%

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Rift Valley Fever

Disease Recognition in Animals

- **Influenza-like syndrome in humans**
  - Fever (100–104°F)
  - Headache
  - Muscular pain
  - Weakness
  - Nausea
  - Epigastric discomfort
  - Photophobia
- **Inapparent infection quite frequent**
- **Recovery occurs within 4–7 days**

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Slides 49-51

Rift Valley Fever *in Sheep*

Diseases with Similar Symptoms

- Bluetongue
- Wesselsbron disease
- Enterotoxemia of sheep
- Ephemeral fever
- Brucellosis
- Vibriosis
- Trichomonosis
- Nairobi sheep disease
- Heartwater
- Ovine enzootic abortion
- Toxic plants
- Bacterial septicemias

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Exotic Newcastle Disease

- Highly contagious avian disease producing severe neurologic and gastrointestinal signs in poultry
- High mortality rates possible
- Not endemic to U.S., but outbreaks occur due to illegal importation of exotic birds
- Economic losses can be significant
- Mortality and morbidity rates vary among host species and with strains of virus
- Sources of virus
  - Respiratory discharges, feces and other bodily secretions
  - All parts of carcass

State Agricultural Response Team 51

Slides 52-54

Exotic Newcastle Disease

Hosts and Transmission

Hosts
- Many species of birds, both domestic and wild
- Chickens are the most susceptible poultry
- Ducks and geese are the least susceptible poultry
- A carrier state may exist in psittacine and some other wild birds

Transmission by direct contact with feces and other secretions from infected birds

Virus shed during the incubation period, convalescence
- Some psittacine birds shed END virus off and on for >1 year

Virus persists in the environment
- Infection can be spread by Contaminated feed, Water, Implements, Premises, Human clothing, etc.

Incubation period is 4–6 days

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Exotic Newcastle Disease

On-Farm Disease Recognition

- **Gasping and coughing are common respiratory signs**
- **Nervous system signs include**
  - Drooping wings
  - Dragging legs
  - Twisting of the head and neck
  - Circling
  - Depression
  - Lack of appetite
  - Complete paralysis
- **Partial or complete cessation of egg production with misshapen, rough or thin-shelled eggs that contain watery albumen**
- **Greenish watery diarrhea**
- **Swelling of the tissues around the eyes and in the neck**

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Exotic Newcastle Disease

On-Farm Disease Recognition

Example of profuse respiratory discharge that may be present with END in chickens

Eyelids and conjunctiva are swollen, edematous and inflamed

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Slides 55-57

Exotic Newcastle Disease

Diseases with Similar Symptoms

- Fowl cholera
- Avian influenza
- Laryngotracheitis
- Fowl pox (diphtheritic form)
- Psittacosis (chlamydiosis in psittacine birds)
- Mycoplasmosis
- Infectious bronchitis
- Pacheco's parrot disease (psittacine birds)
- Management errors such as deprivation of water, air, and/or feed

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Highly Pathogenic Avian Influenza

- Capable of producing disease in many species of animals, including humans
- Ability for genetic shift
  - Difficult to develop vaccine
- High mortality rate and extremely contagious
- Recent U.S. outbreaks have been different strains than the 2004 > Asian epidemic
  - Lower pathogenic strains may have ability to mutate and become highly pathogenic

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Slides 58-60

Highly Pathogenic Avian Influenza

Hosts and Sources

Hosts

- Assume all avian species are susceptible to infection
- Highly pathogenic avian influenza isolates obtained primarily from chickens and turkeys
- Pigs considered as "mixing vessel" for influenza viruses and should be considered when examining any influenza outbreak

Sources of virus

- Feces and respiratory secretions
- Highly pathogenic viruses may remain viable for long periods of time in infected feces, but also in tissues and water

State Agricultural Response Team 58

Highly Pathogenic Avian Influenza

Transmission and Incubation

Transmission

- Direct contact with secretions from infected birds, especially feces
- Contaminated feed, water, equipment and clothing
- Clinically normal waterfowl and sea birds may introduce the virus into flocks
- Broken, contaminated eggs may infect chicks in the incubator

Incubation period is 3–5 days

State Agricultural Response Team 59

Highly Pathogenic Avian Influenza

On-Farm Disease Recognition

- **Severe depression**
- **Lack of appetite**
- **Nasal and oral cavity discharge**
- **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%)**

The comb and wattle on this chicken are swollen and cyanotic

State Agricultural Response Team 60

Slides 61-63

Highly Pathogenic Avian Influenza

Diseases with Similar Symptoms

- Acute fowl cholera
- Velogenic Newcastle disease
- Respiratory diseases, especially infectious laryngotracheitis

State Agricultural Response Team 61

Recognition of Specific Diseases

Foot and Mouth Disease
Heartwater
African Horse Sickness
Venezuelan Equine Encephalomyelitis
Rift Valley Fever
Exotic Newcastle Disease
Highly Pathogenic Avian Influenza
African Swine Fever
Classical Swine Fever

State Agricultural Response Team 62

African Swine Fever

- Endemic in most sub-Saharan Africa
  - Reported in Europe, Iberian Peninsula, and Sardinia
  - Now eradicated from four South American and Caribbean countries
- Hosts
  - Pigs
  - Wart hogs, Bush pigs (often show no symptoms)
  - American wild pigs

State Agricultural Response Team 63

Slides 64-66

African Swine Fever

Transmission and Sources

Transmission
- Contact between sick and healthy animals
- Indirect transmission
  - Example: Feeding on garbage containing infected meat
- Biological vectors
  - Soft ticks of the genus *Ornithodoros*
- Contaminated premises, vehicles, implements and/or clothes

Incubation period is 5–15 days

Sources of virus
- Blood, tissues secretions and excretion of sick and dead animals
- A carrier state exists
  - Especially in African wild swine and domestic pigs in endemic areas
- Soft ticks of genus *Ornithodoros*

Soft ticks are the main method of virus maintenance

State Agricultural Response Team 64

African Swine Fever

On-Farm Disease Recognition

Acute form (highly virulent virus)
- Fever (104.9–107.6°F)
- Reddening of the skin (visible in white pigs)
  - Tips of ears, tail, limbs and underside of chest and abdomen
- Lack of appetite
- Listlessness
- Cyanosis
- Incoordination within 24–48 hours of death
- Increased pulse and respiratory rate
- Vomiting
- Diarrhea (sometimes bloody)
- Eye discharges
- Death within a few days
- Abortions
- Survivors are carriers for life
- In domestic swine, mortality approaches 100%

State Agricultural Response Team 65

African Swine Fever

On-Farm Disease Recognition

Sub acute form (moderately virulent virus)
- Less intense symptoms
- Duration of illness is 5–30 days
- Abortion
- Mortality rate is lower
  - Varies widely
  - Between 30–70%

Chronic form
- Various signs: weight loss, irregular peaks of temperature, respiratory signs, necrosis in areas of skin, chronic skin ulcers, arthritis
- Pericarditis
- Adhesions of lungs
- Swelling over joints
- Develops over months
- Low mortality

State Agricultural Response Team 66

Slides 67-69

African Swine Fever

On-Farm Disease Recognition

Skin of pig severely inflamed, reddened

Depressed piglet also with signs of erythema

African Swine Fever

Diseases with Similar Symptoms

- Classical swine fever
  - It is not possible to differentiate African and Classical Swine fever by clinical or post-mortem exam; must send samples to laboratory
- Erysipelas
- Salmonellosis
- Pasteurellosis
- All septicemic conditions

Recognition of Specific Diseases

Foot and Mouth Disease
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Classical Swine Fever

Slides 70-72

Classical Swine Fever

- Occurs in much of Asia, Central and South America, and parts of Europe and Africa
  - Many countries free of the disease
- Hosts
  - Pigs and wild boar are the only natural reservoir
- Transmission
  - Direct contact between animals: Secretions, excretions, semen and/or blood
  - Spread by farm visitors, veterinarians, pig traders
  - Indirect contact through premises, implements, vehicles, clothes, instruments and needles
  - Insufficiently cooked waste food fed to pigs
  - Transplacental infection to unborn piglets

State Agricultural Response Team 70

Classical Swine Fever

Sources of Infection

Incubation period is 2–14 days

Sources of virus

- Blood, all tissues, secretions and excretions of sick and dead animals
- Congenitally infected piglets persistently viremic, may shed virus for months
- Infection routes are
  - Ingestion
  - Contact with the conjunctiva, mucous membranes, skin abrasions
  - Insemination

State Agricultural Response Team 71

Classical Swine Fever

On-Farm Disease Recognition

Acute form

- Fever (105.8° F)
- Lack of appetite
- Lethargy
- Multifocal hyperemia and hemorrhagic lesions of the skin and conjunctiva
- Cyanosis of the skin especially the extremities
- Transient constipation followed by diarrhea
- Vomiting (occasionally)
- 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%

State Agricultural Response Team 72

Slides 73-75

Classical Swine Fever

On-Farm Disease Recognition

Chronic form
- Dullness
- Capricious appetite
- Fever
- Diarrhea for up to one month
- Apparent recovery with eventual relapse then death

Congenital form
- Congenital 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
- Transient fever
- Lack of appetite
- Fetal death, mummification, resorption, still birth
- Birth of live, congenitally affected piglets
- Abortion (rare)

State Agricultural Response Team 73

Classical Swine Fever

Disease with Similar Symptoms

- African Swine fever
  - Indistinguishable clinicopathologically, must send samples to laboratory
- Bovine viral diarrhea virus infection
- Salmonellosis
- Erysipelas
- Acute pasteurellosis
- Other viral encephalomyelitis
- Streptococcosis
- Leptospirosis
- Coumarin poisoning

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Diagnosing, Controlling, and Reporting FADs

State Agricultural Response Team 75

Slides 76-78

A Difficult Diagnosis

- FADs often resemble many other diseases
- Attention to clinical signs and ruling out other diseases is often the first step to making an accurate diagnosis
- Some clinical signs are more suggestive of a FAD
  - Vesicles/blisters on the mouth, nose and feet of ruminants or swine
  - Sudden death in livestock
  - Abortions in otherwise healthy and well vaccinated herds

State Agricultural Response Team 76

Reporting a Suspected FAD

- Cases of suspected FADs must be reported to federal and state authorities
- Federal
  - Area Veterinarian in Charge or AVIC (See Web site)
- State
  - State Veterinarian (See Web site)
- Federal and State authorities work together to obtain appropriate samples for FAD diagnosis
  - Samples are handled with special processing and handling
- Movement of people and animals should be restricted to limit the potential spread of infection

State Agricultural Response Team 77

Controlling FADs

- Maintain good biosecurity practices on farms
- Insect, rodent and parasite control
- Up-to-date vaccination schedule
- Isolate and quarantine new animals
- Limit contact between animals of differing species
- Limit contact between livestock and wildlife

State Agricultural Response Team 78

Slides 79-81

Key Resources 1

- Florida Department of Community Affairs, Division of Emergency Management
  http://www.floridadisaster.org
- United States Department of Agriculture (USDA)
  http://www.usda.gov
- Florida Department of Agriculture and Consumer Services (FDACS)
  http://www.doacs.state.fl.us

Key Resources 2

- FDACS Division of Animal Industry
  http://www.doacs.state.fl.us/ai/
- USDA Animal and Plant Health Inspection Service (APHIS)
  http://www.aphis.usda.gov
- Iowa State University Center for Food Security and Public Health
  http://www.cfsph.iastate.edu

Key Resources 3

- USDA-APHIS fact sheets
  http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html
- World Organisation for Animal Health (OIE)
  http://www.oie.int
- APHIS's Center for Emerging Issues worksheets
  http://www.aphis.usda.gov/vs/ceah/cei/worksheets.htm

Slides 82-84

Key Resources 4

- **UF-IFAS EDIS fact sheets on veterinary and animal health topics**
  - http://edis.ifas.ufl.edu/DEPARTMENT_VETERINARY_MEDICINE
  - http://edis.ifas.ufl.edu/TOPIC_Livestock_by_Animal
  - http://edis.ifas.ufl.edu/TOPIC_Livestock_Health_by_Animal
- **UF-IFAS Extension Disaster Handbook**
  - http://disaster.ifas.ufl.edu
- **United States Animal Health Association (USAHA) home page and animal disease information links**
  - http://www.usaha.org/index.shtml
  - http://www.usaha.org/links.shtml#disease

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Key Resources 5

- **USDA-APHIS Veterinary Services publication, "Animal Health Hazards of Concern During Natural Disasters"**
  - http://www.aphis.usda.gov/vs/ceah/cei/EmergingAnimalHealthIssues_files/hazards.PDF
- **USDA-APHIS fact sheets for various animal disease are available on the World Wide Web**
  - http://www.aphis.uda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html
- **USDA-APHIS Area Veterinarians in Charge (AVICs) office locations**
  - http://www.aphis.usda.gov/vs/area_offices.htm

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Key Resources 6

- **State Veterinarian list**
  - http://www.aphis.usda.gov/vs/sregs/official.html
- **Saunders Comprehensive Veterinary Dictionary**, 2nd edition by D.C. Blood and V. P. Studdert, 1999
- **Recognizing and Responding to Foreign Animal Diseases**, web-based training from Florida Dept. of Agriculture and Consumer Services; available for continuing education credit
  - http://www.sarttraining.com/courses/FADS_Beta/

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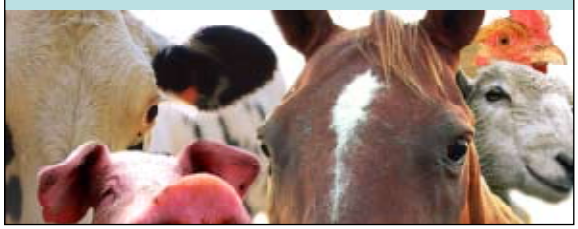
Slides 85-86

Summary

- Defined foreign animal disease
- How foreign animal diseases are introduced and consequences of the introduction
- Overviewed nine specific animal diseases
- Described the difficulty in diagnosing foreign animal diseases and how diagnosis is confirmed
- How to prevent disease spread and introduction
- Resources available for further information

Thank You!

SART Training Media



PowerPoint Slides

The *Foreign Animal Disease Recognition* PowerPoint slides are reproduced full-size on the following pages. You can use these pages as a display or photocopy them onto plastic overhead sheets for use with an overhead projector.

Color versions of these slides can be downloaded at the SART Web site:

<www.flsart.org>.


STATE AGRICULTURAL RESPONSE TEAM
S.A.R.T.
FLORIDA

Livestock and Horses

Foreign Animal Disease Recognition

Foreign Animal Disease Recognition

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Learning Objectives

- Define foreign animal disease
- Explain how foreign animal diseases (FADs) are introduced
- Explain consequences of FAD introduction
- Name and provide details of nine specific FADs
- Describe the difficulty in diagnosing foreign animal diseases and how diagnosis is confirmed
- Explain how to prevent disease spread and introduction
- Identify key resources that participants can easily access for more information

What is a FAD?

A foreign animal disease, or FAD, is:

- An exotic, important, transmissible livestock or poultry disease
- Believed to be absent from the United States and its territories
- Has potential to cause significant health or economic impact, should it be introduced

UF/IFAS Photo by Eric Zamora

UF/IFAS Photos by Tom Wright

UF/IFAS Photo by Audrey Wynne

OIE List of Reportable Diseases

- The World Organization for Animal Health, or OIE*, maintains a list a reportable diseases
- Diseases listed by OIE are considered the greatest threats to animals and livestock worldwide
- More information on these diseases is available on the OIE Wb site <www.oie.int>

* The organization was previously called Office International des Epizooties.

What is reportable?

- Transmissible diseases with potential for very serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequence and that are of major importance in the international trade of animals and animal products.
- Reports are submitted to the OIE as often as necessary to comply with the International Animal Health Code. Reports are submitted by national delegate. In the US, this is USDA-APHIS International Services.
- During outbreaks, several reports can be filed each day.

Multiple Species Diseases

- Anthrax
- Aujeszky's disease
- Bluetongue
- Brucellosis (*Brucella abortus*)
- Brucellosis (*Brucella melitensis*)
- Brucellosis (*Brucella suis*)
- Crimean Congo hemorrhagic fever
- Echinococcosis/hydatidosis
- Foot and mouth disease
- Heartwater
- Japanese encephalitis
- New world screwworm (*Cochliomyia hominivorax*)
- Old world screwworm (*Chrysomya bezziana*)
- Paratuberculosis
- Q fever
- Rabies
- Rift Valley fever
- Rinderpest
- Trichinellosis
- Tularemia
- Vesicular stomatitis
- West Nile fever

Some Reportable Mammalian Diseases

Cattle diseases
- Bovine anaplasmosis
- Bovine babesiosis
- Bovine genital campylobacteriosis
- Bovine spongiform encephalopathy

Equine diseases
- African horse sickness
- Contagious equine metritis
- Dourine
- Equine encephalomyelitis (Eastern and Western)

Swine diseases
- African swine fever
- Classical swine fever
- Nipah virus encephalitis

Sheep and goat diseases
- Caprine arthritis/encephalitis
- Contagious agalactia
- Contagious caprine pleuropneumonia

Lagomorph diseases
- Myxomatosis
- Rabbit haemorrhagic disease

Some Reportable *Non*-Mammalian Diseases

Bird diseases

- Avian chlamydiosis
- Avina infectious bronchitis
- Avian infectious laryngotracheitis
- Avian mycoplasmosis
- Duck virus hepatitis

Bee diseases

- Acarapisosis of honey bees
- American foulbrood of honey bees
- Small hive beetle infestation
- Varroosis of honey bees

Fish diseases

- Epizootic haemotpoietic necrosis
- Spring viremia of carp
- Viral haemorrhagic septicemia

Mollusc diseases

- *Bonamia ostreae*
- *Martellia refringens*
- *Mikrocytos mackini*

Crustacean diseases

- Taura syndrome
- White spot disease

Consequences of Introduction

- Could devastate livestock or poultry populations through high morbidity or mortality
- Other countries ban import of animals and related animal products to protect their agriculture industry
- Millions, possibly billions, of dollars spent to control or eradicate the disease
  - 2002–2003 Newcastle Disease outbreak in CA, NV, TX and AZ
    - 932 farms identified as infected
    - Taxpayer cost $168-million for eradication
- Spread of disease into a susceptible wildlife population could complicate or prevent disease eradication

How are FADs introduced?

Florida's vast and diverse agricultural system is susceptible to many FADs due to:

- Geographical location
- Climate
- Numerous ports of entry
- Legal importation of animals for trade
- Smuggling of animals
- International travel by people
- International travel by pets
- Wildlife movement and migration
- Animal products
- Bioterrorism or other malicious introduction

Current Issues

Exotic reptiles such as this tortoise may harbor vectors of a FAD or be carriers of a FAD themselves

For 20 years, many outbreaks of Newcastle disease have been caused by psittacine birds illegally imported into the U.S.

Orlando International Airport saw over 26 million passengers in 2002, including 1.7 million internationals

Current Issues

The migratory flight path of these cattle egrets is often directly through Florida

Dogs can also carry ticks or other parasites that could introduce a FAD when they travel with their owners

People can intentionally release diseases or agents of disease

Recognition of Specific Diseases

- Foot and Mouth Disease
- Heartwater
- African Horse Sickness
- Venezuelan Equine Encephalomyelitis
- Rift Valley Fever
- Exotic Newcastle Disease
- Highly Pathogenic Avian Influenza
- African Swine Fever
- Classical Swine Fever

Foot and Mouth Disease

- Highly contagious viral disease
- Important economic losses
- Low mortality rate in adults
- High mortality often in young animals due to myocarditis
- Incubation period 2–14 days
- Recovery often in 8–15 days
- Endemic to parts of Asia, Africa, the Middle East and South America

Classical presentation of a cow afflicted with FMD is excessive salivation and licking of the lips

Hosts

- Cattle
- Zebu
- Domestic buffalo
- Yaks
- Sheep
- Goats
- Swine
- All wild ruminants and swine
- Camels, llamas, and other *Camelidae* species have lower susceptibility

In endemic areas, multiple species of both domestic and wild animals can be susceptible to FMD

Transmission and Sources

Transmission by direct or indirect contact with breath, saliva, feces and urine

- Milk and semen can transmit disease up to 4 days before clinical signs
- Animate and inanimate objects (fomites) can be vectors
- Airborne transmission of infectious droplets can occur 35 miles over land or 185 miles over sea

Sources of virus

- Incubating and clinically affected animals
- Meat and by-products in which pH has remained above 6.0
- Carriers
  - Particularly cattle and water buffalo, convalescent animals and exposed vaccinates
  - In Africa, the Cape buffalo is the major maintenance host

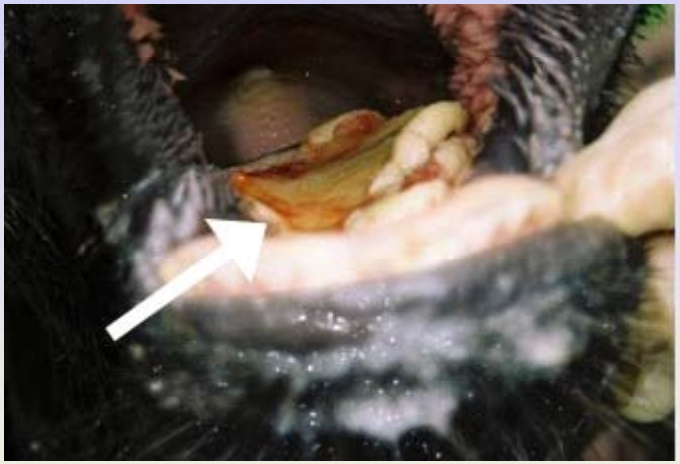
On-Farm Disease Recognition

Cattle

- High temperature
- Lack of appetite
- Shivering
- Reduced milk production for 2–3 days
- Smacking of the lips
- Teeth grinding
- Drooling
- Lameness
- Stomping or kicking
- Vesicles (blisters) in mouth and nose, between hooves, at coronary band – Rupture typically after 24 hours

Recognizing FMD in Cattle

This cow has visible blister ruptures on the nose and signs of drooling

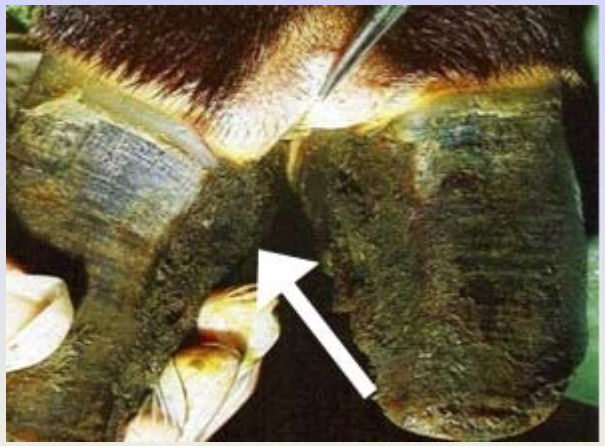


Ruptured vesicle covers large portion of cow tongue

Over time, healing of ruptured vesicles is obvious

Recognizing FMD in Cattle

A new vesicle that has yet to rupture; about 1-2 days old



Vesicles and erosions can occur on the mammary glands resulting in lowered milk production and nursing problems

Erosion left after vesicle ruptures disrupts foot health; leads to lameness

Recognizing FMD in Sheep and Goats

- Vesicles less pronounced, easier to miss
  - On dental pad and feet in sheep
- Agalactia in milking sheep and goats
- Death in young stock

Vesicles in small ruminants are often less severe

This sheep has a large erosion on the dental pad

Recognizing FMD in Swine

- Swine housed on concrete can develop severe foot vesicles as a result of FMD
- Frequently see high mortality in piglets

Early blisters hard to notice; vesicles have not ruptured

Couple days later vesicles become more obvious

Vesicles at healing stage at or over one week old

Lameness resulting from interdigital vesicles

Diseases with Similar Symptoms

- Mucosal disease
- Infectious bovine rhinotracheitis
- Bluetongue
- Bovine mammillitis
- Bovine papular stomatitis
- Bovine viral diarrhea

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

African Horse Sickness

Venezuelan Equine Encephalomyelitis

Rift Valley Fever

Exotic Newcastle Disease

Highly Pathogenic Avian Influenza

African Swine Fever

Classical Swine Fever

Heartwater

- Also known as Cowdriosis
- Rickettsial disease of ruminants
- Caused by a bacteria, *Ehrlichia ruminantium (formerly Cowdria ruminantium)*
- Occurs in nearly all sub-Saharan African countries, Madagascar and some islands in the Caribbean
- Concern for Florida exists because
  - Native tick vectors
  - Migratory bird paths between Florida and Caribbean
  - Indigenous and exotic reptiles can be reservoir hosts
  - Large, susceptible deer population

On-Farm Disease Recognition

Primary vectors: *Amblyomma* ticks

- Larvae and nymphs pick up *E. ruminantium* while feeding
- Adults transmit disease to susceptible animals

Hosts

- Domestic cattle, sheep and goats: *Bos indicus* breeds typically have less severe disease than *Bos taurus* breeds
- Wild ruminants like eland, springbok, blesbock and black wildebeest

Other wild animals act as vector hosts and disease carriers, e.g., helmeted guinea fowl, leopard tortoise, scrub hare

Ticks of varying sizes and at varying stages within their life cycles play an important role in the transmission of Heartwater and other diseases

On-Farm Disease Recognition

- Body temperature suddenly rises to more than 106°F within 1-2 days, fluctuates, then drops before death
- Lack of appetite
- Listlessness
- Respiratory distress
- Diarrhea common in cattle
  - Not common in small ruminants
- Subacute Heartwater with less pronounced signs, and peracute Heartwater with sudden death, can also occur
  - Depends on ruminant breed and *Ehrlichia* strain

Signs of Nervous System Impairment

- Walk in circles
- Make sucking movements
- Stand rigidly with tremors of superficial muscles
- Cattle may push head against wall, act aggressive or anxious
- Animal falls to ground, pedals, exhibits opisthotonos (arching), nystagmus (eye movements), and chewing movements
  - Usually die during or after this nervous attack

Nervous signs start with aggression and mania

Cattle die quickly once they fall; only option is euthanasia

Diseases with Similar Symptoms

- Rabies
- Bacterial meningitis and encephalitis
- Chlamydiosis
- Toxic plants
- Mycotoxin exposure
- Heavy metal toxicity
- Pulpy kidney disease and Bluetongue in sheep

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

African Horse Sickness

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African Horse Sickness

Mortality rates

- Horses 70–95%
- Mules ~50%
- Donkeys ~10%

Usual hosts are horses, mules, donkeys and zebra

- Occasionally elephants, camels and dogs (after eating infected blood or horsemeat) may become hosts

Zebra believed to be reservoir host

Incubation period

- Usually 7–14 days, but can be as short as 2 days

Transmission and Sources

Not directly contagious

Requires a biological vector

- Midges and mosquitoes
  - *Culicoides*, *Culex*, *Anopheles* and *Aedes* spp.
- Ticks (occasionally)
  - *Hyalomma* and *Rhipicephalus* spp.

Virus sources

- Viscera and blood of infected horses

Viremia (virus in blood stream)

- Horses: up to 18 days, often 4–8 days
- Zebra and donkeys: up to 28 days

Wildlife often host or carry viral diseases; this often makes eradication very difficult

Midges (*Culicoides sp.*) are efficient vectors of AHS

On-Farm Disease Recognition

Subclinical form
- Fever (104–104.9°F)
- General malaise for 1–2 days

Subacute or cardiac form
- Fever (102–105.8°F)
- Swelling of eyelids and above, facial tissues, neck, thorax, brisket and/or shoulders
- Death usually within one week

Acute respiratory form
- Fever (104–105.8°F)
- Difficulty breathing (dyspnea)
- Spasmodic coughing
- Dilated nostrils with frothy fluid oozing out
- Redness of conjunctiva
- Death within one week

Swollen eyelids and area above eye (supraorbital fossa)

On-Farm Disease Recognition

Mixed form (cardiac and respiratory) occurs frequently

- Pulmonary signs of a mild nature that do not progress
- Edematous swellings and effusions
- Death from cardiac failure usually in one week

Nervous form is rare

Severe case with collapse and frothy discharge from nose; indicates pulmonary failure due to fluid buildup

Diseases with Similar Symptoms

- Anthrax
- Equine infectious anemia
- Equine viral arteritis
- Trypanosomosis
- Equine encephalosis
- Piroplasmosis
- Purpura hemorrhagica

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

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Venezuelan Equine Encephalomyelitis

- **Mosquito-borne virus**
- **Similar to Eastern and Western Equine Encephalomyelitis (EEE and WEE)**
  - Similar clinical signs
  - Ultimately fatal in many cases
- **Endemic in Central and northern South America**
- **Last reported U.S. outbreak in 1971**
  - Lower virulence strains endemic to southern Florida

Hosts and Sources

Hosts

- Rodents, birds, humans and horses (VEE, EEE, WEE can infect all)
- Bats, reptiles, and amphibians (EEE)
- Bats and marsupials (VEE)
- Humans are dead-end hosts for VEE, EEE, WEE
- Cattle, swine and dogs can be infected, often do not show signs of illness and do not spread the disease

Virus sources

- Blood of VEE infected horses
- Rodent-mosquito infection cycle
- Bird-mosquito infection cycle for EEE and WEE

Incubation period

- VEE: 2–6 days
- EEE and WEE: 5–15 days

Transmission and Subtypes

Transmission

- VEE virus transmitted by mosquitoes that had blood meal from animal with sufficient blood levels of virus (viremia)
  - Subsequent feeding on animals transmits virus via mosquito saliva

Subtypes

- Endemic
  - Disease endemic to a specific area
  - Associated with rodent-mosquito transmission cycle
  - Can cause human illness, but not affect equine health
- Epidemic
  - Spread rapidly through large populations
  - Highly pathogenic to humans and horses
  - Horses are primary reservoir (not true for EEE and WEE)

On-Farm Disease Recognition

- Mild, vague signs of fever, lack of appetite, depression
- Increased or decreased response to external stimuli
- Unusual behavior
- Appear blind and ataxic, or walk in small circles with progressive lose of motor control
- Nervous signs may progress until collapse with violent and uncontrolled movements of limbs, head, mouth and eyes
- Death without preceding signs is possible
- Humans typically have headaches, fever and other flu-like symptoms

Diseases with Similar Symptoms

- West Nile Virus
- Eastern Equine Encephalomyelitis
- Western Equine Encephalomyelitis (and related viruses)
- Equine Herpes Virus 1 Encephalomyelitis
- African Horse Sickness
- Rabies
- Toxins
- Botulism
- Trauma

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

African Horse Sickness

Venezuelan Equine Encephalomyelitis

Rift Valley Fever

Exotic Newcastle Disease

Highly Pathogenic Avian Influenza

African Swine Fever

Classical Swine Fever

Rift Valley Fever

- Acute hepatic and hemorrhagic disease
- Caused by mosquito-borne virus
- Affects domestic ruminants and humans
- Very high mortality rate in young animals
- High abortion rate in ruminants
- Hosts
  - Cattle, sheep, goats
  - Dromedaries
  - Several rodents
  - Wild ruminants, buffaloes, antelopes, wildebeest, etc.
  - Humans very susceptible
  - African monkeys and domestic carnivores present a transitory viremia

Transmission and Sources

- **Mosquitoes of many genera are effective biological vectors**
  - *Aedes*, *Anopheles*, *Culex*, *Eretmapodites*, *Mansonia*, etc.
  - *Aedes* mosquitoes are reservoir hosts
- **Direct contamination can occur in humans when handling infected animals and meat**
- **Incubation period ranges from 1–6 days**
- **Recognized exclusively in African countries; enhanced by high rainfall and dense populations of vector mosquitoes**
- **Sources of virus…**

  For animals: Wild fauna and vectors

  For human: Nasal discharge
  Blood and vaginal secretions after abortion in animals
  Mosquitoes
  Infected meat
  Possibly aerosols and consumption of raw milk

Disease Recognition in Animals

Adult Cattle

- Fever (104–105.8°F)
- Excessive salivation
- Lack of appetite
- Weakness
- Fetid diarrhea
- Jaundice
- Drop in milk production
- Abortion may reach 85% in the herd
- Mortality rate usually <10%
- Inapparent infections quite frequent

Calves

- Fever (104–105.8°F)
- Depression
- Jaundice
- Mortality rate 10–70%

Disease Recognition in Animals

Adult sheep, goats and swine

- Fever (104–105.8°F)
- Increased respiratory rate
- Bloody, mucopurulent nasal discharge
- Vomiting
- In pregnant ewes, abortion may reach 100%
- Inapparent infections in goats and swine quite frequent

Lambs have different signs from adult sheep

- Fever (104–107.6°F)
- Increased respiratory rate
- Lack of appetite
- Weakness
- Death within 36 hours after inoculation
- Mortality rate: Under 1 week of age: up to 90%
  Over 1 week of age: up to 20%

Disease Recognition in Animals

- **Influenza-like syndrome in humans**
  - Fever (100–104°F)
  - Headache
  - Muscular pain
  - Weakness
  - Nausea
  - Epigastric discomfort
  - Photophobia
- **Inapparent infection quite frequent**
- **Recovery occurs within 4–7 days**

Diseases with Similar Symptoms

- Bluetongue
- Wesselsbron disease
- Enterotoxemia of sheep
- Ephemeral fever
- Brucellosis
- Vibriosis
- Trichomonosis
- Nairobi sheep disease
- Heartwater
- Ovine enzootic abortion
- Toxic plants
- Bacterial septicemias

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

African Horse Sickness

Venezuelan Equine Encephalomyelitis

Rift Valley Fever

Exotic Newcastle Disease

Highly Pathogenic Avian Influenza

African Swine Fever

Classical Swine Fever

Exotic Newcastle Disease

- Highly contagious avian disease producing severe neurologic and gastrointestinal signs in poultry
- High mortality rates possible
- Not endemic to U.S., but outbreaks occur due to illegal importation of exotic birds
- Economic losses can be significant
- Mortality and morbidity rates vary among host species and with strains of virus
- Sources of virus
  - Respiratory discharges, feces and other bodily secretions
  - All parts of carcass

Hosts and Transmission

Hosts

- Many species of birds, both domestic and wild
- Chickens are the most susceptible poultry
- Ducks and geese are the least susceptible poultry
- A carrier state may exist in psittacine and some other wild birds

Transmission by direct contact with feces and other secretions from infected birds

Virus shed during the incubation period, convalescence

- Some psittacine birds shed END virus off and on for >1 year

Virus persists in the environment

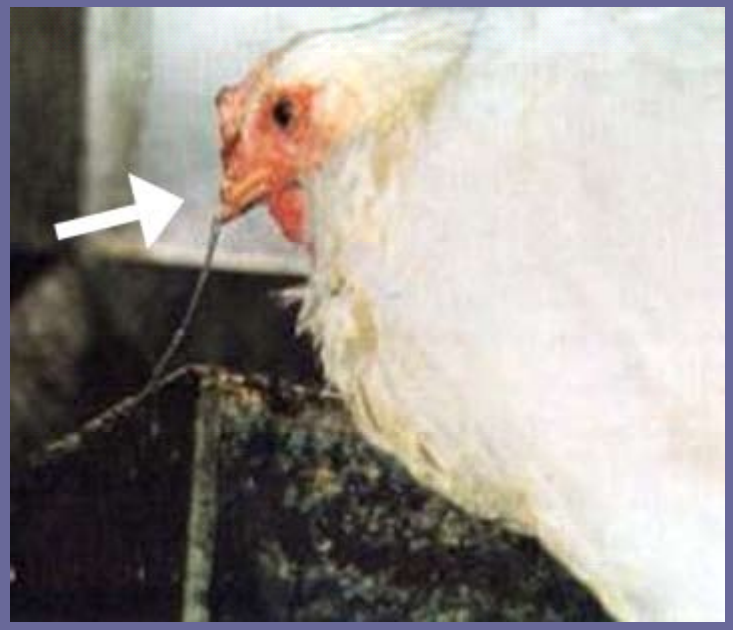
- Infection can be spread by Contaminated feed, Water, Implements, Premises, Human clothing, etc.

Incubation period is 4–6 days

On-Farm Disease Recognition

- Gasping and coughing are common respiratory signs
- Nervous system signs include
  - Drooping wings
  - Dragging legs
  - Twisting of the head and neck
  - Circling
  - Depression
  - Lack of appetite
  - Complete paralysis
- Partial or complete cessation of egg production with misshapen, rough or thin-shelled eggs that contain watery albumen
- Greenish watery diarrhea
- Swelling of the tissues around the eyes and in the neck

On-Farm Disease Recognition



Example of profuse respiratory discharge that may be present with END in chickens

Eyelids and conjunctiva are swollen, edematous and inflamed

Diseases with Similar Symptoms

- Fowl cholera
- Avian influenza
- Laryngotracheitis
- Fowl pox (diphtheritic form)
- Psittacosis (chlamydiosis in psittacine birds)
- Mycoplasmosis
- Infectious bronchitis
- Pacheco's parrot disease (psittacine birds)
- Management errors such as deprivation of water, air, and/or feed

Recognition of Specific Diseases

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African Swine Fever

Classical Swine Fever

Highly Pathogenic Avian Influenza

- **Capable of producing disease in many species of animals, including humans**
- **Ability for genetic shift**
  - Difficult to develop vaccine
- **High mortality rate and extremely contagious**
- **Recent U.S. outbreaks have been different strains than the 2004 > Asian epidemic**
  - Lower pathogenic strains may have ability to mutate and become highly pathogenic

Hosts and Sources

Hosts

- Assume all avian species are susceptible to infection
- Highly pathogenic avian influenza isolates obtained primarily from chickens and turkeys
- Pigs considered as “mixing vessel” for influenza viruses and should be considered when examining any influenza outbreak

Sources of virus

- Feces and respiratory secretions
- Highly pathogenic viruses may remain viable for long periods of time in infected feces, but also in tissues and water

Transmission and Incubation

Transmission

- Direct contact with secretions from infected birds, especially feces
- Contaminated feed, water, equipment and clothing
- Clinically normal waterfowl and sea birds may introduce the virus into flocks
- Broken, contaminated eggs may infect chicks in the incubator

Incubation period is 3–5 days

On-Farm Disease Recognition

- Severe depression
- Lack of appetite
- Nasal and oral cavity discharge
- 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%)

The comb and wattle on this chicken are swollen and cyanotic

Diseases with Similar Symptoms

- Acute fowl cholera
- Velogenic Newcastle disease
- Respiratory diseases, especially infectious laryngotracheitis

Recognition of Specific Diseases

Foot and Mouth Disease

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Rift Valley Fever

Exotic Newcastle Disease

Highly Pathogenic Avian Influenza

African Swine Fever

Classical Swine Fever

African Swine Fever

- **Endemic in most sub-Saharan Africa**
  - Reported in Europe, Iberian Peninsula, and Sardinia
  - Now eradicated from four South American and Caribbean countries
- **Hosts**
  - Pigs
  - Wart hogs, Bush pigs (often show no symptoms)
  - American wild pigs

Transmission and Sources

Transmission

- Contact between sick and healthy animals
- Indirect transmission
  - Example: Feeding on garbage containing infected meat
- Biological vectors
  - Soft ticks of the genus *Ornithodoros*
- Contaminated premises, vehicles, implements and/or clothes

Incubation period is 5–15 days

Sources of virus

- Blood, tissues secretions and excretion of sick and dead animals
- A carrier state exists
  - Especially in African wild swine and domestic pigs in endemic areas
- Soft ticks of genus *Ornithodoros*

Soft ticks are the main method of virus maintenance

On-Farm Disease Recognition

Acute form (highly virulent virus)

- Fever (104.9–107.6˚F)
- Reddening of the skin (visible in white pigs)
  - Tips of ears, tail, limbs and underside of chest and abdomen
- Lack of appetite
- Listlessness
- Cyanosis
- Incoordination within 24–48 hours of death
- Increased pulse and respiratory rate
- Vomiting
- Diarrhea (sometimes bloody)
- Eye discharges
- Death within a few days
- Abortions
- Survivors are carriers for life
- In domestic swine, mortality approaches 100%

On-Farm Disease Recognition

Sub acute form (moderately virulent virus)

- Less intense symptoms
- Duration of illness is 5–30 days
- Abortion
- Mortality rate is lower
  - Varies widely
  - Between 30–70%

Chronic form

- Various signs: weight loss, irregular peaks of temperature, respiratory signs, necrosis in areas of skin, chronic skin ulcers, arthritis
- Pericarditis
- Adhesions of lungs
- Swelling over joints
- Develops over months
- Low mortality

On-Farm Disease Recognition

Skin of pig severely inflamed, reddened

Depressed piglet also with signs of erythema

Diseases with Similar Symptoms

- **Classical swine fever**
  - It is not possible to differentiate African and Classical Swine fever by clinical or post-mortem exam; must send samples to laboratory
- **Erysipelas**
- **Salmonellosis**
- **Pasteurellosis**
- **All septicemic conditions**

Recognition of Specific Diseases

Foot and Mouth Disease

Heartwater

African Horse Sickness

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Exotic Newcastle Disease

Highly Pathogenic Avian Influenza

African Swine Fever

Classical Swine Fever

Classical Swine Fever

- **Occurs in much of Asia, Central and South America, and parts of Europe and Africa**
  - Many countries free of the disease
- **Hosts**
  - Pigs and wild boar are the only natural reservoir
- **Transmission**
  - Direct contact between animals: Secretions, excretions, semen and/or blood
  - Spread by farm visitors, veterinarians, pig traders
  - Indirect contact through premises, implements, vehicles, clothes, instruments and needles
  - Insufficiently cooked waste food fed to pigs
  - Transplacental infection to unborn piglets

Sources of Infection

Incubation period is 2–14 days

Sources of virus

- Blood, all tissues, secretions and excretions of sick and dead animals
- Congenitally infected piglets persistently viremic, may shed virus for months
- Infection routes are
  - Ingestion
  - Contact with the conjunctiva, mucous membranes, skin abrasions
  - Insemination

On-Farm Disease Recognition

Acute form

- Fever (105.8° F)
- Lack of appetite
- Lethargy
- Multifocal hyperemia and hemorrhagic lesions of the skin and conjunctiva
- Cyanosis of the skin especially the extremities
- Transient constipation followed by diarrhea
- Vomiting (occasionally)
- 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%

On-Farm Disease Recognition

Chronic form
- Dullness
- Capricious appetite
- Fever
- Diarrhea for up to one month
- Apparent recovery with eventual relapse then death

Congenital form
- Congenital 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
- Transient fever
- Lack of appetite
- Fetal death, mummification, resorption, still birth
- Birth of live, congenitally affected piglets
- Abortion (rare)

Disease with Similar Symptoms

- African Swine fever
  - Indistinguishable clinicopathologically, must send samples to laboratory
- Bovine viral diarrhea virus infection
- Salmonellosis
- Erysipelas
- Acute pasteurellosis
- Other viral encephalomyelitis
- Streptococcosis
- Leptospirosis
- Coumarin poisoning

Diagnosing, Controlling, and Reporting FADs

A Difficult Diagnosis

- **FADs often resemble many other diseases**
- **Attention to clinical signs and ruling out other diseases is often the first step to making an accurate diagnosis**
- **Some clinical signs are more suggestive of a FAD**
  - Vesicles/blisters on the mouth, nose and feet of ruminants or swine
  - Sudden death in livestock
  - Abortions in otherwise healthy and well vaccinated herds

Reporting a Suspected FAD

- **Cases of suspected FADs must be reported to federal and state authorities**
- **Federal**
  - Area Veterinarian in Charge or AVIC (See Web site)
- **State**
  - State Veterinarian (See Web site)
- **Federal and State authorities work together to obtain appropriate samples for FAD diagnosis**
  - Samples are handled with special processing and handling
- **Movement of people and animals should be restricted to limit the potential spread of infection**

Controlling FADs

- Maintain good biosecurity practices on farms
- Insect, rodent and parasite control
- Up-to-date vaccination schedule
- Isolate and quarantine new animals
- Limit contact between animals of differing species
- Limit contact between livestock and wildlife

Key Resources 1

- **Florida Department of Community Affairs, Division of Emergency Management**

  http://www.floridadisaster.org

- **United States Department of Agriculture (USDA)**

  http://www.usda.gov

- **Florida Department of Agriculture and Consumer Services (FDACS)**

  http://www.doacs.state.fl.us

Key Resources 2

- **FDACS Division of Animal Industry**
  http://www.doacs.state.fl.us/ai/
- **USDA Animal and Plant Health Inspection Service (APHIS)**
  http://www.aphis.usda.gov
- **Iowa State University Center for Food Security and Public Health**
  http://www.cfsph.iastate.edu

Key Resources 3

- **USDA-APHIS fact sheets**

  http:///www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html

- **World Organisation for Animal Health (OIE)**

  http:///www.oie.int

- **APHIS's Center for Emerging Issues worksheets**

  http://www.aphis.usda.gov/vs/ceah/cei/worksheets.htm

Key Resources 4

- **UF-IFAS EDIS fact sheets on veterinary and animal health topics**

  http://edis.ifas.ufl.edu/DEPARTMENT_VETERINARY_MEDICINE

  http://edis.ifas.ufl.edu/TOPIC_Livestock_by_Animal

  http://edis.ifas.ufl.edu/TOPIC_Livestock_Health_by_Animal

- **UF-IFAS Extension Disaster Handbook**

  http://disaster.ifas.ufl.edu

- **United States Animal Health Association (USAHA) home page and animal disease information links**

  http://www.usaha.org/index.shtml

  http://www.usaha.org/links.shtml#disease

Key Resources 5

- **USDA-APHIS Veterinary Services publication, "Animal Health Hazards of Concern During Natural Disasters"**

  http://www.aphis.usda.gov/vs/ceah/cei/EmergingAnimalHealthIssues_files/hazards.PDF

- **USDA-APHIS fact sheets for various animal disease are available on the World Wide Web**

  http://www.aphis.uda.gov/lpa/pubs/fsheet_faq_notice/fsfaqnot_animalhealth.html

- **USDA-APHIS Area Veterinarians in Charge (AVICs) office locations**

  http://www.aphis.usda.gov/vs/area_offices.htm

Key Resources 6

- **State Veterinarian list**
  http://www.aphis.usda.gov/vs/sregs/official.html

- **Saunders Comprehensive Veterinary Dictionary**, 2nd edition by D.C. Blood and V. P. Studdert, 1999

- **Recognizing and Responding to Foreign Animal Diseases**, web-based training from Florida Dept. of Agriculture and Consumer Services; available for continuing education credit
  http://www.sarttraining.com/courses/FADS_Beta/

Summary

- Defined foreign animal disease
- How foreign animal diseases are introduced and consequences of the introduction
- Overviewed nine specific animal diseases
- Described the difficulty in diagnosing foreign animal diseases and how diagnosis is confirmed
- How to prevent disease spread and introduction
- Resources available for further information

Thank You!

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