


# Safeguarding American Agriculture From Foreign Animal Diseases

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In cooperation with the: 

## U.S. Agriculture Vulnerable





- *Accidental or intentional* introduction of disease agents
- *Emerging or re-emerging* diseases

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## Vulnerabilities

- High density husbandry
- Auction markets, transport of animals
- Limited immunity to foreign animal diseases
- Centralized feed supply and distribution



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## Vulnerabilities

- Poor traceability of animals
- Expanded international trade and travel
- Infectious agents are widespread in other countries
- Porous borders
- Inadequate on-farm biosecurity
- Inadequate foreign animal disease awareness

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## Overview

- Agroterrorism
- Importance of U.S. agriculture
- Impact of agroterrorism
- Agencies involved in prevention and response
- Potential agents and public health zoonotic implications
- Biosecurity and disease control

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## Terrorism

Bioterrorism	Agroterrorism	Other
Biological agents targeting humans, animals, or plants	Biological, chemical, or radiological agents targeting agriculture or its components <ul style="list-style-type: none"> <li>• Livestock</li> <li>• Food supply</li> <li>• Crops</li> <li>• Industry</li> <li>• Workers</li> </ul>	Conventional, radiological, nuclear, chemical, cyber <ul style="list-style-type: none"> <li>• Typically direct human targeting</li> </ul>

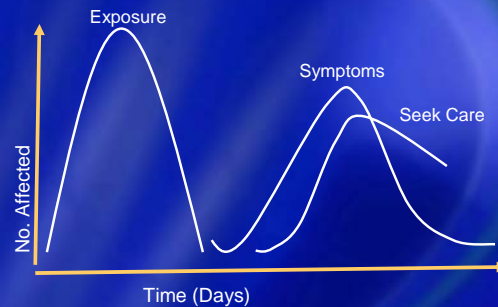
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## Characteristics of an Attack

- Attack on animals not as emotional as human targets
  - Less chance of retaliation
- Use of agent may go undetected for days, weeks
  - Difficult to trace
  - Plausible deniability
- Many of the infectious agents not zoonotic
  - Safe to work with

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## Infectious Disease Outbreak



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## Introducing an Agent

- Multiple methods of delivery
  - Accidental by tourists, products
  - Intentional
- Simultaneous introduction in multiple areas
- Real vs. hoax
  - Lack of consumer confidence

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## Clues Suggesting an Attack

- Traceback of animals yields dead-end
- No shared factor among animals
- History of the farm/facility
- Other concurrent outbreaks
- Unusual signs
- Overwhelming mortality
- Unusual season for disease

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## Historical Aspects of Agroterrorism

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## History

- WWII, Germany
  - Experimentation with Foot and Mouth Disease
- 1921, France
  - Rinderpest, late blight in potatoes
- 1940-50, Soviet Union
  - Anti-agriculture weapons
- 1941, United States
  - Examined use of Newcastle, fowl plague, FMD, hog cholera



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## The U.S. Program

- 1969-70, shut down
  - Total spent: \$726 million
- Reasons for discontinuing
  - No guarantee they work
  - Unpredictable
  - Costly
  - Aging research facilities



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## Importance of Agriculture



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## U.S. Animal Data, 2003

Animal	Number	Value
Cattle	94.9 million	~\$70.5 billion
Pigs	60 million	~\$4.5 billion
Poultry (non-broiler)	338 million	~\$1 billion
Sheep	6.1 million	~\$600 million

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## Trends in US Agriculture

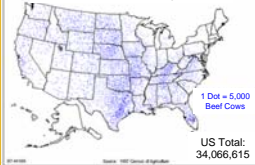
	Beginning of the Century (1900)	End of the Century (1997)
<b>Number of Farms</b>	5,739,657	1,911,859
<b>Average Farm Acreage</b>	147 acres	487 acres
<b>Livestock</b>		
Percent of Farms Raising:		
Cattle	85 %	95 %
Milk cows	79 %	6 %
Hogs & pigs	76 %	6 %
Chickens*	97 %	5 %
<b>Farm Mechanization</b>		
Percent of Farms with:		
Wheel Tractors*	4 %	89 %
Horses	79 %	20 %
Mules	26 %	2 %
<b>Government Payments</b>	- 0 -	\$5 billion
<b>Percent Population Living on Farms*</b>	29.2 %	1.8% (1990)
<b>Percent Labor Force on Farms*</b>	38.8 %	1.7 % (1990)

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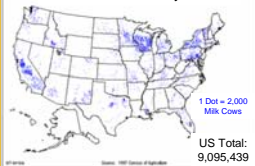
Hogs and Pigs- Inventory: 1997



Beef Cows- Inventory: 1997



Milk Cows- Inventory: 1997

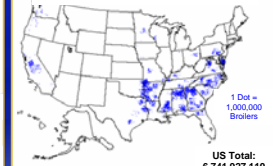


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Layers/Pullets >13 wks- Inventory: 1997



Broilers/Meat Chickens Sold: 1997



Corn for Grain or Seed: 1997



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# Impact of Foreign Animal Disease Outbreaks



## Impact

- Economic and trade disruption
- Exports are our lifeblood
  - 2003, \$56.2 billion exported in agricultural commodities
    - \$12.2 billion from animal/animal products
- Negative effect on economy, livestock/grain producers, and employment rate




## Impact

- Movement restrictions
  - Road closures, quarantined farms
- Psycho-social concerns
  - Livestock producers, veterinarians, local community members
  - Shocking public images
- Consumers alter buying habits
- Food shortages unlikely
  - Temporarily unavailable due to movement restrictions





## Impact

- Quickly felt by state/federal economy
- Loss in trade
- Other industries damaged
  - Restaurants, suppliers, tourism, zoos, hunting, etc.
- Direct costs
  - Diagnostics, surveillance, depopulation, cleaning, disinfection, indemnity, overtime




# U.S. Agencies



## U.S. Department of Agriculture (USDA)

- Animal Plant and Health Inspection Service (APHIS)
  - Veterinary Services (VS)
    - Livestock, poultry emergencies
  - Emergency Programs (EP)
    - Prepares and trains veterinarians and personnel to respond to outbreaks





## USDA-APHIS-VS

- National Veterinary Services Laboratories (NVSL)
  - Ames, IA and Plum Island, NY
  - Four labs
  - Provide diagnostic services and training
- Foreign animal disease diagnosticians
- All suspect FAD's investigated within 24 hours of notification



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## Department of Homeland Security (DHS)

- Customs and Border Protection
- 317 ports of entry into US
- Monitor for imported animal and plant material
- Over 40,000 employees working to safeguard our borders and ports



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## DHS Beagle Brigade

- 141 detector dog teams in the U.S.
  - 24 at int'l airports
  - 9 at ports of entry on land
  - 9 at int'l mail facilities
- 2002, 8 million passengers searched
  - Over 22,000 vehicles and 43,000 aircraft
- 75,000 interceptions annually



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## USDA Quarantine Stations

- Livestock and poultry
  - 4 facilities
  - 2002, imported 1.5 million cattle and 5.8 million pigs
- Personally owned birds
  - 6 facilities
- Dogs, cats, turtles, monkeys
  - CDC Division of Global Migration and Quarantine



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## Potential Agents

*Livestock Pathogens*

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### High Consequence Livestock Pathogens and Toxins


- |   |   |
|---|---|
| <p><b>USDA only agents and toxins</b></p> <ul style="list-style-type: none"> <li>African horse sickness virus</li> <li>African swine fever virus</li> <li>Alkalic virus</li> <li>Asian influenza virus (highly pathogenic)</li> <li>Blaugovirus virus (exotic)</li> <li>Bovine spongiform encephalopathy agent</li> <li>Canine parvovirus</li> <li>Classical swine fever virus</li> <li>Cornahay morbillivirus (Hemorrhagic)</li> <li>Fox and mouth disease virus</li> <li>Goat pox virus</li> <li>Japanese encephalitis virus</li> <li>Lumpy skin disease virus</li> <li>Malignant catarrhal fever virus (exotic)</li> <li>Morungo virus</li> <li>Mycobacterium avium subspecies M</li> <li>F73 M. goodii</li> <li>M. goodii (contaminated equine)</li> <li>Myxomatosis (contaminated)</li> <li>Myxomatosis (contaminated)</li> <li>Newcastle disease virus (VND)</li> <li>Pink eye (contaminated)</li> <li>Rinderpest virus</li> <li>Sleep pox virus</li> <li>Swine vesicular disease virus</li> <li>Vesicular stomatitis virus (exotic)</li> </ul> | <p><b>USDA/DHS overlap agents and toxins</b></p> <ul style="list-style-type: none"> <li>Bacillus anthracis</li> <li>Bordetella pertussis</li> <li>Bordetella pertussis producing species of Clostridium</li> <li>Brucella abortus</li> <li>Brucella melitensis</li> <li>Brucella suis</li> <li>Breidbachia ruffii</li> <li>Breidbachia ruffii</li> <li>Chlamydia abortus</li> <li>Chlamydia felis</li> <li>Chlamydia psittaci</li> <li>Coccidioides immitis</li> <li>Coccidioides posadasii</li> <li>Eastern equine encephalitis virus</li> <li>Francisella tularensis</li> <li>Hantaan virus</li> <li>Nipah virus</li> <li>Rift Valley fever virus</li> <li>Schmalleria</li> <li>Staphylococcus aureus</li> <li>T-2 toxin</li> <li>Venezuelan equine encephalitis virus</li> </ul> |
|---|---|

## USDA High Consequence Livestock Pathogens and Toxins

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## Zoonotic Implications

- Several zoonotic diseases
  - Many diseases listed on the previous slide have human health consequences
- Mechanical (negligible threat)
  - Newcastle disease, swine vesicular disease
- Biological
  - Avian influenza, FMD

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## Accidental or Intentional Introduction

### *Foot and Mouth Disease*

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## Foot and Mouth Disease (FMD)

- Virus
- Considered to be the most important livestock disease in the world
- Not in U.S. since 1929
- Vesicular disease of cloven-hoofed animals
- Spread by aerosol & fomites



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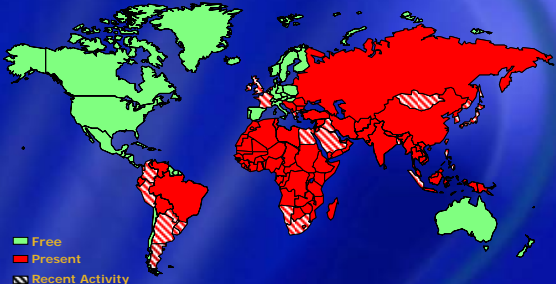
## World Organisation for Animal Health



- Early Warning System
- Disease reported within 24 hours
- Informs countries at risk
- Trade shut down until further notice


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## Foot-and-Mouth Disease Distribution and Recent Activity



Free  
Present  
Recent Activity

(Rev. 3-25-01)

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## Foot and Mouth Disease

- Animals at risk in the U.S.
  - 94.9 million cattle
  - 60 million swine
  - 6 million sheep
  - 40 million wildlife
  - Not horses
- Humans rarely infected
- Huge economic impact



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## U.K. FMD Outbreak, 2001

- Total costs over £10 billion
  - Ag industry, compensation, tourism, sports
- 6 million animals slaughtered
  - FMD free in less than 1 year
- Public perception
  - Animal welfare
  - Smoke pollution



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## FMD in Wildlife

- Risk of enzootic wildlife infection
  - Permanent trade embargoes possible
- Risk to zoos and endangered species
  - 1985 Israel FMD infection in gazelles
  - 1,500 deaths, spread to neighboring livestock
- Billions spent annually in the U.S.
  - Outdoor recreational activities

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## Re-emerging Disease

*Exotic Newcastle Disease*

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## Newcastle Disease (ND)

- Virus affecting poultry
- Four pathotypes
  - Asymptomatic, lentogenic, mesogenic, velogenic
- END endemic in Asia, Middle East, Africa, Central/ South America
- Causes drop in egg production, neurological damage, and death



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## Exotic Newcastle Disease

- 1950: First U.S. case
- 1972: Eradication campaign began
  - 12 million birds destroyed
  - \$56 million dollar cost to tax payers
- 1974: Eradicated END
- Outbreaks continue due to illegal importation of exotic birds and poultry
- Humans can acquire eye infections

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## Exotic Newcastle Disease


- 2002-2003: California outbreak
  - 2,662 premises depopulated
  - 4 million birds destroyed
  - \$160 million impact
- Developing countries
  - Affects quality and quantity of dietary protein
  - Significant effect on human health



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# Emerging Disease

## *Nipah Virus*





## Nipah Virus

- Newly discovered virus
  - First isolated in March 1999 in Malaysia
- Respiratory and neurologic syndrome in swine
- Severe, rapidly progressive encephalitis in humans
  - High mortality rate ~40%
  - Close contact with infected pigs



## Nipah Virus

- Flying foxes (fruit bats)
  - Asymptomatic carriers
  - Virus found in urine, partially eaten fruit
  - Migratory
    - Australia, Indonesia, Philippines
- No secondary hosts

## Nipah Virus

- 1998-1999, Malaysia
  - 1.1 million pigs culled
    - 2.4 million pigs prior to disease onset
    - \$217 million (USD) lost in this outbreak
  - Pork consumption dropped 80%
- No new cases since May 1999
  - Surveillance and testing continue
- Americans and 60 million pigs at risk






# Biosecurity and Disease Control




## Enhance Biosecurity

- Goal is to stop the introduction and spread of infectious agents
- Prevent domestic and exotic animal diseases
- Restricting movement of people and animals is essential

## Enhance Biosecurity

- Identify high risk factors on each farm
  - Biosecurity walkthrough with veterinarian
  - Develop a tailored biosecurity plan
  - Train employees to help maintain the plan



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## Enhance Biosecurity

- Regulate visitors
- Keep visitors sanitary
  - Clean clothing, boots
  - Disposable plastic shoe/boot covers
- Implement insect, bird, and animal control
- Secure water, feed and nutrient sources



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## Disease Control

- Maintain healthy herd
  - Vaccinate
  - Proper hygiene for animals and handlers
- Purchase from reputable sources
- Quarantine newly purchased animals
- Separate sick animals



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## Disease Control

- Change high risk management practices
- Avoid animal collection and dissemination points
  - Auction markets, shows
- Nationwide animal identification and tracking system
  - Goal: Premise identification system in place by July 2004



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## Disease Control

- Local and state veterinarians
  - Recognize outbreak of foreign animal disease
- USDA-APHIS personnel
- University extension personnel
- Local, state, federal health agencies
- Law enforcement
- Emergency management division

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## Conclusion

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## Awareness Education

- Early detection and response are critical to limit impact
  - Know what to look for and who to call for assistance
- Cooperation with local, state, and federal authorities is essential
- Everyone plays an important role in protecting U.S. agriculture



## Summary

- Foreign animal diseases are a real threat
- Economic consequences could be severe
- Prevention plans in place
- Awareness education imperative
- Continued vigilance essential



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