One Health Initiative at Iowa State
Connecting Education, Research, and Outreach

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College of Veterinary Medicine

• First public veterinary college in the US (1879)
• Internationally known for veterinary education, research and service
College of Veterinary Medicine

- We are Iowa State’s only professional college
- Ames harbors one of the country’s largest concentrations of animal health professionals
- Focus on animal and human health, food safety and animal welfare to the benefit of animal agriculture, economic development, and the health and well-being of humans and their animals
College of Veterinary Medicine

**Academic departments:**
- Biomedical Sciences
- Clinical Sciences
- Pathology
- Microbiology & Preventive Medicine
- Diagnostic & Production Animal Medicine

**Service Units:**
- Lloyd Veterinary Medical Center
- Veterinary Diagnostic Laboratory
- Field Services
One Health Approach

One Health is the collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our environment.

Source: One Health Commission website
Integrated One Health Health Initiative

Based on land-grant universities’ strengths in human, animal, plant, and environmental health, how can we strategically collaborate to expand our research capabilities?
Land-Grant Institutions are Ideally Positioned

- Quality of faculty
- Breadth of research (basic, applied, clinical, and translational)
- Convergence of disciplines in the biological, physical, social, and clinical sciences
- Established partnerships
- Complementary colleges
- Incubators and Research Farms
- Institutes and Centers
- Relationships with Federal Labs (e.g., USDA and DOE)
- Industry ties and community outreach and service
- Interdisciplinary culture
Concept for a One Health Approach at the Convergence of the Biological, Physical, Social and Clinical Sciences
Land-Grant Research Foci

Integrated One Health
• Health, nutrition, & food security and safety

Biorenewables
• Products & energy

New Technologies
• Materials to systems

Environment
• Climate change to ecosystem degradation

Integration with Behavioral and Social Sciences

Quality of Life
Interconnected Research Foci

The Pillars on which ISU will Continue to Build

- Transform the Research Enterprise at Iowa State by building on its pillars of strength in one health

- Create a “self-sustaining” pipeline that translates bench-top discovery into health innovations

- Continue to build a foundation of research capabilities that will ‘stand the test of time’
Interconnected Research Foci

Healthy Humans
- Bioinformatics & Computational Biology
- Biomedical Nanotechnology & Translational Discovery Research

Healthy Animals
- Food, Nutrition & Health, and Food Safety
- Structural Biology, Cell Biology, Disease Control & Prevention, and Animal Models

Healthy Plants
- Plant Health

Healthy Environment
- Decision-Based Health Informatics
- Infectious & Emerging Diseases, and Translational Preventive Medicine
Outreach, Research and Teaching

- Added to Iowa State’s strategic plan
- Research symposium for Iowa State researchers and students
- University planning committee
- Funding for seed grants
- One Health Endowed Lecture Series
- New Presidential Hires
Integrated One-Health Initiative

- Healthy Environment
- Healthy Plants
- Healthy Animals
- Healthy Humans
Center for Food Security and Public Health Mission

- Established in 2002 by the CDC
- To increase national and international preparedness for accidental or intentional introduction of disease agents which threaten food security or public health
Education Materials

• Bioterrorism and Agroterrorism
  – PowerPoints, fact sheets, handouts, disease wall charts

• Emerging and Exotic Diseases of Animals
  – Fact sheets, textbook, online course, Spanish

• Zoonotic Diseases
  – Textbook, fast facts, handouts

• Biological Risk Management
  – PowerPoints, handouts, online database
- 160 disease fact sheets
- 100 Diseases with images
- 56 PPTs
  - Speaker notes
- 91 1-page Fast Facts
Disease Fact Sheets

Foot and Mouth Disease

Foot and Mouth Disease (FMD) is a highly contagious viral disease that primarily affects domestic livestock (such as cows, goats, and pigs) but can also infect wild species such as whales, pigs, and cows. The disease is caused by a virus that belongs to the Picornaviridae family, and it is transmitted through direct contact, aerosolization, or contamination of fomites.

Importance
Foot-and-mouth disease (FMD) is a higher in some parts of the world, including China, and can be very costly to control. The disease has been reported in African countries such as South Africa, Zimbabwe, and Kenya, and it is also present in many European countries, including the UK and France. The disease can also be transmitted to domesticated animals, including livestock and pets. In the UK, the disease has been reported in wild boar, which can serve as a reservoir for the virus.

Signs and symptoms
Foot-and-mouth disease in cattle can present with fever, lameness, and swelling of the feet and mouth. In pigs, the disease can present with fever, coughing, and diarrhea. In humans, the disease can present with fever, joint pain, and throat irritation. In all cases, the disease can be transmitted through direct contact or through aerosolization.

Prevention and control
Foot-and-mouth disease can be prevented through the use of vaccines and through the implementation of good hygiene practices. Vaccines are typically administered on a regular basis to livestock and pets, and control measures may include the vaccination of the entire population, the culling of infected and exposed livestock, and the quarantine of infected animals.

Outbreak control
If an outbreak of foot-and-mouth disease occurs, control measures may include the vaccination of the entire population, the culling of infected and exposed livestock, and the quarantine of infected animals. In addition, affected areas may be isolated, and all exports of livestock and meat products may be prohibited.

1. Disease Fact Sheets

Foot and Mouth Disease

Last Updated: September 28, 2027

3 to 28 pages in length
Image Database

- 100 Diseases
- One to several clinical images
- Annotated by board certified pathologists
In today’s presentation we will cover information regarding the organism that causes foot and mouth disease and its epidemiology. We will also talk about the economic impact the disease has had in the past and could have in the future. Additionally, we will talk about how it is transmitted, the species it affects (including humans), clinical and necropsy signs seen, and diagnosis and treatment of the disease. Finally, we will address prevention and control measures for the disease, as well as actions to take if foot and mouth disease is suspected.

Foot and Mouth Disease

Overview
- Organism
- Economic Impact
- Transmission
- Clinical Signs
- Diagnosis and Treatment
- Prevention and Control
- Actions to take

The Organism

Foot and mouth disease virus (FMDV) is in the family Picornaviridae, genus *Apthovirus*. There are 7 immunologically distinct serotypes which do not cross protect. There are over 60 subtypes; these subtypes develop spontaneously making effective vaccination difficult. FMDV primarily affects cloven-hoofed domestic and wild animals such as cattle, sheep, goats, pigs, deer, and water buffalo. It can also affect horses, armadillos, minks, elephants, capybaras, rats and mice. African buffalo are the maintenance host for the SAT serotype in Africa. Wildlife, other than African buffalo, do not seem to maintain the FMD viruses and usually only become infected after contact with infected livestock. FMDV is inactivated at a pH below 6.5 or above 11 (acidic or very basic conditions). The pH drop that occurs in muscle tissue post-mortem will inactivate the virus. It can survive in milk and milk products, frozen bone marrow, and lymph glands with stability increasing at lower temperatures. It can remain active on surfaces for days to weeks and survives drying if it is in serum.
General Public Factsheets...

Fast Facts

- 91 one-page fact sheets on diseases written for the general public
Zoonoses: Protecting People and Their Pets

• Textbook - 1st Ed.
• 7 chapters
  - Overview, Human-animal bond, Bites/scratches, Children, Shared risks
• Color images
• Handouts
• 220 pages
Emerging and Exotic Diseases of Animals

- Online course
- 28 Colleges of Veterinary Medicine
  - Incorporates USDA Initial Accreditation Training
- Continuing education
  - Offered on VIN for practitioners
Infection Control

- Infection Control Manual for Animal Shelters
- Free assessment tool for shelters
- Identify disease risk areas
- Implement prevention practices and training
  - Maddie’s Shelter Funding
BRM Resources

• PowerPoints
  – General prevention
  – Foreign animal diseases
  – Zoonotic diseases

• Handouts
  – Checklists
  – Prevention info

• Signage

• Disinfectant info

• English & Spanish
Animal Disease Emergency Local Preparedness Program

- Training curriculum for Iowa
  - Preparedness, response, developing, testing local response plans
- PowerPoints, handouts
- 5 target audiences:
  - Animal industry
  - Local government
  - Local business owners
  - First responders
  - General public
Master of Public Health (MPH) Degree

• **Cooperative agreement 2002**
  University of Iowa, College of Public Health
  Iowa State University, CVM

  – Graduates:
    43 practicing veterinarians – MPH
    22 concurrent veterinary students – DVM/MPH

  – Enrolled as of May 2013:
    31 practitioners, 14 veterinary students

• **Distance Learning – Summer Institutes**

  – 2 weeks in Iowa City (year 1)
  – 2 weeks in Ames (year 2)
2013 One Health Lecture – *Zoobiquity*

Iowa State University College of Veterinary Medicine hosted the second One Health Endowed Lecture in April 2013:

- Authors of *Zoobiquity*
- Presentation for community, lecture for CVM students
- Animals and humans share the same diseases
- Draws on:
  - Latest in medical and veterinary science
  - Evolutionary and molecular biology
A One Health Approach to Mountain Gorilla Conservation

presentation by Dr. Mike Cranfield, co-director of Gorilla Doctors – April 24

Dedicated to saving the endangered mountain and Grauer’s gorillas
Iowa State has Embraced One Health

• In 2013, 8 of 12 funded Health Research Initiative projects at Iowa State were awarded to CVM faculty
• Teams working to create novel vaccines for new and emerging pathogens; two of the 4 presidential initiatives are on vaccine development
• Faculty new hires in strategically important areas: Translational Health and Pathogenomics
Research Leadership at the Intersection of Animal & Human Health

Translational Research
- Alzheimer’s, Cancer, Parkinson’s stroke & prion diseases (mad cow)
- Respiratory (Syncytial), vision (glaucoma, retinal diseases); digestive diseases
- PEDV, PRRS, HIV, influenza, etc
- Vaccine development & delivery

Animal & Public Health
- *Campylobacter* – a major foodborne pathogen worldwide
- *E. coli*-caused colibacillosis - #1 worldwide bacterial poultry disease
One Health in South Africa
Participation
New Insights into One Health

- Disease management
- Differences in one health perception
- Industry - wildlife - local population interface
- Wildlife conservation vs environmental conservation
- Network with folks from five universities from around the world interested in one health research
- Develop collaborations
One Health in China

- Collaboration with Multiple institutions in China (e.g. Nanjing Agricultural University, China Agricultural University)
- Research: Detection, ecology, transmission of pathogens
- Advanced diagnostic service
- Surveillance: A network monitoring antimicrobial resistance of animal origin
- Education: training of graduate students and visiting scholars
QUESTIONS?