



**Homeland Security**

Science and Technology

# National Center for Zoonotic and Animal Disease Defense (ZADD)

A DHS Science and Technology Center of Excellence



C · E · E · Z · A · D

Center of Excellence  
for Emerging and Zoonotic Animal Diseases

## Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD)

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INSTITUTE FOR  
INFECTIOUS ANIMAL DISEASES

A Department of Homeland Security Science & Technology Center of Excellence

## Institute for Infectious Animal Diseases (IIAD)

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**Mission:** To protect the nation's agricultural and public health sectors against high-consequence foreign animal, emerging, and zoonotic disease threats.

### Quick Facts

- Co-led by Kansas State University and Texas A&M University.
- Established in 2004 by the U.S. Department of Homeland Security (DHS) to address challenges posed by foreign animal, emerging, and zoonotic pathogens.
- Engages in research and develops tools for use against high-threat agricultural pathogens across three major themes:
  - Biological Systems: vaccines, anti-virals, detection and diagnostic assays, and diagnostic platforms
  - Information Analysis Systems: epidemiology and disease modeling analysis tools to support business continuity, emergency response, risk mitigation, and decision-making
  - Education and Outreach: educational programs; first responder training; gap analysis workshops; and seminars on foreign animal, emerging, and zoonotic diseases

### Collaboration

- Partners with more than 100 academic research institutions, homeland security agencies, biopharmaceutical companies, and food and agriculture agencies across the United States and around the world.
- Coordinates efforts with industry stakeholders, government agencies, and private animal health and biomedical companies to ensure that research is translated into useful products and meets customer needs.

### Impact and Relevance

- Protects U.S. agriculture and public health from catastrophic diseases by advancing the development of:
  - Next-generation vaccine candidates, vaccine platforms, and adjuvants against high-consequence animal diseases.
  - Decision support systems and emergency management tools to support prevention, control of, and recovery from high-consequence animal and zoonotic diseases.
  - Integrated educational and training programs for the next generation of professionals to work in disciplines that research, support, and respond to foreign animal, emerging, and zoonotic diseases.



## Customers

### Department of Homeland Security

- National Protection and Programs Directorate's Office of Infrastructure Protection
- Office of Health Affairs' Food, Agriculture, and Veterinary Defense Division
- Office of Policy's Office of Strategy, Planning, Analysis and Risk
- Science and Technology Directorate's Chemical and Biological Defense Division

### Department of Agriculture

- Animal and Plant Health Inspection Service's Veterinary Services: National Veterinary Service Laboratories, National Animal Health Laboratory Network, National Center for Animal Health Emergency Management, Centers for Epidemiology and Animal Health
- Agricultural Research Service: Plum Island Animal Disease Center, National Animal Disease Center, Arthropod-Borne Animal Disease Research Unit

### Centers for Disease Control and Prevention

- National Center for Emerging and Zoonotic Infectious Diseases

### State veterinarians, animal health officials, and area veterinarians

### Livestock and poultry producers

- National Pork Board
- National Cattlemen's Beef Association
- National Milk Producers Federation
- Texas Poultry Federation
- Texas Cattle Feeders Association
- Texas Pork Producers Association

## ZADD Highlights

### AgConnect

Coordinating the decision-making process is critical to successful disease outbreak management. AgConnect is a suite of customizable data-sharing products piloted by food and agriculture stakeholders. It integrates validated information into a single, easy-to-use, real-time interface. This suite of products supports the entire emergency cycle—planning, preparedness, mitigation, response, and recovery—and empowers the decision-maker to effectively harness the real-time collection, distribution, and analysis of bio-surveillance, business continuity, and incident command data.

### Basic Detection Research

To protect U.S. agricultural systems, we need rapid detection of newly emerging agents and operator-safe assay platforms. ZADD researchers are using Mass-spectrometric-based polymerase chain reaction (MassTag PCR) and unbiased high-throughput pyrosequencing (UHTS) to rapidly identify known and unknown pathogens of animals. UHTS can also provide insight into the dynamics of complex microbial communities that have implications for health and disease. The objective of this research is to apply these methods to clinical samples from agricultural animals and wildlife in order to develop state-of-the-art multiplex technologies for pathogen surveillance and discovery for DHS and related agencies.

### Diagnostic Kit to Identify Infected Animals

The ability to distinguish herds that are disease-free from diseased herds is a critical component in maintaining business continuity and resuming foreign trade after an outbreak. ZADD researchers are developing a competitive enzyme-linked immunosorbent assay (ELISA) against the foot-and-mouth disease virus (FMDV) 3B non-structural protein for use in a diagnostic kit that is capable of differentiating infected from vaccinated animals (DIVA) for detection of FMDV. The pilot lot of kits will be compatible with the recently developed adenoviral vaccine platform deployed by the DHS Science and Technology Directorate for demonstrating herd-level freedom from disease.

### Rift Valley Fever Vaccine (RVFV) Development

Vaccines against Rift Valley fever are currently not available in the United States. RVFV infects both humans and ruminant animals (e.g., cattle, goats, sheep). ZADD researchers are developing a subunit vaccine through expression of structural proteins of RVFV in baculovirus with the intention of establishing a safe and efficacious vaccine with DIVA capability. The vaccine will be tested in a secure laboratory environment in lambs and calves. Companion DIVA serological tests based on the RVFV N protein are also being developed.

- High-consequence animal diseases pose significant threats to homeland security.
- ZADD products protect U.S. agriculture and public health from catastrophic diseases.
  - 60 percent of animal pathogens are zoonotic (transmissible between animals and humans).
  - 75 percent of recent emerging infectious diseases that affect humans began as animal diseases. The most dangerous of these pose catastrophic risks to human health, livestock health, and the food supply.
  - 16 percent (about 1 in 6) of all U.S. jobs and \$1.25 trillion in annual U.S. economic activity are at risk when the national agriculture economy is threatened by high-consequence animal diseases.