Texas Veterinary Medical Diagnostic Laboratory

DHS University Summit

Biological Systems for Foreign Animal and Zoonotic Diseases

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Director

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Protecting Animal and Human Health through Diagnostics

TVMDL: Who We Are

- **State agency dedicated to providing veterinary diagnostic services to the citizens of Texas**

- **Service-based organization**
  - **Backbone of Texas animal and emerging/zoonotic disease surveillance program**
    2008-1.4 million tests

- **Facilities and staff at four locations throughout the state:** Staff: 155

- **National Animal Health Laboratory Network Lab**
  - One of twelve core members of National Animal Health Laboratory Network Laboratories (NAHLN)
  - BSL-3 capacity
    - ✓ Surveillance (BSE, bird flu, chronic wasting disease)

National Animal Health Laboratory Network (NAHLN)

Protecting Animal and Human Health through Diagnostics

Amarillo

Center

Gonzales

College Station

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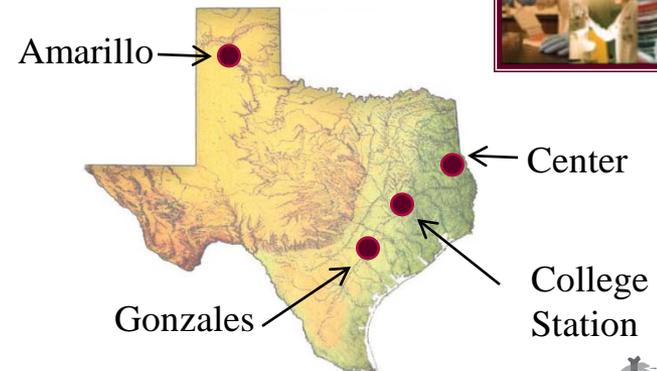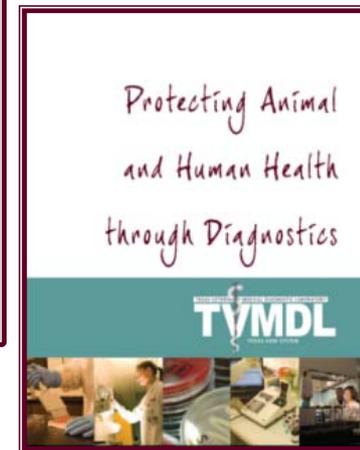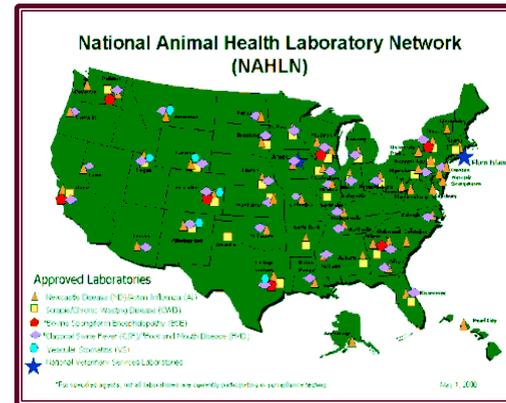
TVMDL Mission

- **Promote animal health and protect agricultural, companion animal and public health interests in Texas and beyond, by providing excellence in veterinary diagnostic services:**

  one world • one health

  ➢ **Provide veterinary medical diagnostic services to the citizens of Texas**

  ➢ **Reduce costs and suffering associated with animal diseases**

  ➢ **Contribute to an animal and zoonotic disease surveillance system**

  ➢ **Respond to potential high consequence and/or emerging/zoonotic disease events**

  ➢ **Contribute to the benefits of healthy human/animal interactions**

TEXAS VETERINARY MEDICAL DIAGNOSTIC LABORATORY
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National Animal Health Laboratory Network (NAHLN)

Approved Laboratories

- △ Newcastle Disease (ND)/Avian Influenza (AI)
- ▢ Scrapie/Chronic Wasting Disease (CWD)
- ⬠ *Bovine Spongiform Encephalopathy (BSE)
- ◇ *Classical Swine Fever (CSF)/*Foot and Mouth Disease (FMD)
- ⬡ Vesicular Stomatitis (VS)
- ★ National Veterinary Services Laboratories

*For specified agents, not all laboratories are currently participating in surveillance testing.

May 1, 2008

Founding Principles and Features of NAHLN

- Standardized, rapid diagnostic techniques
- Trained personnel, modern equipment
- Quality standards, proficiency testing
- Secure communication, alert, reporting system
- Adequate facility biosafety/biosecurity levels
- Scenario testing

NAHLN- A State and Federal Partnership to Safeguard Animal Health

NAHLN

Mission

- Provide accessible, timely, accurate, and consistent animal disease laboratory services nationwide
- Provide laboratory data to meet epidemiological and disease reporting needs
- Maintain the capacity and capability to provide laboratory services in support of responses to foreign animal disease outbreaks or other adverse animal health events
- Focus on diseases of livestock (exotic, zoonotic, and emerging diseases)

Key Elements

- Capability and capacity to conduct nationwide *surveillance, surge* and *recovery* testing for an animal disease outbreak
- Secure communication, alert, and reporting systems
- National training, proficiency testing, and quality assurance
- Modern equipment and experienced personnel

Major Livestock Production Region
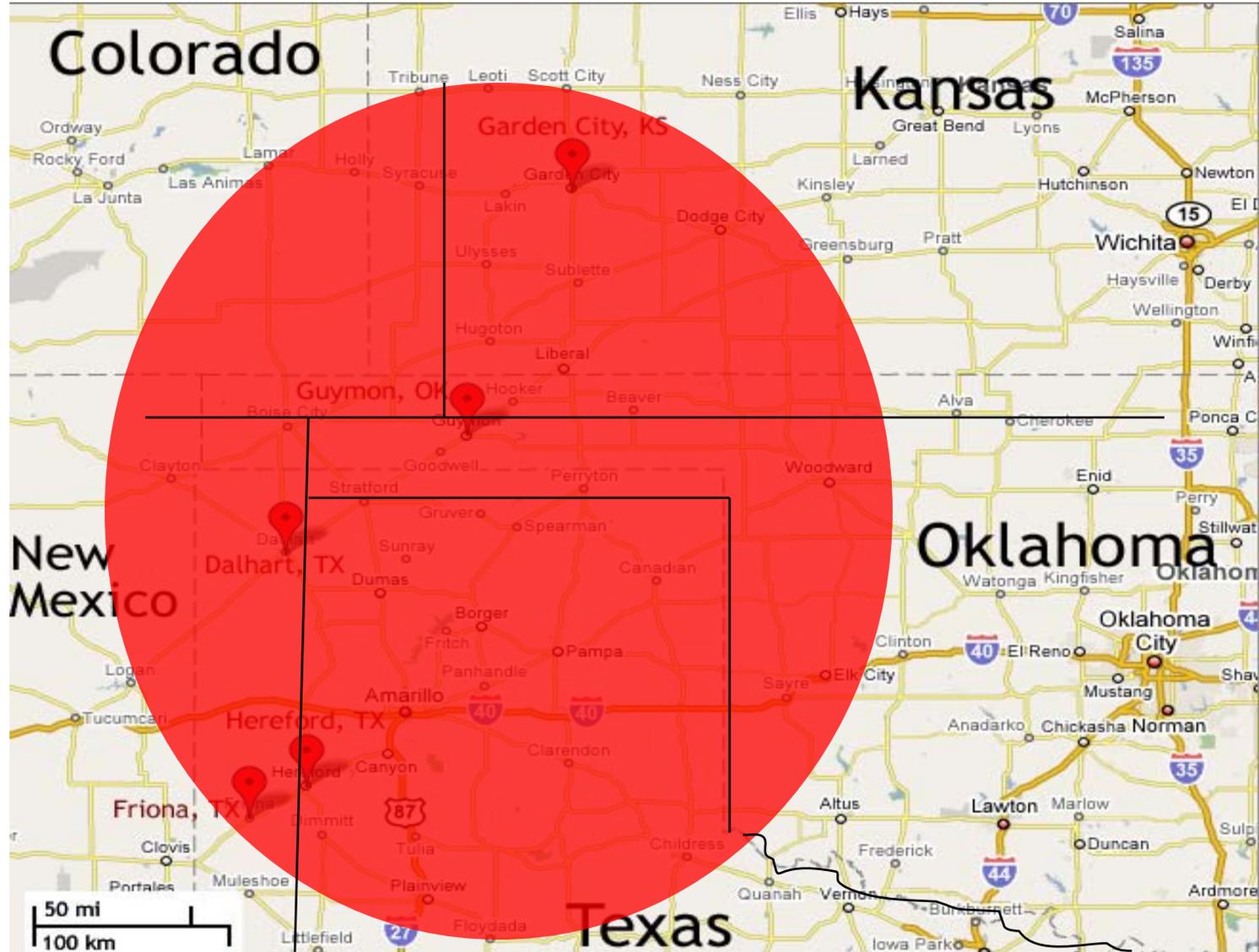
Laboratory Surge Capacity and Other Challenges

- *Challenges:*
  - Supporting surveillance zone testing, large demand for laboratory surge capacity
    - Early detection/directly linked to controlling the spread
  - Surveillance, response *and* recovery
    - High throughput analysis, reproducible assays
  - Testing for movement control/stop/permitting
    - "Point of care" diagnostics?
    - Permitting movement to slaughter/home?
  - Readily available reagents
 - DIVA vaccines and companion diagnostics

FOOT & MOUTH DISEASE INFECTED AREA

The Road Ahead: Challenges and Technological Needs

- **Technologies of the Future**
  - Lab-based technologies
    - Early detection and characterization of newly emerging diseases/strains
    - High-throughput (HTP) Capability
  - "Field" Based Detection Technologies
   - "Point of Care" Diagnostics

New Assay Formats/Technology Requirements


Assay Sensitivity

Assay Specificity
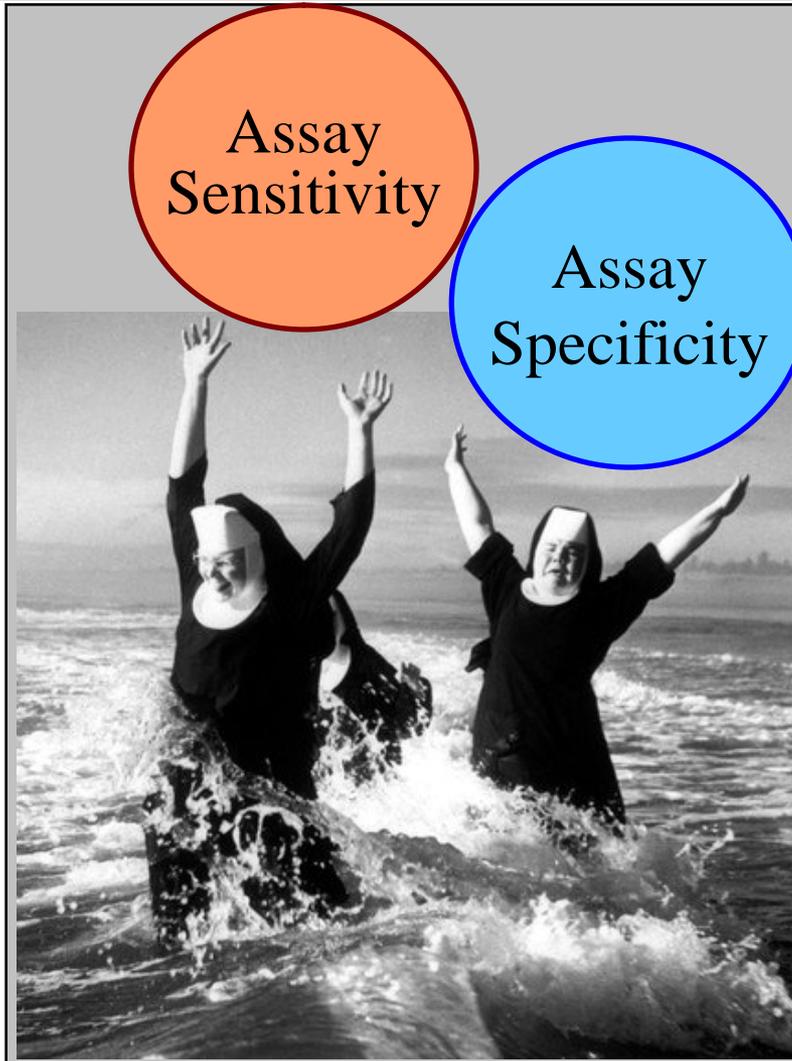
- **Performance**
  - **Limit of Detection**
  - **Ability to identify strain/serotype**

- **Speed**

- **Scalability**

- **Cost**

- **Reliability**

- **Quality, readily available reagents**

Diagnostic windows

What are we trying to do?

② Active surveillance for infected animals (including pre-clinical cases)

① Rapid confirmation of clinical signs

③ sero-surveillence for FMDV exposed animals
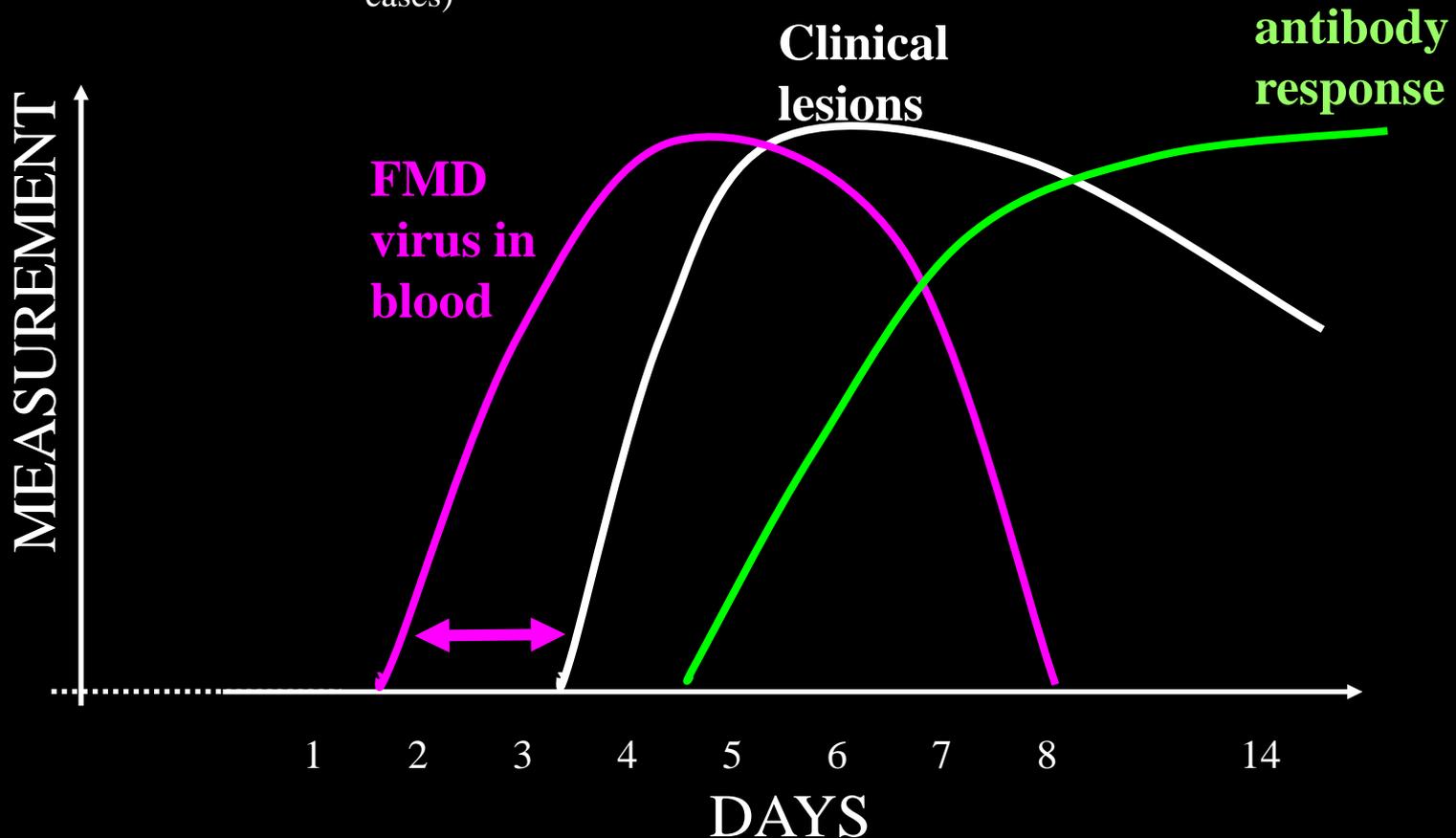
Representative "in contact" cattle data from Alexandersen et al., 2003 and unpublished data from IAH
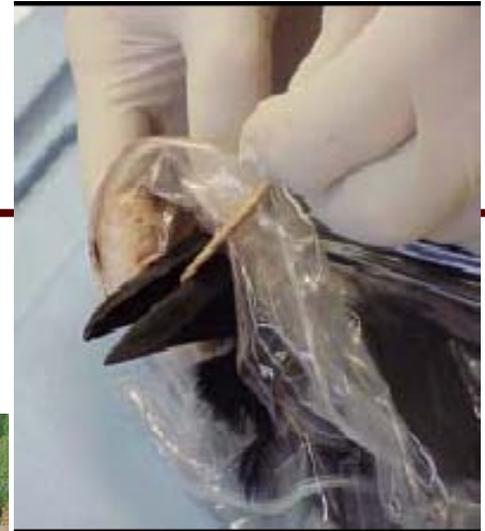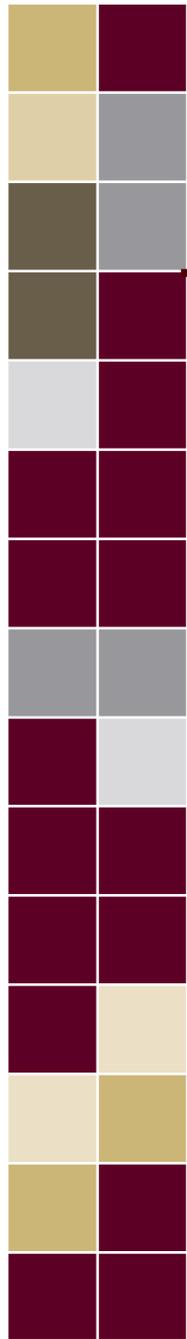
FAZD Center
Development/Technology Transfer

- **Tools for early detection, surge and recovery testing**
  - **NAHLN**
    - High-throughput surge-capacity robotic diagnostic tests
      - FMD replicons-mass scale ELISA for use in recovery
      - FMD and RVF
      - Readily available, reproducible reagents
    - Improved H5 ELISA and fluorescent microsphere based multiplex diagnostics
      - Efficient sub-typing of AI
      - 384 well format for surge response
      - Competitive ELISA
    - DIVA technologies
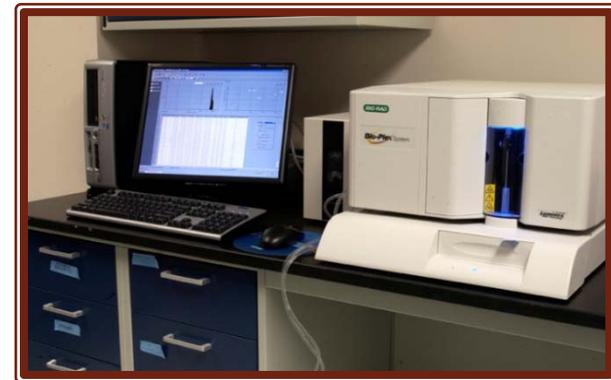
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FAZD Center
Development/Technology Transfer

FAZD Center
Development/Technology Transfer

- **"Point of Care" Diagnostics**
  - **Movement control**
  - **Preliminary premise diagnosis**
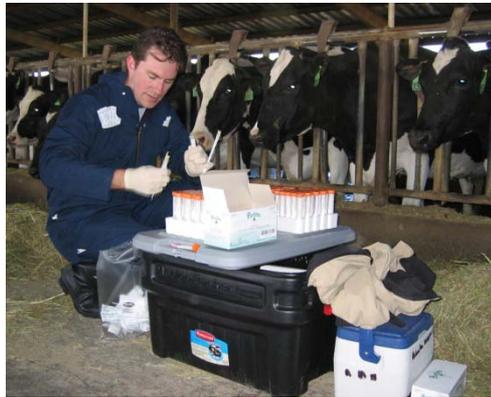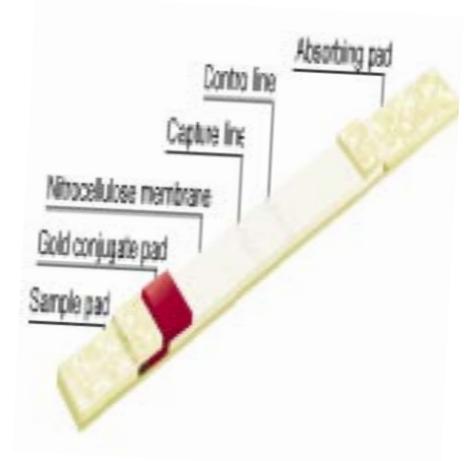
FAZD Center/NAHLN Laboratory Collaboration

- **FAZD Center discovery/development of new technologies**
  - Addressing all stages, technological requirements of disease response

- **NAHLN laboratory validation of assays**
  - Aid in transfer of technology/CVB approval package
  - Negative cohort testing
    - Assay specificity
  - Validation of standard operating procedures

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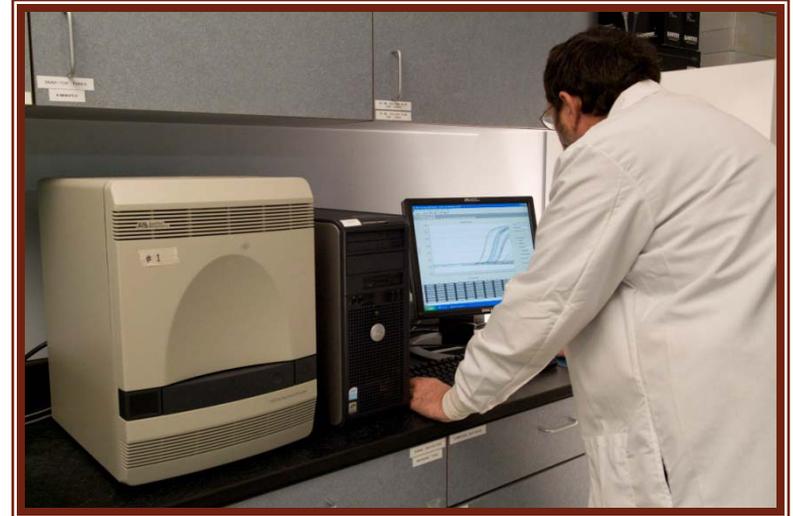
Summary

- **FAZD Center work critical in developing and transfer of novel technologies that can be utilized in "field" and in the NAHLN laboratory**
  - Technologies that address stages of disease surveillance, response and recovery
- **NAHLN laboratories can play significant role in feasibility, validation and licensing studies**

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Ultimately it is all about "Business Continuity"-Getting our producers and the industry "back in the business" of feeding the nation and the world

A Special Thank You

- Ross Wilson, Texas Cattle Feeders Association
- Ken Horton, Texas Pork Producers Association
- John Cowan, Texas Association of Dairymen
- Dr. Bob Hillman, Texas Animal Health Commission
- Dr. Dee Ellis, Texas Animal Health Commission