Texas A&M Veterinary Medical Diagnostic Lab

Advocacy Presentation

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Texas A&M AgriLife Advanced Leadership Program

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Vision

To be the global leader in providing innovative and state-of-the-art veterinary diagnostic services

Mission

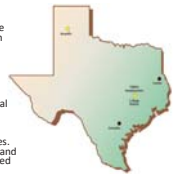
To promote animal health and protect agricultural, companion animal, and public health interests in Texas and beyond by providing excellence in veterinary diagnostic service

TVMDL Locations

TVMDL is composed of two full-service laboratories, located in College Station and Amarillo, and two poultry laboratories, located in Center and Gonzales.

With its strategic locations, TVMDL is uniquely positioned to serve the animal industries of Texas.

The agency is staffed by 165 employees. With over 30 hold a DVM and/or PhD and over 20 professionals are board certified in their specific discipline.



TVMDL Locations

TVMDL Agency Impacts

- One of four state agencies under the oversight of the Vice Chancellor for Agriculture within The Texas A&M University System
- Only state agency dedicated to providing veterinary diagnostic services to the citizens of Texas
- Only state lab with ability and response capacity for high consequence animal diseases

TVMDL Agency Impacts

- Backbone of an animal and public health disease surveillance program
- Protects the State's $11 billion livestock and poultry industry
- Facilitates movement and export of live animals and commodities
  - Testing supports agricultural sector business continuity planning efforts

TVMDL College Station - 2017

TVMDL History

1967

- Texas Legislature establishes TVMDL to perform diagnostic testing for livestock and poultry. Two years later, the 18,000 sqft College Station facility opens.

1975

- TVMDL opens a 12,000 sq.ft laboratory in Amarillo to serve the important feedlot and large animal industries of the Texas Panhandle

1978

- TVMDL becomes the world's first laboratory to isolate canine parvovirus.

1989

- Texas Racing Act gives TVMDL primary responsibility for drug testing services for pari-mutuel racing

TVMDL History

1991

- Texas Legislature transfers Pullorum-Typhoid program and poultry laboratories in Center and Gonzales from the Texas Agricultural Experiment Station to TVMDL

1998

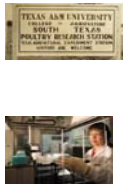
- TVMDL is the first to recognize liver lesions in dogs are caused by aflatoxin contamination of corn-based dog food

2002

- USDA selects TVMDL as one of 12 core diagnostic laboratories to be part of the National Animal Health Laboratory Network

2004

- TVMDL plays a critical role in containing and eradicating a highly pathogenic avian influenza outbreak in poultry in Gonzales County, Texas



TVMDL History

2004

- College Station facility adds two new 800 sqft BSL-3 laboratories

2008

- TVMDL is one of the nation's first laboratories to alert vets and federal agencies to the presence of melamine in companion animal food

2009

- TVMDL diagnoses an outbreak of equine piroplasmosis

2011

- TVMDL opens a new 2,950 sqft Poultry Diagnostic Laboratory in Gonzales

2011

- The Amarillo laboratory is expanded to include a BSL-3 laboratory and improved specimen receiving

TEXAS A&M VETERINARY MEDICAL DIAGNOSTIC LABORATORY

Pathology Branch

- **Necropsy** examines animal remains to evaluate physical signs of injury or disease, or to sample tissue for testing.
- **Histopathology** conducts microscopic exams of tissue specimens taken during biopsy or necropsy.
- **Clinical Pathology** analyzes blood, body fluids, tissue fluids and secretions.

TVMDL Clientele

- Texas veterinarians and animal owners
- Veterinarians and animal owners from other states
- Local, state and national agencies
- International clientele
- Commercial and state diagnostic laboratories
- Industry Partners (i.e., Zoetis, Applied Biosystems)

TVMDL Strategic Partnerships

USDA

TEXAS PARKS & WILDLIFE

AgriLIFE RESEARCH

TVMA

AgriLIFE EXTENSION

APHIS

TEXAS Department of State Health Services

INSTITUTE FOR INFECTIOUS ANIMAL DISEASES

Microbiology Branch

- **Bacteriology** identifies bacteria, fungi and other microorganisms cultured from animal specimens.
- **Virology** looks for viruses or immune responses to viruses in specimens from clinically ill animals.
- **Molecular Diagnostics** tests for minute amounts of genetic material of infectious microbes in specimens.
- **Serology** examines serum and other bodily fluids for antibodies that may indicate disease or exposure.

Other Testing Sections

- **Poultry diagnostics** works with producers to protect flocks from infectious diseases of high significance.
- **Endocrinology** determines hormone levels to confirm certain diseases or to evaluate fertility.
- **Toxicology** studies and tests specimens for indications of accidental or intentional poisoning.
- **Drug Testing** analyzes samples from race track and livestock shows to help enforce competitive rules.

Diagnostic Cases

Small Animal Case Presentation

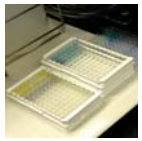
- Adult male cat - 15 pounds.

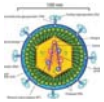
Clinical History

- Cat not acting normal
- Not eating well
- Osteomyelitis or neoplasm?

Virology Results

- Feline leukemia virus ELISA - negative
- Feline immunodeficiency virus ELISA - negative





Bacterial Culture Results

No bacterial growth

Tiny slow-growing fungal colonies after 3 days on blood agar

Case Presentation

- Submitting vet performed blood work – results normal
- Radiographs taken in clinic

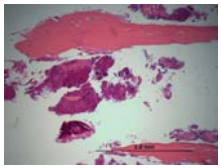
Samples Submitted to TVMDL

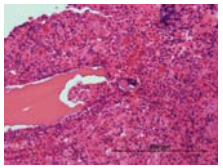
- Serum → Virology
- Bone → Histopathology
- Bone swab → Bacteriology → Molecular Dx

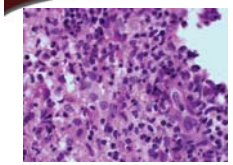
Histopathology Results

- Two sections of bone examined
- Areas of bone resorption and remodeling
- Histopathologic dx: pyogranulomatous osteomyelitis

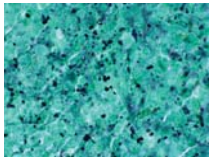
Bone section, H&E







Bone section, PAS



Bone section, GMS

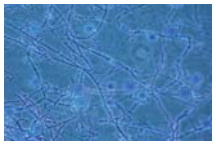
Histoplasmosis

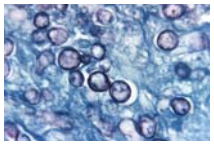
- **Public Health Significance**
  - Most common human pulmonary mycosis in U.S.
  - Disseminated disease
    - Impairment of host immunity
    - Elderly, immunocompromised
    - Dormancy in macrophages and reactivation
  - Disease in healthy individuals
    - Overwhelming inoculum of organisms
  - Interspecies transmission unlikely

Case Coordination

- Histopathology findings supported by Bacterial culture results
- Virological etiologies were ruled out
- Molecular Dx confirmed identity of fungal isolate

Histoplasma capsulatum





Molecular sequencing was also done for confirmation

Histoplasmosis

- Canine histoplasmosis
  - Most susceptible domestic species
  - Young outdoor sporting breeds
- Feline histoplasmosis
  - Rare, progressive, debilitating (wt loss, lethargy, fever)
  - 44% of cats in endemic areas may harbor yeast in tissues
- Other animals
  - Horses, cattle, pigs, zoo birds, poultry, exotics

Impacts

- Identification of etiology results in appropriate therapy
- Zoonotic agent identified – look for potential sources in order to protect human health

Large Animal Case Presentations

Abortion cases from three cattle ranches in the Texas panhandle

Case 1

- Submission consisted of a male bovine fetus weighing 29 lbs with moderate post-mortem autolysis.
- Herd had been vaccinated with a modified live virus (MLV) vaccine prior to breeding and at pregnancy check.

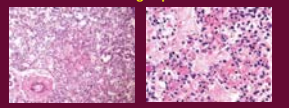
- No gross lesions were observed
- Histologically there were lesions in liver and lungs
- Immunohistochemistry (IHC) of liver lesions stained positive for BoHV-1 viral antigen.

Histopathology

Liver

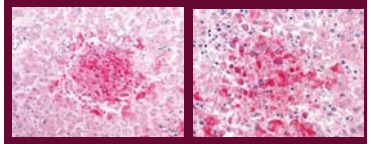
Multifocal to coalescing hepatic necrosis

Lung



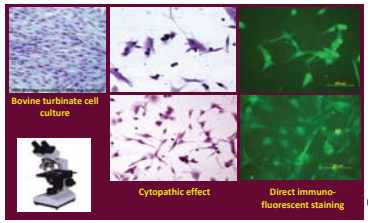
Multifocal necrotic pneumonia

Immunohistochemistry - Liver



- Bovine turbinate cells inoculated with fetal tissues showed cytopathic effect in the form of rounding and clumping (grape-like clusters).
- The cells were fixed and stained with BoHV-1 specific antibodies conjugated with a fluorescein dye.
- The cells showed positive nuclear staining specific for the presence of BoHV-1.

Virus Isolation

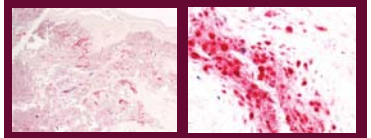


Case 2

- Ranch with 130 head of bred heifers. Abortions started in the third trimester.
- Heifers had been vaccinated with three MLV products prior to breeding
- An additional MLV vaccine at pregnancy check
- Submission included fresh and fixed placenta, and sera.

- Placenta showed suppurative inflammation and IHC showed positive staining for BoHV-1 antigen.
- BoHV-1 was isolated from placenta in ell culture
- It was confirmed by fluorescent antibody staining specific for BoHV-1.
- The heifer had a positive BoHV-1 antibody titer - virus neutralization test.

Immunohistochemistry – Placenta

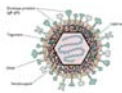


Case 3

- Submission consisted of fresh and fixed placenta and sera.
- Placenta showed moderate suppurative inflammation.
- IHC staining was positive for BoHV-1. Serum was positive for BoHV-1 antibodies by VN test.
- BoHV-1 was isolated from placenta in cell culture, and confirmed by fluorescent antibody staining.

Bovine herpesvirus 1

- An abortifacient in cattle
- Prevalent in both cow-calf and Feedlot
- Alphaherpesvirinae
  - Varicellovirus
  - dsDNA, enveloped



BoHV-1 can cause:
- Respiratory disease
- Abortions
- Meningo-encephalitis

Reproductive Form

- Abortions
  - Fetus of any age, mostly last trimester
  - Fetus die in utero with autolysis
  - Fetal hepatic necrosis

Background of the present study

- There are MLV vaccines containing BoHV-1 that are approved for use in pregnant cattle
- There are several reports on herpesvirus abortions in vaccinated cattle

Sequence Comparison

- Sequenced 869bp segment of gD gene of BoHV-1 (vaccine strain and two of the field isolates)

- The vaccine strain and the field isolates showed 100% sequence homology (ClustalW)

Summary & Impacts

- Three cases of IBR abortions in recently vaccinated cow herds
- Diagnostic tests in Virology and Histopathology support the findings
- Sequence analysis showed high nucleotide similarity between the vaccine strain and field isolates
- Revisit the vaccination strategy - Is it safe to vaccinate pregnant cattle with MLV?

Protecting animal and human health through diagnostics