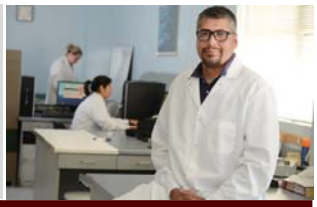
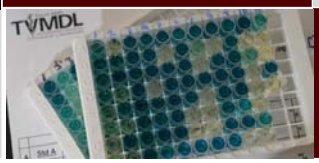
TVMDL Texas A&M Veterinary Medical Diagnostic Laboratory

Texas A&M Veterinary Medical Diagnostic Laboratory

Cat Barr
Diagnostic Toxicologist

January 7, 2019





Advocacy Presentation

Texas A&M AgriLife Advanced Leadership Program

1

TVMDL Texas A&M Veterinary Medical Diagnostic Laboratory

Vision and Mission

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, food safety and public health interests in Texas and beyond by providing excellence in veterinary diagnostic service

2

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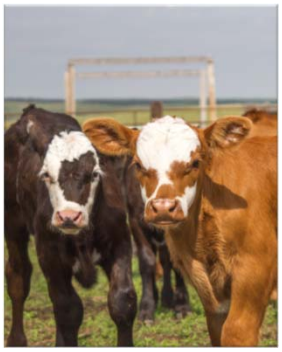
Value of Livestock & Companion Animals in Texas

- Livestock and poultry production contributes **$18B annually** to the Texas economy[1]
- Agriculture directly accounts for over **56,000 Texas jobs**, 1 in 7 Texans work in an agriculturally-related job[1, 2]
- **Exports** of livestock & livestock products total $3.66B/yr[2]
- Veterinary medicine contributes ~$827M to Texas economy[3]
- 56% of all Texas households own at least one pet[4]



1 Office of the Governor
2 Texas Department of Agriculture
3 College of Veterinary Medicine, Texas A&M University
4 American Veterinary Medical Association

3

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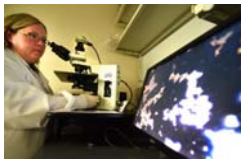
Agency Impacts

- Full service, state of the art, veterinary diagnostic laboratory
- The only state lab with response capacity for high consequence, emerging and zoonotic disease surveillance
  - *Foot and Mouth Disease, Avian Influenza, etc.*
- Facilitates movement & export of live animals & commodities
  - Testing supports agricultural sector business continuity planning efforts



- Only state agency dedicated to providing veterinary diagnostic services to the citizens of Texas
- Provides expertise/consultation to help solve difficult cases
- Supports research efforts and trains future leaders in veterinary diagnostics

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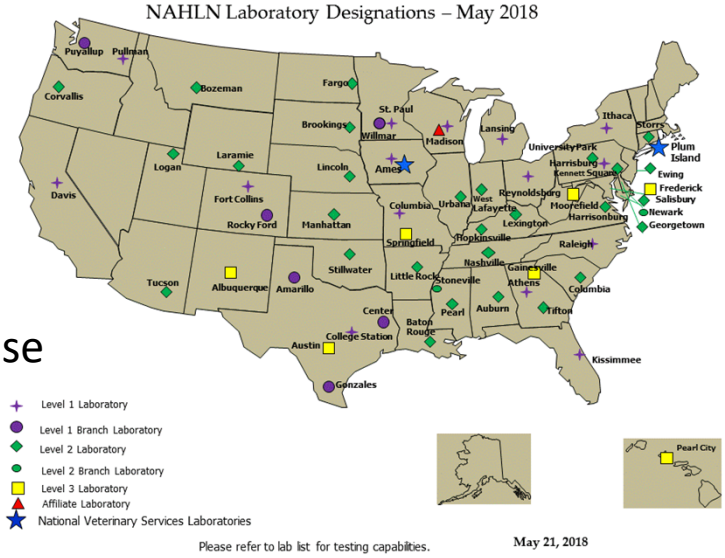
Level 1 Member of the NAHLN

Backbone of an animal and public health disease surveillance program



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TVMDL Strategic Partnerships

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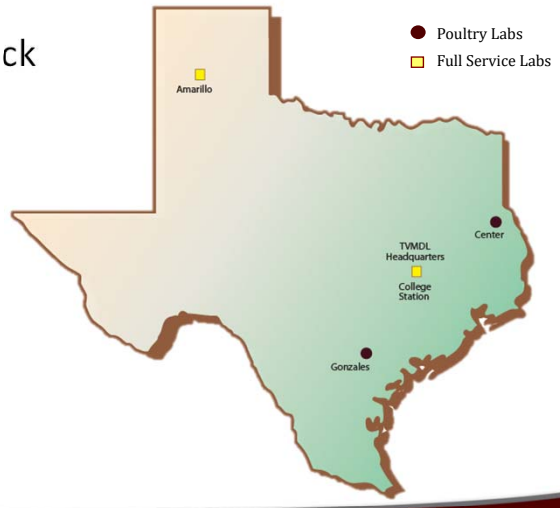
Service Locations

- Strategically located in the livestock and poultry rich regions of Texas
- 165 staff
- 30+ professional staff who hold a DVM and/or PhD
- 13 professionals with board certifications in their specialty



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Clientele

- Veterinarians
- Producers & animal owners
- Local, state, regional, national and international businesses
- Zoos, wildlife sanctuaries
- Commercial and state diagnostic laboratories
- International trade clientele

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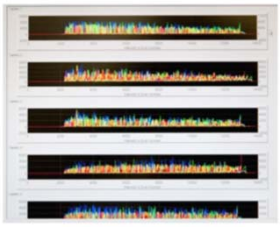
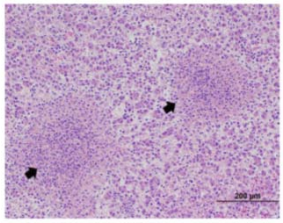
Disciplines

- Bacteriology
- Clinical Pathology
- Drug Testing
- Endocrinology
- Histopathology
- Virology
- Molecular Genetics
- Necropsy
- Parasitology
- Poultry Diagnostics
- Serology
- Toxicology



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TVMDL Facilities



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TVMDL History

1967

•Texas Legislature establishes TVMDL to perform diagnostic testing for livestock and poultry. Two years later, the 18,000 ft^2 College Station facility opens

1975

•TVMDL opens a 12,000 ft^2 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

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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

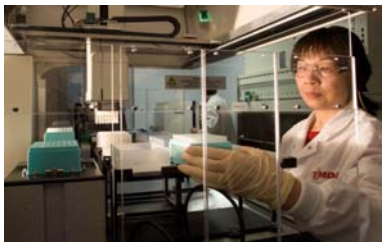
- TVMDL is the first to recognize liver lesions in dogs are caused by aflatoxin contamination of corn-based dog food

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
- College Station facility adds two new 800 ft^2 BSL-3 laboratories



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TVMDL History

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 ft^2 Poultry Diagnostic Laboratory in Gonzales
- The Amarillo laboratory is expanded to include a BSL-3 laboratory and improved specimen receiving

2017

- College Station lab moves into new, 93,000 ft^2 state-of-the-art laboratory in March

2018

- TVMDL receives funding for a new Panhandle laboratory building on WTAMU campus to replace the Amarillo facility

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Quality Assurance System

- Ensures consistent, reliable and timely results
- Aids in obtaining and maintaining accreditations
- Robust quality assurance (QA) system
  - Active QA committee
  - Evaluate & respond to customer feedback
  - Document control
  - Corrective and preventative actions
  - Track & maintain staff training
  - Participate in proficiency testing programs
  - Internal and external audits, management reviews
  - Support contracts governed by federal GLP requirements

USDA

AAVLD

ACCREDITED

RMTC Racing Medication & Testing Consortium

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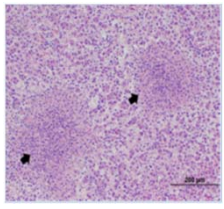
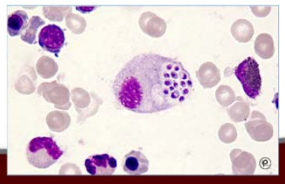
Pathology Disciplines

- **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. It encompasses **Endocrinology**, which determines hormone levels to confirm certain diseases or to evaluate fertility.





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Microbiology Disciplines

- **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 using PCR.
- **Serology** examines serum and other bodily fluids for antibodies that may indicate disease or exposure.

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Analytical Chemistry

- **Toxicology** tests specimens for indications of accidental or intentional poisoning, and for nutritional status.
- **Drug Testing** analyzes samples from race tracks and livestock shows to help enforce competitive rules.

Poultry diagnostics is an external program that works with producers to protect flocks from infectious diseases of high significance.

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Routine Diagnostics

- Diverse Test Offerings
  - 650+ assays for livestock, companion animals, exotic species
- Ease of Use
  - Convenient overnight and next day shipping options
  - Import/export coordinators, import permits
  - Several bilingual staff
- Online Access
  - Reports sent electronically
  - Test results available 24/7 via secure online portal
  - Historical repository of test results and reports
  - Access discounted shipping, download forms
  - Order supplies, pay online

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Specialty Services

- Complimentary Consultation
- Research & Validation
  - Offering customized testing for researchers and animal health companies
    - project specific diagnostic testing
    - assay development
    - protocol evaluation
- State of the Art Testing Capabilities
  - Mass spectrometry
  - Classical and real-time PCR
  - Nucleic acid sequencing
- Rapid bacterial identification

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Veterinary Diagnosticians

- Staff veterinarians with practice experience
- Available in person or by phone to offer guidance on test selection and result interpretation
- Provide consultation on herd or farm problems
- Coordinate multiply-assigned or complex cases
- Develop and deliver educational programs, perform outreach to clinics and practitioners
- Collaborate with Texas A&M University and AgriLife life science entities

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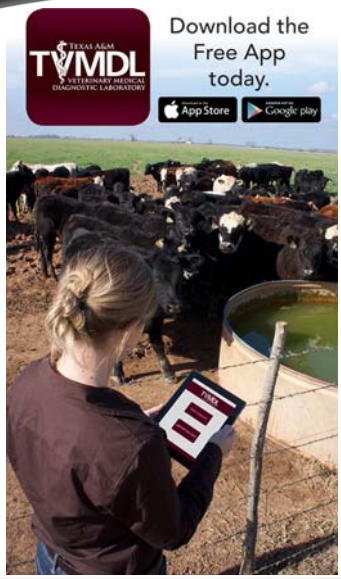
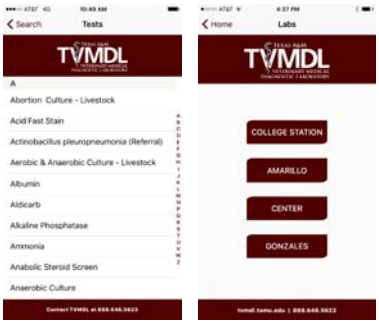
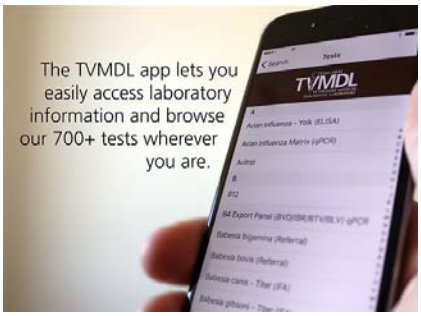


Test information includes:
– A detailed description of the test.
– Specimens needed for testing.
– How to package and ship specimens safely.
– Pricing information.
– Test schedules and expected turnaround times.





Laboratory information includes:
– Link to driving directions to all four locations.
– TVMDL contact information.
– Billing and physical addresses for sending specimens.
– Hours of operation.

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WANT CYTOLOGY RESULTS WITHIN AN HOUR?

Now you can, by using your smart phone

Here's How

1.  Capture slide images with any smart phone, camera eye piece adapters, or built-in microscope cameras.
2. Submit microscopic images to: **digitalcytology@tvmdl.tamu.edu**
3. Receive a cytologic interpretation within an hour.

Price $65

Includes rapid image interpretation, and full cytologic evaluation of glass slides.

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Digital Toxicology Services

Subjects for identification or comment:

- Potential toxic plants
- Potential toxic mushrooms
- Potential blister beetles
- Potential blue-green algae (will require a microscopic image. Image can be taken on a smart phone over eye-piece of microscope)
- Material observed in pet ingesta, unknown baits

digitaltoxicology@tvmdl.tamu.edu

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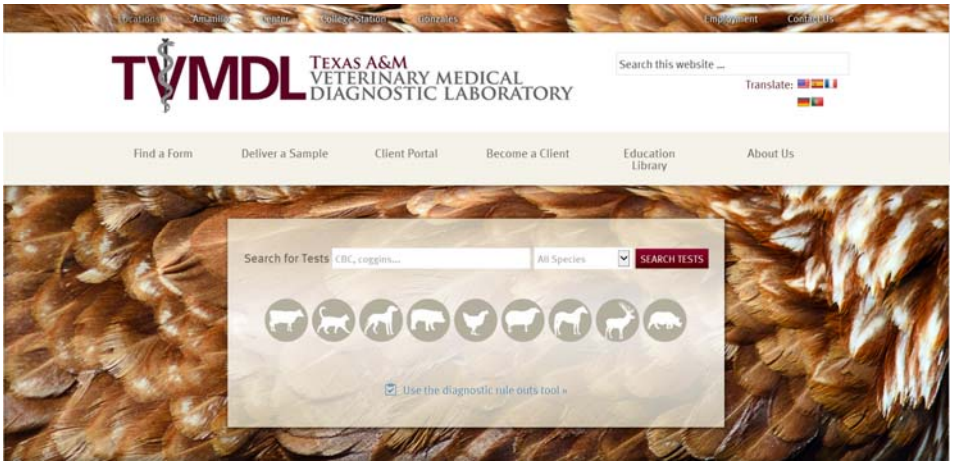

Protecting animal and human health through diagnostics

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Small Animal Case Presentation

- Adult male cat - 15 pounds

Clinical History

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

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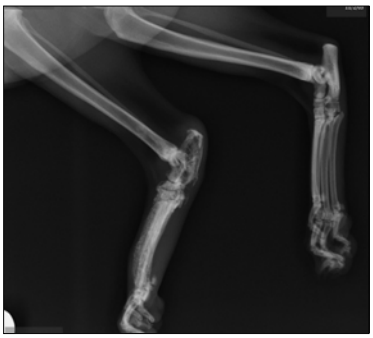
- Submitting vet performed blood work – results normal
- Radiographs taken at clinic



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Samples Submitted to TVMDL

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

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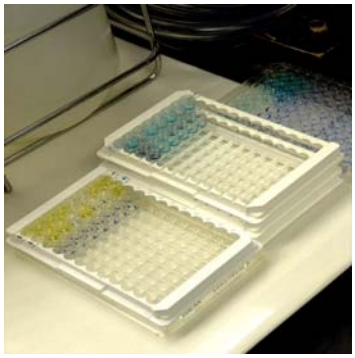
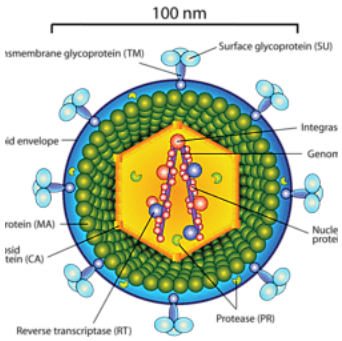
Virology Results

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





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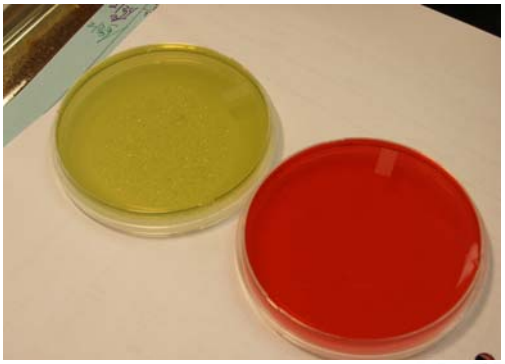
Bacterial Culture Results

- No bacterial growth
- Tiny slow-growing fungal colonies after 3 days on blood agar



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Histopathology Results

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

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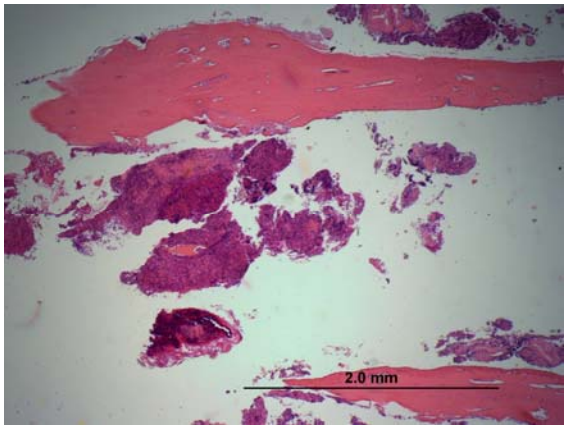
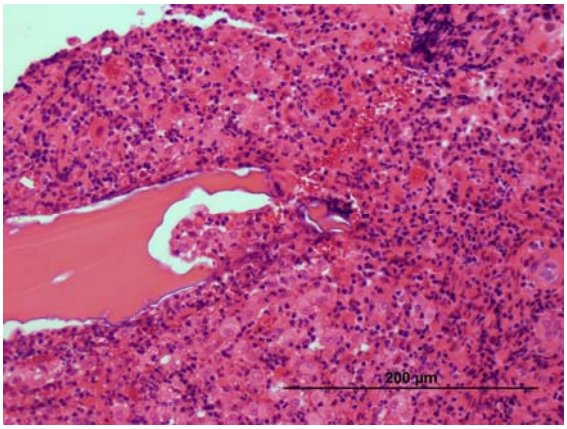
Bone Section, H&E





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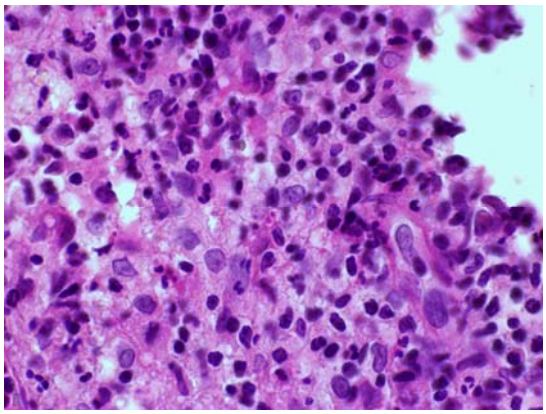
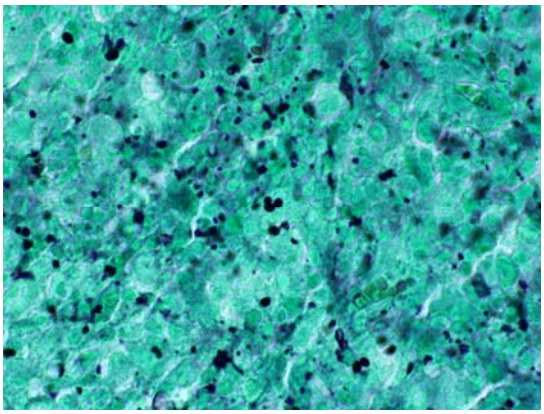


Bone section, PAS



Bone section, GMS

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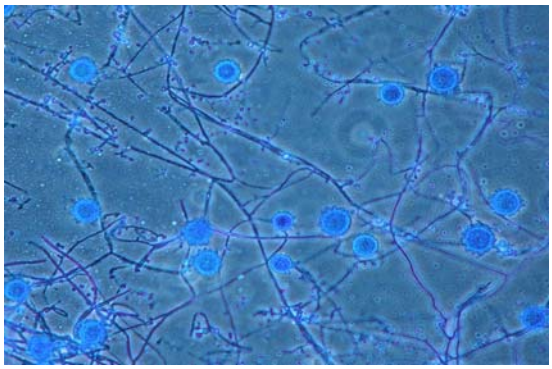
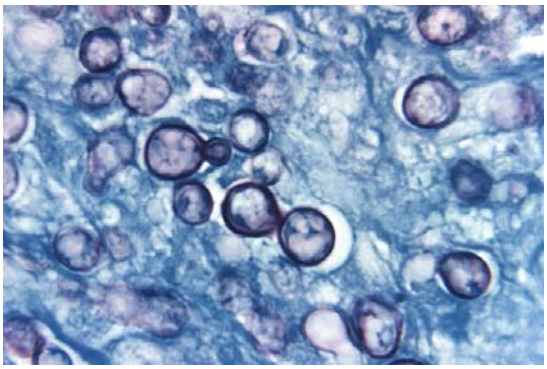
Histoplasma capsulatum





Molecular sequencing was also done for confirmation

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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
  - Humans

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Histoplasmosis

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

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Case Coordination

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

Impacts

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

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Large Animal Case Presentation

- Clinical history
  - December, coastal bend area, coastal bermudagrass pasture
  - Herd of 25 hd observed, all fine except 2 seemed stiff
  - Two days later, 4 cows down, including the stiff ones
  - Good body condition, sternal, alert – but could not rise
  - One was noted to have dark urine
  - Clinical Dx – coffee senna poisoning
- Samples submitted
  - Serum on 3, whole blood, urine
  - Plants for identification
    - Winter weeds, none known to be toxic

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Clinical Pathology

- Urinalysis (1)
  - Opaque brown, 3+ for hemolyzed blood, 4+ for protein
- CBC (1)
  - Elevated fibrinogen – normally 300-700 mg/dL, was 1500 mg/dL
- Serum chemistry panels (3) were all normal *except*
  - AST (aspartate aminotransferase, liver indicator) – normally 47-138 U/L
    - 5041, 3440, 5224 U/L
  - CK (creatine kinase, muscle indicator) – normally 77-256 U/L
    - *All three animals > 100,000 U/L*

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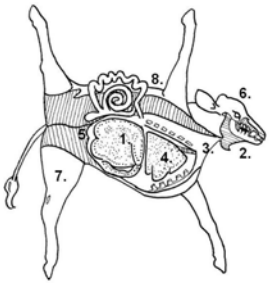
- Two of the animals died
- Necropsy (x2) by Rvet, submitted to TVMDL
  - Fixed tissues: liver, kidney, spleen, lung, skeletal and cardiac muscle
  - Fresh tissues: eye, liver, kidney, rumen content



Sequence
1. Abdomen (forestomachs, intestines, liver, spleen)
2. Oral cavity (tongue, teeth, oropharynx)
3. Neck (larynx, trachea, oesophagus)
4. Thorax (heart, lungs)
5. Abdomen revisited (urogenital organs)
6. Head (brain, eyes, nasopharynx)
7. Feet and limbs (muscle, nerves, bone marrow)
8. Spine (spinal cord)

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Toxicology: Rumen content microscopy

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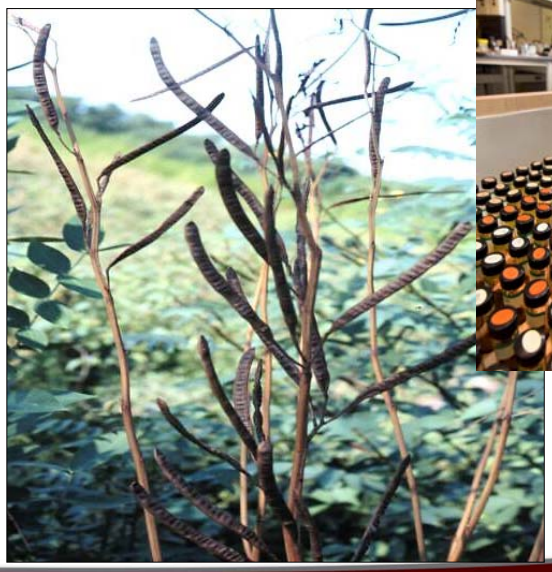
- Confirmed ingestion of coffee senna



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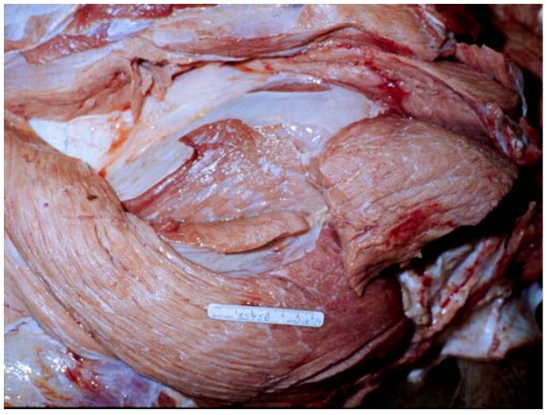
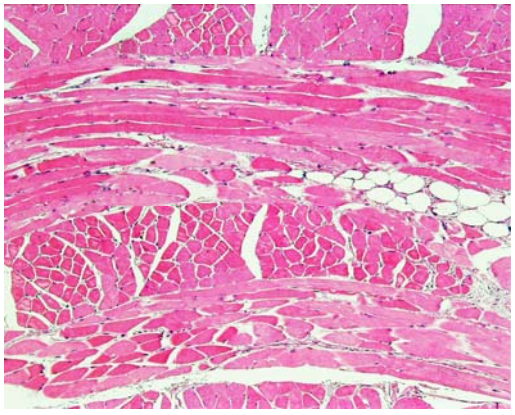
Histopathology





- Confirmed necrosis in skeletal muscle

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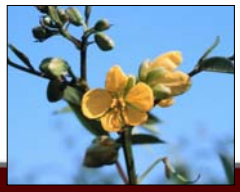
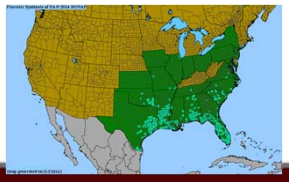
Coffee Senna (*Senna occidentalis*)





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TVMDL Texas A&M Veterinary Medical Diagnostic Laboratory

Case Coordination

- Histopathology findings
- Supported by Toxicology microscopy results
- And Clinical Pathology parameter values
- In conjunction with the local practitioner's observations and geographic location

Impacts

- Identification of etiology leading to appropriate actions
- No need to pursue zoonotic/non-zoonotic disease differentials with further testing – Leptospirosis /Babesiosis (tick fever) and Bacillary hemoglobinura

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Protecting Animal and Human Health through Diagnostics

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