Bronson Animal Disease Diagnostic Laboratory Testing Review

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Gloria M. Wood, HT(ASCP)

Only AAVLD accredited Lab in FL

The American Association
of
Veterinary Laboratory Diagnosticians
Accreditation Committee

certifies that

Bronson Animal Disease Diagnostic Laboratory
Florida Department of Agriculture and Consumer Service
Kissimmee, Florida

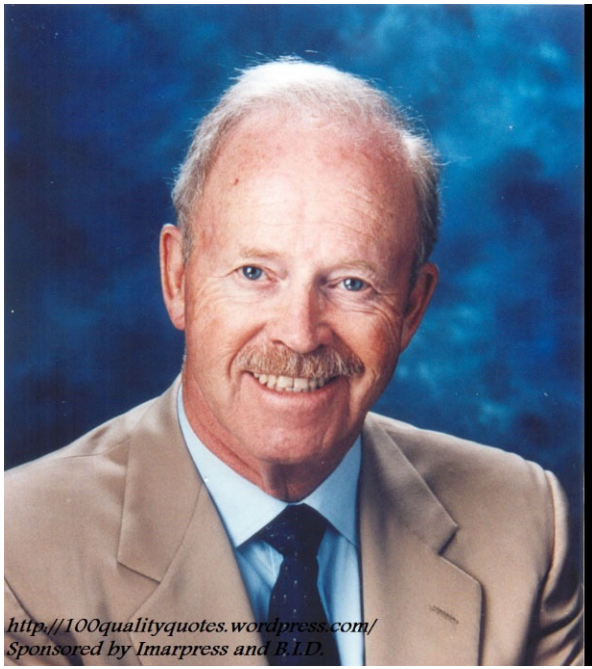
Has met the standard for
Full Accreditation / All species

Tim Baszler, co-chair, Committee

Dave S. Korcal, co-chair, Committee

Expires December 31, 2024

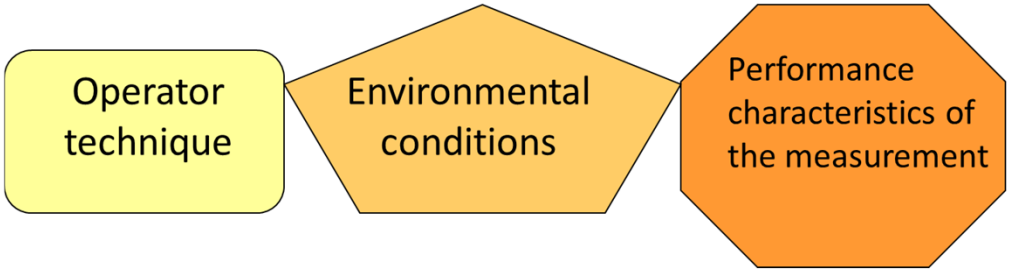
Laboratory Accreditation/ ISO 17025



"Quality is the result of a carefully constructed cultural environment. It has to be the fabric of the organization, not part of the fabric."

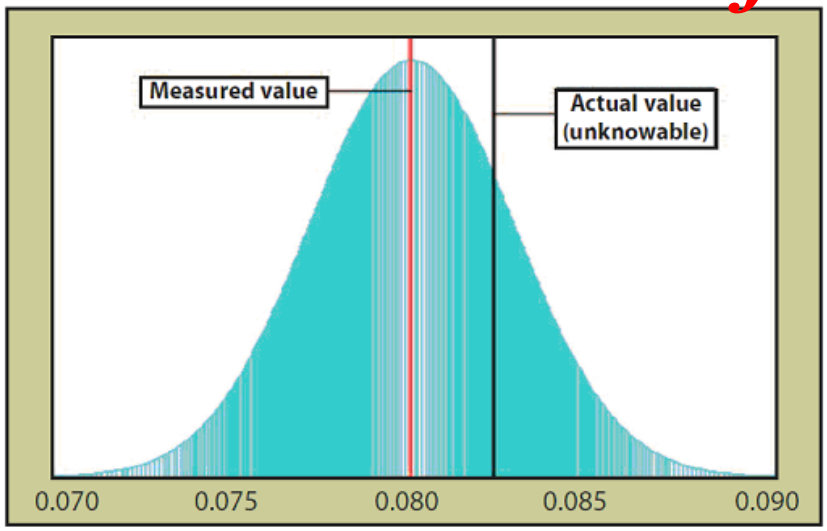
Phill Crosby

Measurement of Variability

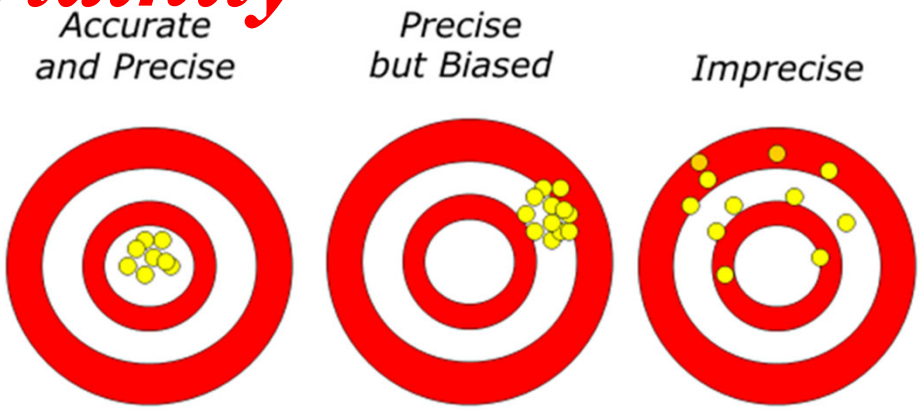


Accuracy and Precision

Measurement of Uncertainity



Source: Ted Vosk, "DWI: Trial by Numbers," The Champion, November 2010, at 48.



Accurate = Precise but not Biased

The Silent Diagnosis: Unknown

Donald Rumsfeld
Department of Defense news briefing
Feb. 12, 2002

There are known knowns.
There are things we know we know.

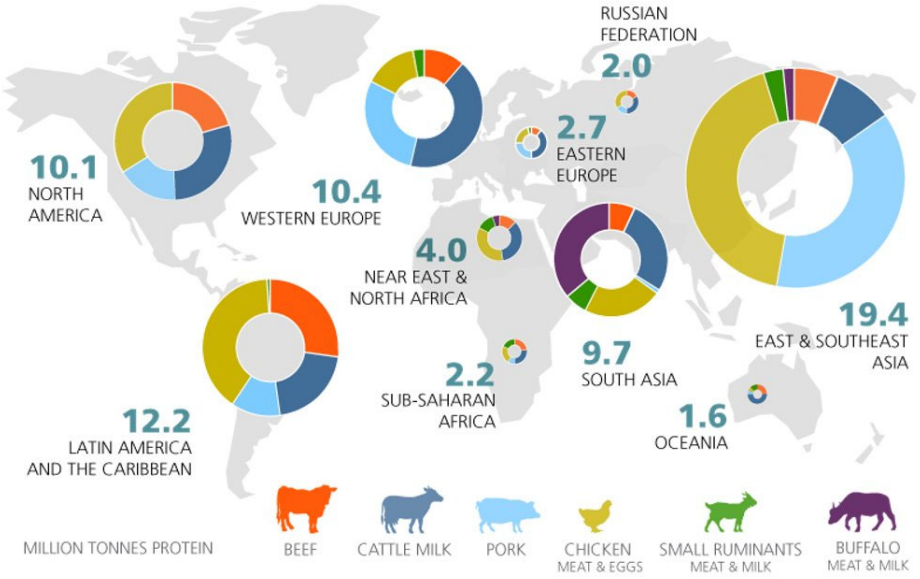
There are known unknowns.
That is to say
We know there are some things we do not know.

But there are also unknown unknowns,
The ones we don't know We don't know.

An effective quality management system defends against The Unknown Unknown

Veterinary Diagnostic Laboratories

Protect global food supply



- Animal Health
- Public health/One health
- Emerging pathogen discovery
- Antimicrobial Stewardship
- Animal models of human disease/drug development

Global livestock production by region (milk and eggs expressed in protein terms) FAO, CC BY-ND

Network of Laboratories-Federal Partners

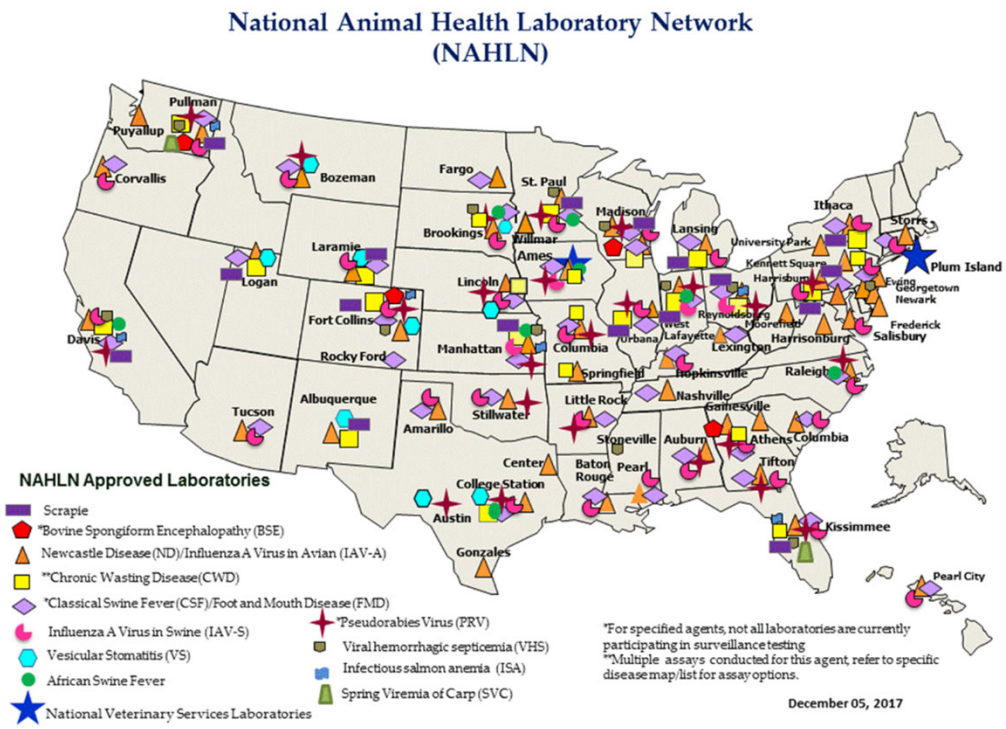
USDA

NPIP

NATIONAL POULTRY IMPROVEMENT PLAN

FERN

FDA



USDA-NVSL

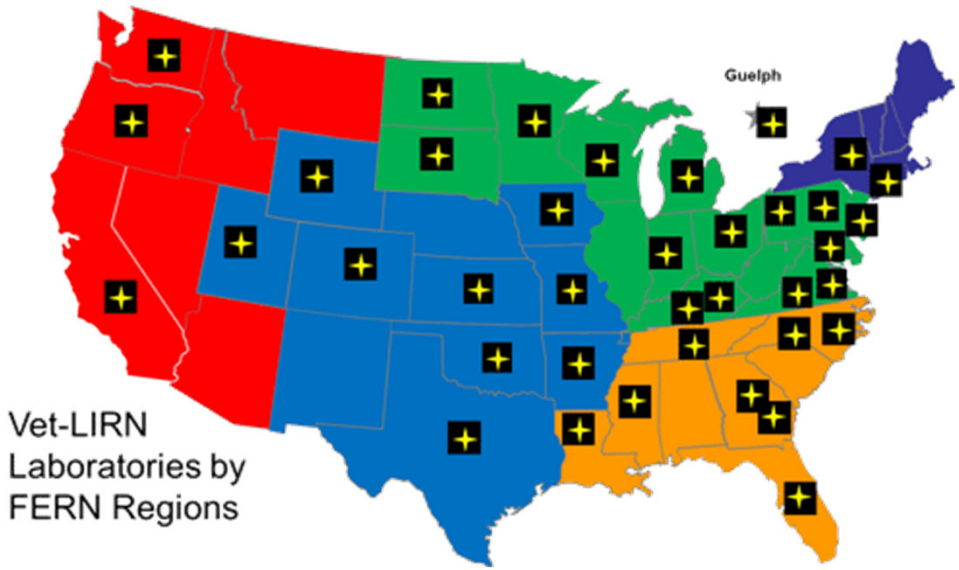
means

United States Department of Agriculture-National Veterinary Services Laboratory

Pacific Region
Southwest Region
Central Region
Northeast Region
Southeast Region

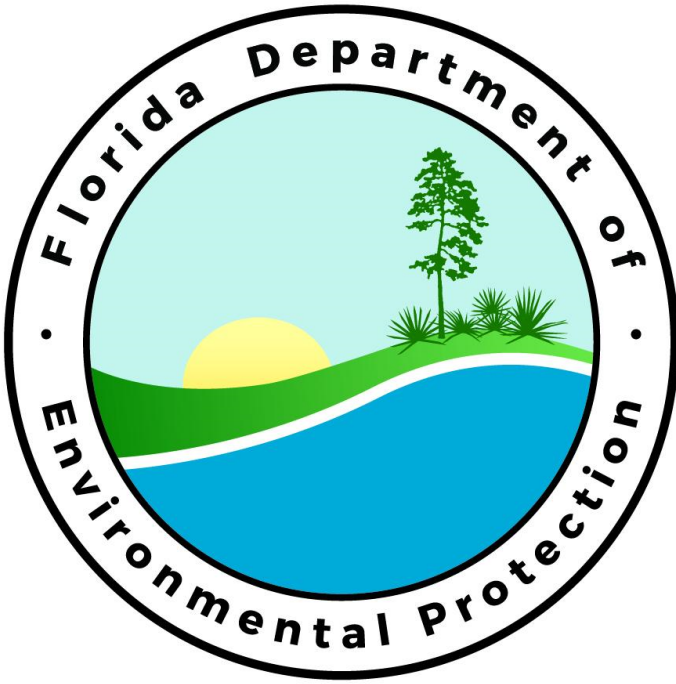
Vet-LIRN Laboratory

Vet-LIRN



Vet-LIRN Laboratories by FERN Regions

State Partners



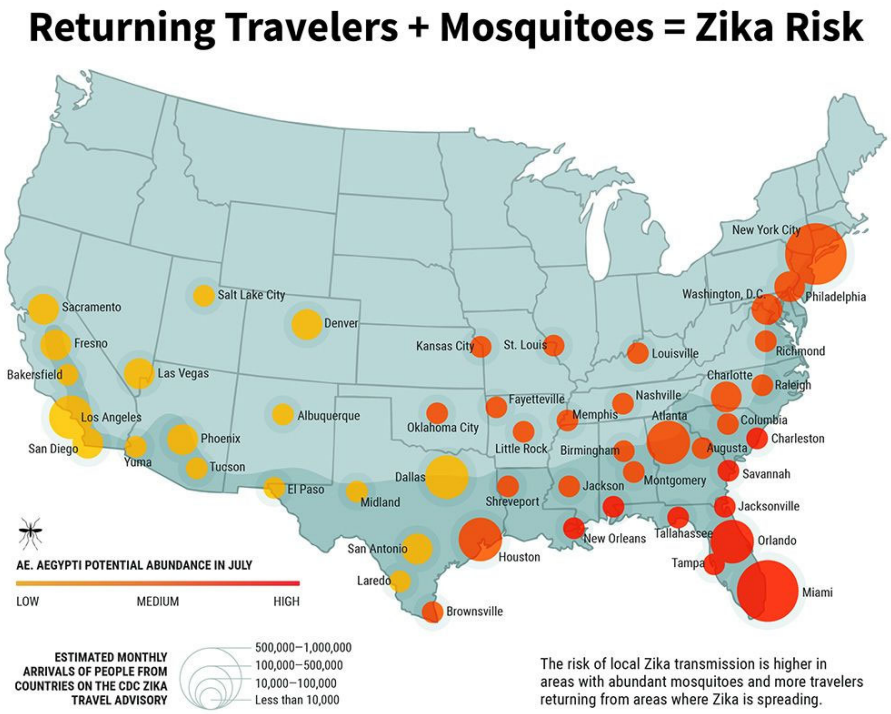
UF
UNIVERSITY of FLORIDA

LMU

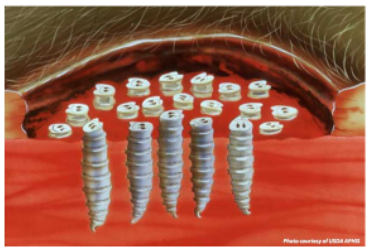
FLORIDA DEPARTMENT OF HEALTH

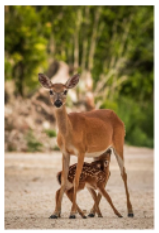
FL Comprehensive Laboratory Response Plan

Florida "Gateway of Diseases"



New world Screw worm outbreak





- Subtropical weather
- Vector paradise
- International trade (Export and Import)
- Visitors paradise

www.People.com

BADDL: New Facility

Laboratory Advisory Committee
Industry needs and Stakeholder's input

- Laboratory advisory committee
- Florida diverse Animal industries-representatives
- DOH, UF, FWC, USDA
- Quarterly meetings

Sections of the Laboratory

- Bacteriology
- Serology
- Virology
- Molecular Diagnostics
- Clinical Pathology and Parasitology
- Histopathology and Immunohistochemistry
- Necropsy

Subject Matter Experts

- Reddy Bommineni: Microbiology, Pathology, Poultry
- John Roberts: Anatomic Pathology, Poultry
- Gizela Maldonado: Anatomic Pathology
- Joanna Hyland: Anatomic Pathology
- Justin Stillwell: Anatomic Pathology (aquatic)
- Abraham Pellissery: Bacteriology/serology
- Natalie Stillwell: Aquaculture
- Sivakumar Periasamy: Virology/Molecular Diagnostics
- Lijuan Zhou: Molecular Diagnostics/ Sequencing
- Mamoon Rashid: Client Services
- Jaqueline Minger: Anatomic Pathology resident
- Dilan Satharasinghe : One health fellow

Who Can Submit Samples

- Veterinarians
- Farm Managers (commercial and Backyard)
- General Public
- Government Agencies
- University Faculty/staff
- Zoos, private collections and Shelters
- County Animal control agencies
- Race tracks
- Mosquito Control Districts

Fee schedule Rule 5C-13

What can be sent to the Lab

- Whole body (carcass)
- Blood or Serum/Plasma
- Swabs
- Milk or Fluids (exudate, Aspirates)
- Biopsies (Fresh or Fixed tissues)
- Feed or water in question (Toxic plants)
- Feces, Urine
- Skin, ear notch and Hair (skin scrapings)
- External parasites

Advantages of Necropsy submissions

- Highly subsidized /cost effective
  - Food animal $100 (Poultry $50 up to 5 birds)
  - Others $150

  If proper sample received -provides comprehensive information about cause of death
- All the tests we perform in our Lab are included that Price
- If we send anything outside the lab will incur additional costs

Things to Consider Before Sampling

- Individual animal Vs Herd testing
- Local Conditions
  - Geography/Climate-Overwintering
  - Se deficiency or toxic algae
- Base Line Values
- Prevalence Rate
- Vaccinations
- Antibiotics used
- Disease Challenges (that you know)
- Type of Animal Husbandry (Farm Management)

What do we need to produce quality result?

What is GIGO?

Garbage In, Garbage Out

Client Services

- Sampling/Collection/Packaging
- Pooling Vs Individual testing
- Test statistically significant numbers
- Herd Health Plan
- Presenting problem Vs Underlying Problem
- Frequency of testing
- Export or out of state movement
- Types of tests For Example: What Salmonella test

Diagnostic Philosophy

- Publicly funded labs Vs Private labs
- Added Value (Customer Service)
- Presenting Problem Vs Underlying Problem
- Livestock Vs Companion Animals
- Corporate Agriculture Vs Small farms
- Regulatory Diseases
- Trend Analysis

Regulatory Veterinary Medicine

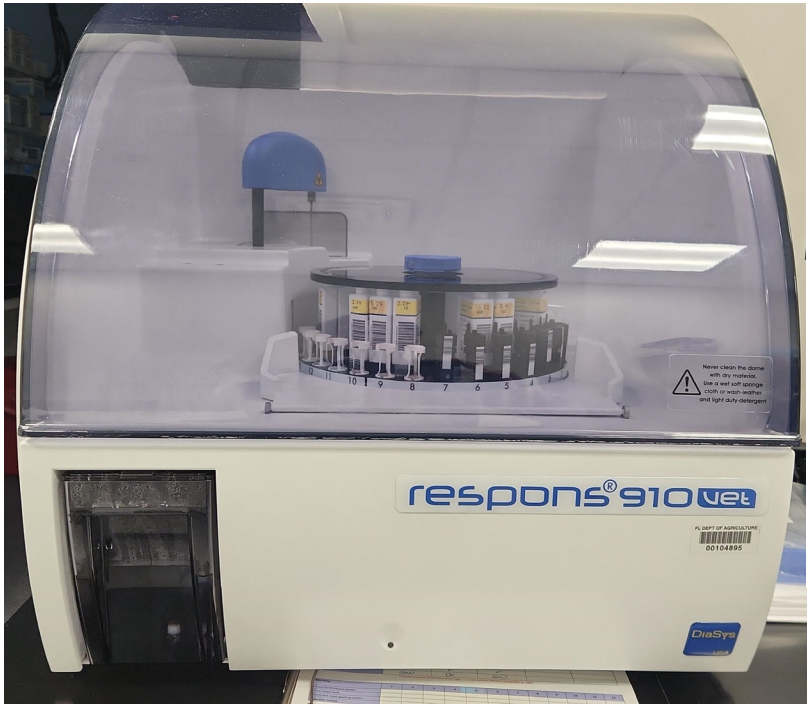
- Who Controls What
- State Veterinarian /USDA AVIC
- NPIP (National Poultry Improvement Plan)
- USDA Program Diseases and FAD Investigations
- NAHLN (National Animal Health Laboratory Network)
- FSIS
- FDA (Example: FDA Egg Rule)
- CDC/DOH
- Reportable diseases and system of reporting
- Trade Embargo (Implications)

Bacteriology

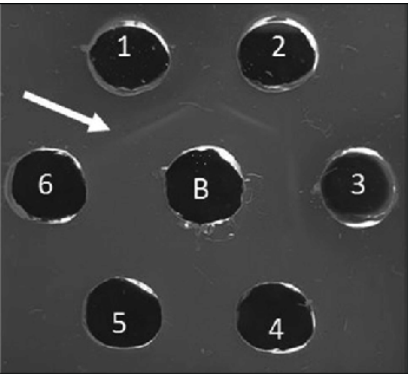
- MALDI-TOF Bacterial Identification System ($210,000)

  New Automated Technology for Precise Bacterial Identification
- Antimicrobial Susceptibility Testing
- Sensititer, New Equipment for Antibacterial Susceptibility Testing (Digital MIC System)

Clinical Pathology and Parasitology



Clinical Pathology



Serology

- Several types of Antibody based tests
- Agglutination Ex: Brucellosis or Pullorum
- Precipitation (AGID) Ex: EIA, BLV
- ELISA
- Pregnancy Tests

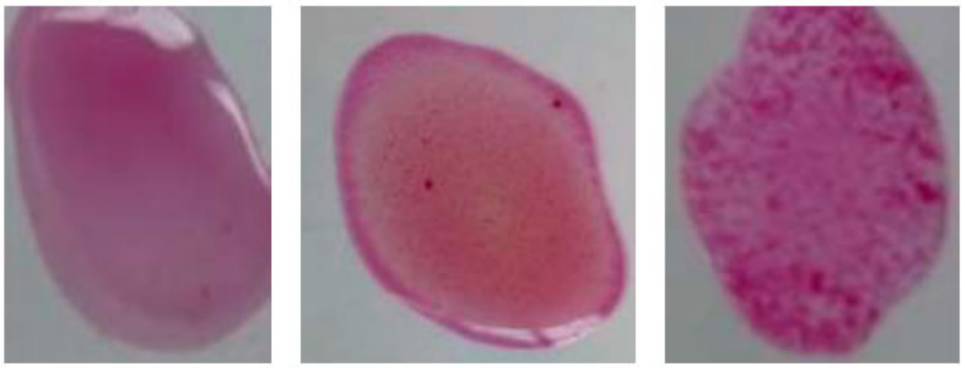


Figure 1. Rose Bengal plate test showing agglutinations. From left No agglutination, Moderate agglutinations, Strong agglutunations.

Virology

- Virus isolation, Cell Cultures are handled
- Neutralization tests
- Electron Microscopy
- Immuno-Fluorescence (Direct or Indirect)
  - Rabies (IFA and PCR)
  - Parvo PCR (Feline and Canine)
  - FIP, Toxoplasma

Molecular Diagnostics

- BVDV
- EHV-1
- WNV and EEE PCRs
- Avian Influenza A
- Toxoplasma
- Chlamydia
- Leptospira
- Mycoplasma PCR

Toxicology

- We don’t have Toxicology section or Toxicologist on staff
- Our Pathologists are able answer routine questions
- We work closely with AES to investigate syndromic patterns
- Vet -LIRN Level-1 lab (FDA)
- MSU, TVMDL and ISU (referral labs)

One Health

People who protect human, animal, and environmental health, and other partners

Coordinating

Communicating

Collaborating

To achieve the best health outcomes for people, animals, plants, and our environment

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

CS292933-A

SARS-CoV-2 PCR at BADDL

Animals	No. of animals	No. of samples	No. of pos animals
Alpaca	1	2	0
Bear	1	4	0
Cat	30	46	5
Cheetah	3	7	0
Civet	2	2	0
Clouded Leopard	2	6	0
Cow	1	1	0
Dog	21	45	2
Ferret	5	8	1
Florida Panther	1	1	0
Giraffe	1	2	0
Goat	1	1	0
Koala	1	1	0
Lion	2	2	0
Otters	6	26	3
Spotted hyena	1	2	0
Tiger	7	26	3
Wallabies	1	2	0
Total	**87**	**184**	**14**

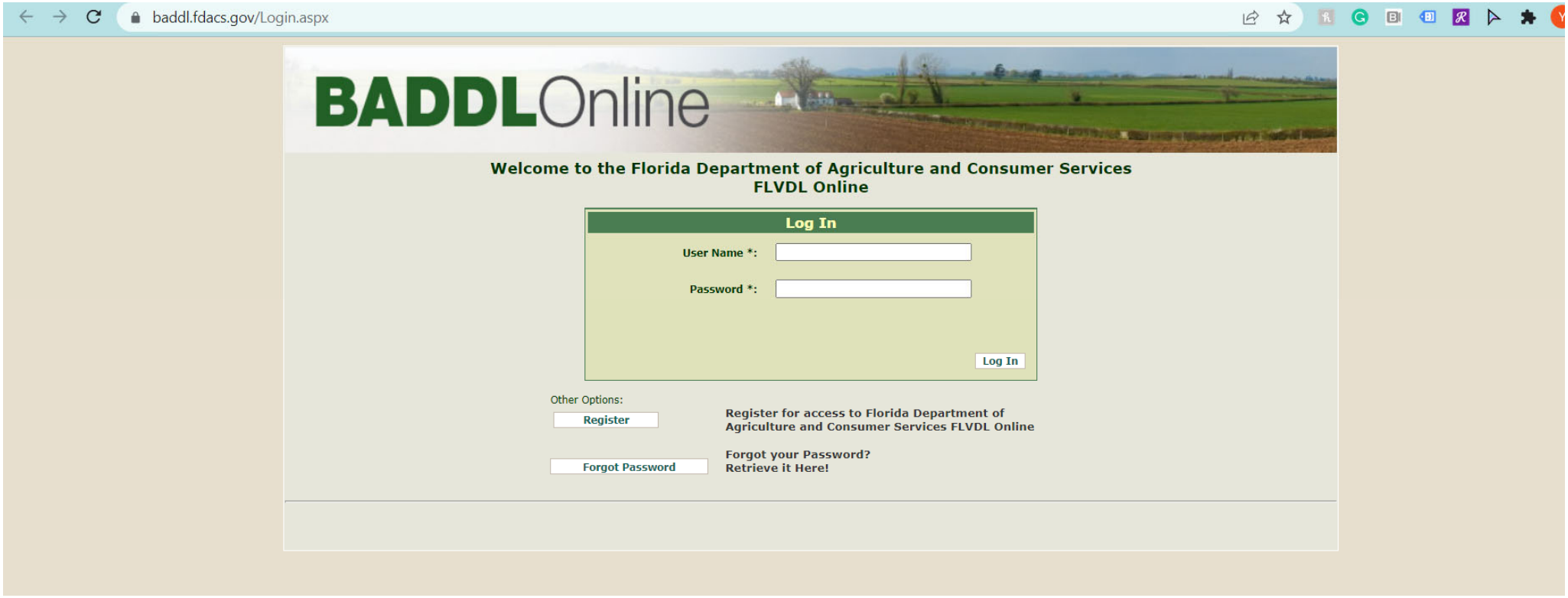
Outreach

www.fdacs.gov/baddl

- Educational Materials
  - Newsletter
  - New Brochures being Developed
    - Salmonella, Campylobacter and AMR

- Magazine Advertisements

BADDL Portal for results



Service Type	Weight Limit	Additional Restrictions	Cost (Flat Rate)
FedEx Priority Overnight	<10 lbs.	Sent from Florida	$20
FedEx Priority Overnight	11–20 lbs.	Sent from Florida	$30
FedEx Priority Overnight	21–40 lbs.	Sent from Florida	$40
Saturday Delivery	N/A	Cost is in addition to Priority Overnight service rate.	$20

While Submitting Samples

- Please fill out the submission form with detailed History

- https://www.fdacs.gov/Consumer-Resources/Animals/Bronson-Animal-Disease-Diagnostic-Laboratory-BADDL

Bacterial Diseases

- **E. coli Infections:** A common cause of diarrhea and septicemia in crias (baby alpacas).
- **Streptococcal Infections:** Can cause various issues like pneumonia, mastitis, and septicemia.
- **Respiratory Syncytial Virus (RSV):** A common viral infection causing respiratory illness.
- **Mycoplasma haemolamae:** A blood-borne organism that can cause anemia.

Viral diseases

- **Bovine Viral Diarrhea Virus (BVDV):** This pestivirus can cause a range of issues, including diarrhea, respiratory problems, abortions, and birth defects in alpacas. Persistently infected crias (young alpacas) are a major source of infection within a herd.
- **Equine Herpesvirus-1 (EHV-1):** While typically associated with horses, EHV-1 can cause neurological signs like blindness, encephalitis, and even death in alpacas. Prevention through biosecurity is crucial due to its highly contagious nature.
- **West Nile Virus:** Alpacas are considered dead-end hosts, meaning they can be infected but don't typically transmit the virus. Infected animals may exhibit neurological signs like ataxia, blindness, or paralysis.
- **Contagious Ecthyma (Orf):** This zoonotic parapoxvirus causes crusty lesions on the nose and mouth. It's highly contagious and can affect various ruminants, including alpacas.
- **Borna Disease Virus 1 (BoDV-1):** .Alpacas are highly susceptible to this virus, which can cause a progressive meningoencephalitis. Lesions can be found in the cerebrum and pituitary gland.
- **Encephalomyocarditis virus (EMCV):** This virus can cause a range of clinical signs in alpacas, including inappetence, colic, and death. Necropsy findings may reveal myocardial degeneration and necrosis, along with mild meningoencephalitis.
- **Alpaca Respiratory Coronavirus:** An outbreak in 2007 highlighted this virus as a cause of respiratory disease in alpacas, particularly under stress conditions.

Neurologic Diseases

- Meningeal worm (Parelaphostrongylus tenuis)
- Listeriosis
- Polioencephalomalacia
- Viral infections like West Nile virus and equine herpesvirus.

Lymphoma

Bovine Viral Diarrhea (BVD)

The signs of BVD vary, depending on the immune status of the exposed animals, and the strain of the infecting virus.

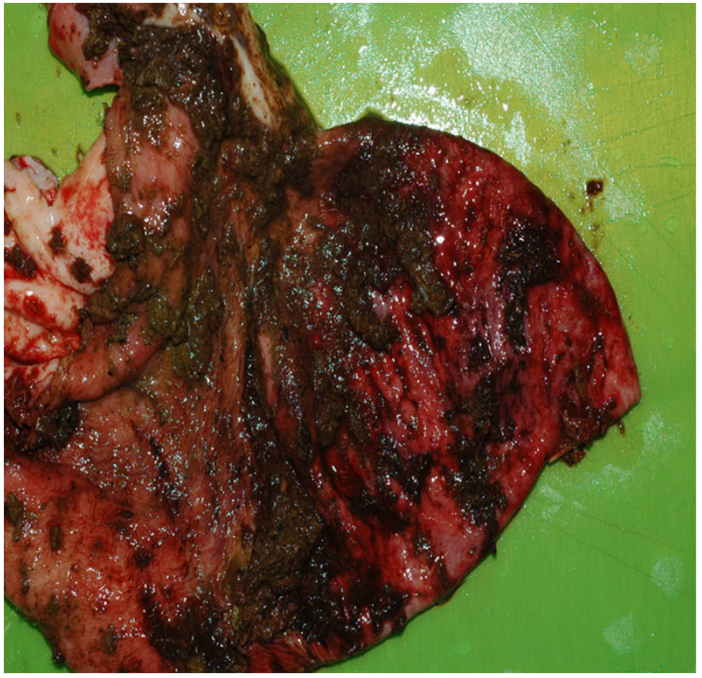
Range of issues including illness, abortions, and the development of persistently infected (PI) crias.

These PI crias shed large amounts of virus throughout their lives and are the primary source of BVDV spread within the alpaca population, often without obvious signs of illness for months.

Preventing BVDV involves maintaining a closed herd whenever possible. Strict biosecurity measures, such as a 30-day quarantine for new or returning animals and testing them before herd introduction, are also important.

Identifying and removing PI animals is vital as they are a constant source of infection.

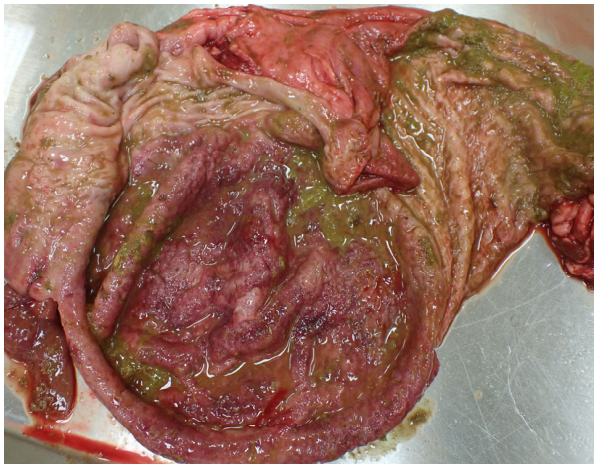
Currently, there is no BVDV vaccine specifically licensed for alpacas, and the effectiveness of cattle vaccines in camelids is uncertain, so vaccination is not currently recommended.

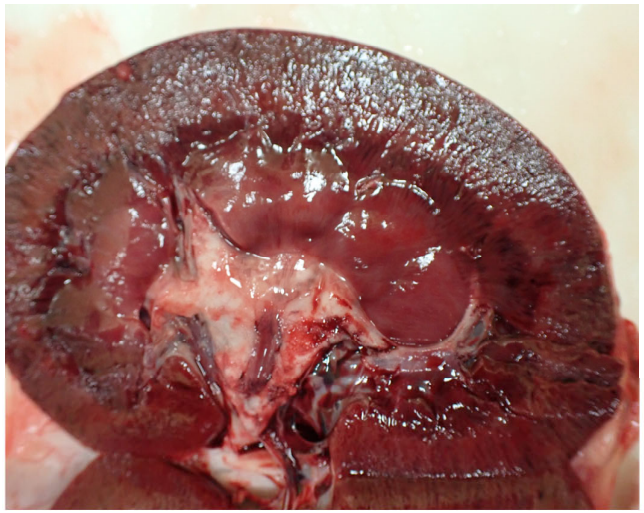


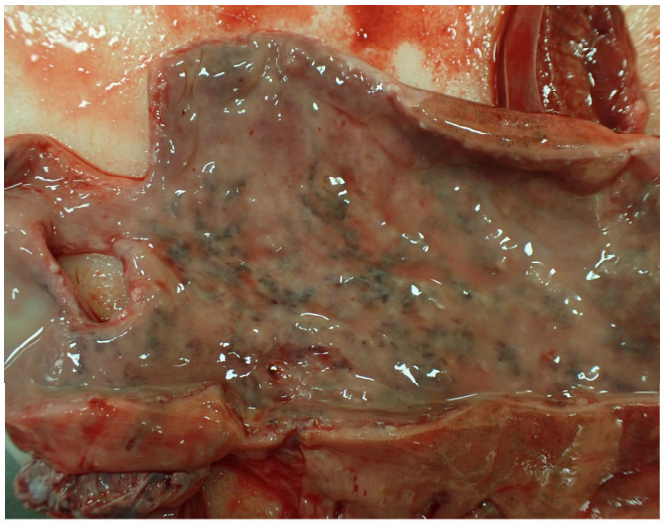
BlueTongue

Bluetongue is a noncontagious, infectious, arthropod-borne viral disease primarily of domestic and wild ruminants. Infection with bluetongue virus (BTV) is common in a broad band across the world.

Bluetongue is a viral disease of ruminants worldwide. Clinical signs in sheep result from vascular endothelial damage, including edema of the muzzle, tongue, and coronary bands. Diagnosis is made on clinical suspicion and viral identification. Control and prevention measures consist of vaccination, where available, and vector control.







Skin and other diseases

- **Dermatophilus:** A bacterial skin condition causing crusty scabs.
- **Ulcerative Pododermatitis:** A condition causing blisters and sloughing of the footpads.
- **Ringworm:** A fungal infection causing circular, scaly patches on the skin.
- **Gastric Ulcers:** Can cause teeth grinding, excessive salivation, and other symptoms.
- **Heat Stress:** Can lead to rapid breathing, shaking, and other symptoms.
- **White Muscle Disease:** A deficiency in Vitamin E and Selenium causing muscle weakness and stiffness.
- Rickets (Vitamin D Deficiency): This bone disease is caused by insufficient vitamin D, leading to impaired calcium and phosphorus absorption, Symptoms include lameness, enlarged joints (especially the carpus or knee), slowed growth, reluctance to move, and a hunched-back stance. It is most common in crias born in the fall and winter, particularly in areas with limited sunlight exposure. Darker-fleeced alpacas are also more susceptible.
- **Berserk Llama Syndrome (BLS):** A behavioral disorder affecting llamas and alpacas raised by humans, characterized by aggressive behavior towards humans.
- TB Tuberculosis

Parasites

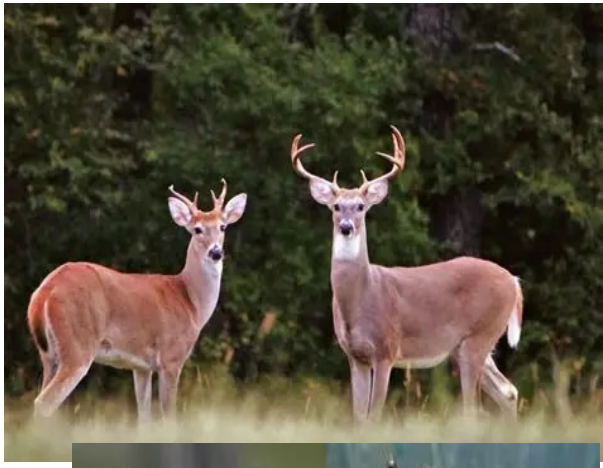
- These include nematodes (worms) like barber pole worm (Haemonchus spp.), scour worms, Nematodirus spp., Trichostrongylus spp., and Strongyloides spp.

- Alpaca lungworms, specifically Dictyocaulus viviparus, are a common respiratory parasite of alpacas that can cause coughing, difficulty breathing, and decreased overall health.

- Alpacas are also susceptible to liver fluke (Fasciola hepatica) and protozoal infections like coccidiosis (Eimeria spp.),

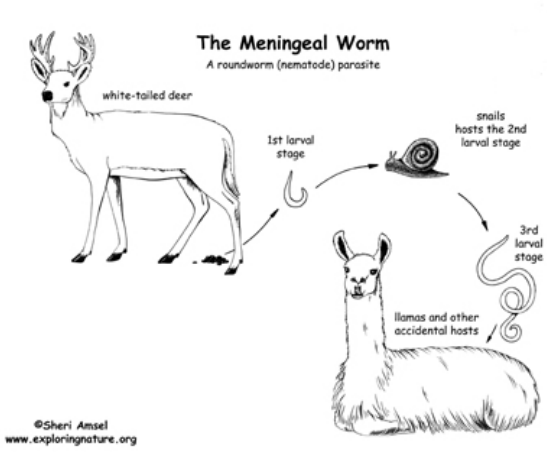
- Mange: Mite infestations, primarily by Chorioptes and Sarcoptes mites, can cause severe skin irritation, itching, hair loss, scaling, and crusting. Sarcoptic mange can be particularly severe, leading to emaciation and even death if left untreated. Early detection and treatment are crucial to prevent spread within the herd.

The meningeal worm (Parelaphostrongylus tenuis)



- Common parasite of white-tailed deer (WTD) and white-tailed deer only.

- Mule deer, fallow deer, moose and elk are aberrant hosts for the parasite



Hosts: Llama, alpaca, goat, sheep, horse

The parasite has an indirect life cycle: Terrestrial snails an slugs are needed as intermediate host

Once ingested, larva travels from GI Tract to spinal cord to brain causing progressively worse symptoms, lameness, gait abnormality, hind quarter weakness, paralysis, death

Parasitology Tests

- Fecal Floatation (Zinc Sulfate – Sucrose centrifugation): Routine diagnostic procedure used to identify internal parasites from intestines and stomachs. It detects eggs of mature worms that are being shed in the stool like nematode ova, cestodes and protozoa (coccidia, giardia). 2 gr needed

- Baermann test: process that allows identification of lungworm. Dictyocaulus viviparus and filaria. 5 gr needed

- McMaster's egg count (Quantitative): Reported as eggs per gram of feces. A counting chamber is used which enables a known amount of the fecal suspension in Zinc Sulfate. 4gr needed

Parasitology Tests

- Sedimentation: allows identification of Trematodes like Fasciola hepatica (liver fluke) and Paramphistomum spp. (rumen fluke), 5gr needed

- Parasite and Tick Identification: allows identification of external parasites and adult intestinal worms as well as ticks. Sealed container with 70% alcohol.

-Cryptosporidium & Giardia DFA: Direct Fluorescent Antigen detection immunoassay

- Direct Smear: allows identification of motile protozoa.

Turnaround Time: 24 hours
Price: $10-15 per sample
Submit with ice packs and keep in the fridge if not shipped immediately.

https://www.fdacs.gov/Consumer-Resources/Animals/Bronson-Animal-Disease-Diagnostic-Laboratory-BADDL/tests-and-fees

Clinical Pathology Tests

Large Animal Chemistry Profile: provides in vitro quantitative determinations of albumin (ALB),alkaline phosphatase (ALP), Aspartate aminotransferase (AST), calcium (CA), creatine kinase (CK), gamma glutamyl transferase (GGT), globulin (GLOB), magnesium (MG),inorganic phosphorus (PHOS), total protein (TP) and urea nitrogen (BUN) in serum.

Electrolyte Panel: Provides in vitro quantitative measure of Sodium (Na+), Potassium (K+), Chloride (CL-).

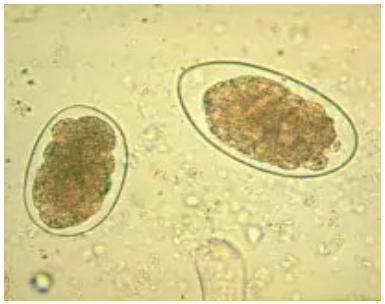
Progesterone: To confirm ovulation at day 8.
To confirm adequate levels of P4 to maintain pregnancy at day 14 and beyond. 1ml of serum needed
In the 11^{th} month of gestation (2 weeks before parturition)

Other tests offered: ACTH, Insulin, Cortisol, Testosterone, Thyroid Panel.

Most Common Intestinal Parasites in Camelids

Nematodes:

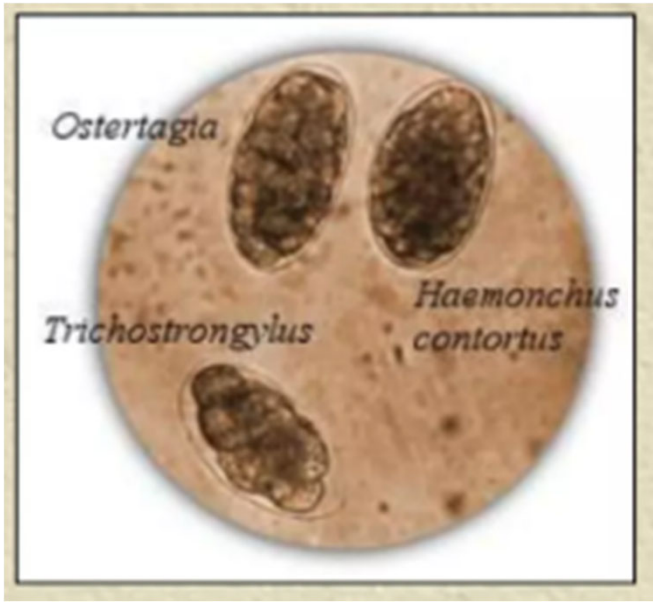
Trichostrongylus, Nematodirus, Trichuris Haemonchus are often lumped into the general category of “strongyles” since the eggs look identical. There is an overlap in size and shape, they look very similar.

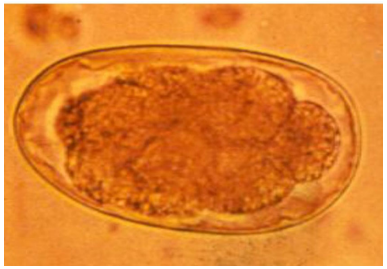


Trichostrongylus sp.

Nematodirus sp.

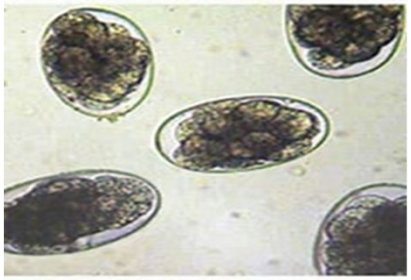
Dictyocaulus viviparus and D. Filaria affect camelid sp. (Lungworm)





Ostertagia (Brown stomach worm)

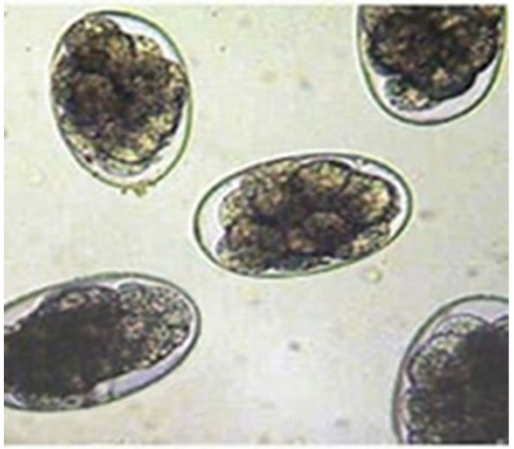
Trichuris & Capillaria sp.



Haemonchus sp.

Most Common Intestinal Parasites in Camelids

Haemonchus contortus: roundworm, (roundworm) red stomach worm, wire worm or barber's pole worm.

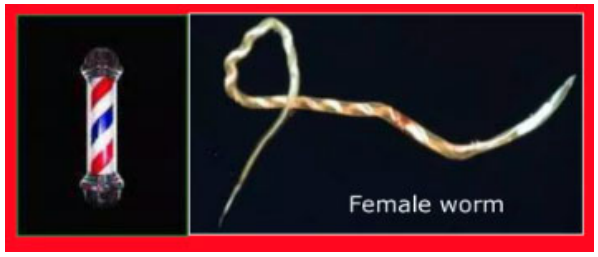


Haemonchus sporulated ova

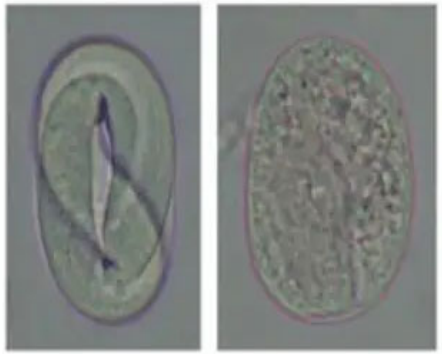
Note the twisted appearance of some, which is why this parasite is also known as the barber pole worm

Haemonchus attached to the walls of the abomasum

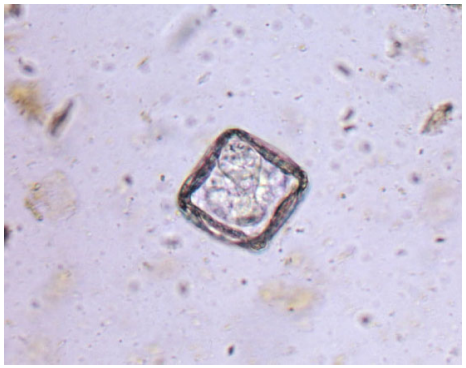
A blood-sucking parasite that lives in the 3rd gastric compartment which is equivalent to the abomasum.



Most Common Intestinal Parasites in Camelids

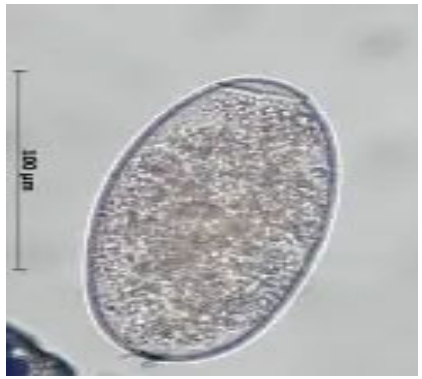


Nematode: Strongyloides sp. Larvated ova

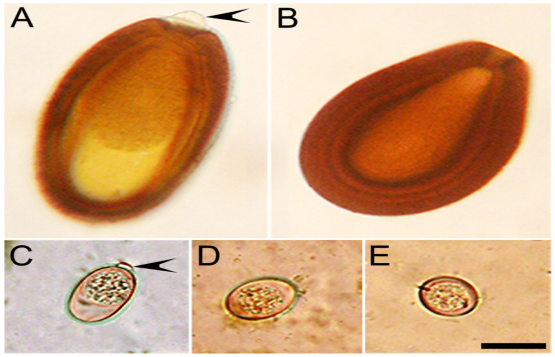


Cestode: Moniezia sp.
Common name: Tapeworm

Trematode: Fasciola hepatica

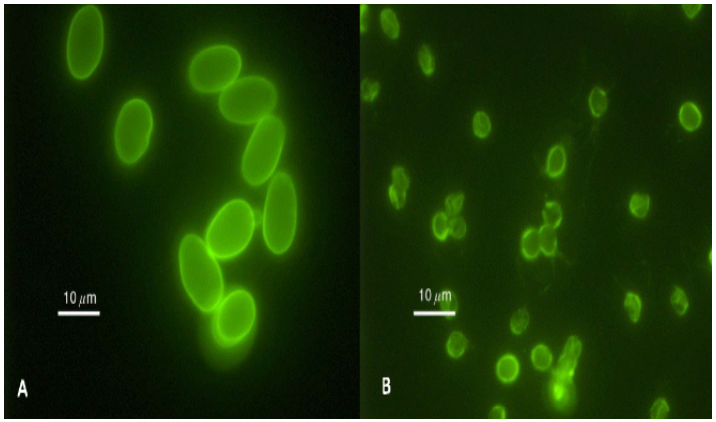


Trematode: Paramphistomum sp.



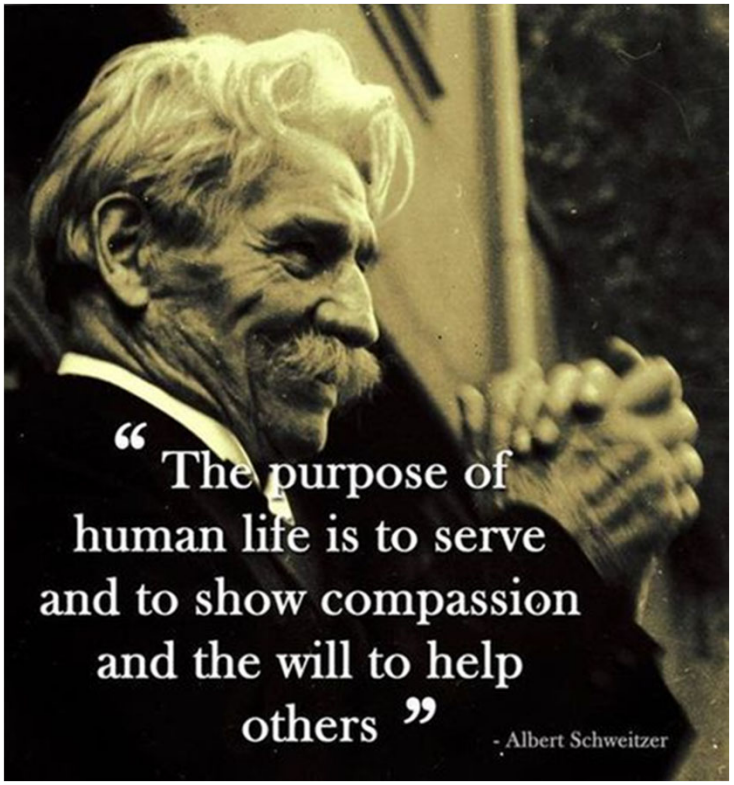
a) E. ivitaensis
b) E. macusaniensis
c) E. lamae
d) E. alpace
e) E. punoensis

Cryptosporidium and Giardia, Direct Fluorescent Antigen (DFA) detection



321 697 1400

diaglab@fdacs.gov



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