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A newsletter about diagnostic trends at the laboratory, animal health topics. interesting cases and new test offerings.

www.vdl.ndsu.edu

Feedback is always welcome. Please feel free to send your comments or suggestions to ndsu.vetlab@ndsu.edu and specify "newsletter" in the subject line.

NDSU Veterinary Diagnostic Laboratory

Director's Corner

The NDSU VDL is thawing out from winter's frost, and local urban wildlife - hares and a woodchuck have been spotted around the grounds.

A hybrid continuing education day is in the early planning stages. Topics under consideration include small animal oncology, highlights of the investigation into the canine respiratory infection that affected our region in 2023-2024, updates on avian influenza in nonavian species and, as always, toxicology and nutrition. Suggestions for other topics are welcome.

As we gear up for spring calving season, I want to highlight the subject matter experts at the NDSU VDL who coordinate diagnostic investigations. Dr. Michelle Mostrom is our veterinary toxicologist and leads our nationally recognized toxicology laboratory. Besides mycotoxin, phytoestrogen and ergot assays, the tox lab regularly tests for blister beetle toxin, bromethalin, and blue-green algae. Dr. Brianna Stenger has been spearheading the avian influenza testing for the last few years and is knowledgeable about all things about molecular diagnostics, including sequencing. Dr. Kelli Maddock heads the microbiology and BSL-3 labs. Dr. Maddock and her team of medical laboratory scientists are on the forefront for antimicrobial stewardship in veterinary medicine. Their drive and passion are moving the field of veterinary microbiology forward. Finally, Drs. Brett Webb, Quynn Steichen, Heather Mitchell and I round out necropsy and biopsy services. All of us are committed to animal health in our region and are available for consultation on difficult cases. We would love to talk to you about your cases of interest!

Best wishes for a productive spring,

Heidi Pecoraro, DVM, Ph.D., Diplomate, ACVP NDSU VDL Director and Veterinary Anatomic Pathologist



Dr. Heidi Pecoraro **Director and Vet**



Pathologist



Dr. Michelle Mostrom Vet Toxicologist

Dr. Brett Webb Vet Pathologist





Vet Diagnostician Vet Pathologist



Dr. Brianna Stenger

Molecular Biologist

Dr. Kelli Maddock

Microbiologist

Calendar: Spring Closures

May 26 – Memorial Day July 4 - Independence Day

VETERINARY DIAGNOSTIC LABORATORY North Dakota State University

Mystery Photo

A 1-month-old female Red Angus calf is presented for necropsy. The clinical history states that two calves out of 100 head have had diarrhea and died. The onset of diarrhea seems acute, as a calf is sick one day and then is found dead the following day.

Upon necropsy, the calf has good body condition (5/9) with adequate visceral and subcutaneous adipose stores and moderate postmortem autolysis. The small intestinal contents are thin, watery, yellow and opaque liquid. The large intestinal contents are yellow, mucoid and semi-formed. No significant abnormalities are observed in the remaining organs of the thoracic and abdominal cavities and brain.



What is the underlying cause?

(Mystery Photo: Small intestine contents. Photo courtesy H. Mitchell)

Visit the NDSU VDL website (www.vdl.ndsu.edu) to see the answers and read more about the case.

Bench Notes

EIA testing changes – From March 1 to May 31, Equine Infectious Anemia (Coggins) ELISA testing will be performed daily.

Rejection of samples – Unlabeled samples submitted for regulatory testing (Coggins or Brucellosis) and samples submitted with needles attached will be rejected. The submitting client will be contacted and informed of the rejected samples. Please review our shipping guidelines on our website at www.vdl.ndsu.edu/shipping/.

Bulk milk tank testing – The bulk tank milk culture guidelines have been updated with new interpretations and now include testing for *Prototheca*, a mastitis pathogen sensitive to freezing. Refer to the Milk Culture-Bulk tank test page on our website for more information: www.vdl.ndsu.edu/bulk-tank-milk-btm-culture-interpretation-guide/.

New Toxicology Nitrate/Nitrite in Serum and Ocular fluid test – This method is used if the serum sample is hemolyzed or if the ocular fluid is pigmented. This is an additional special request test and clients are asked to call Dr. Mostrom at 701-231-7529 before requesting the test.

Animal Plant Health Inspection Service-National Animal Health Laboratory Network (APHIS-NAHLN) feedback – APHIS-NAHLN provides an opportunity to submit any feedback or concerns that pertain to the NAHLN Program Office. The email address, APHIS-NAHLN.Concerns@usda.gov, is provided to stakeholders for contact.

Clinical Pathology fee increase – Due to increased charges from Zoetis, the price for a referral cytology is now \$90.

Quynn Steichen, MS, DVM, Diplomate ACVP Veterinary Anatomic Pathologist and Alex McCormack, DVM

This mini case report focuses on a unique biopsy submitted from a local veterinarian from a 9-year-old feline with a chronic history of urinary tract infections. A biopsy is a small sample of tissue that is removed, usually while the animal is still alive, and submitted for histopathology. At the NDSU VDL, biopsies can make up approximately 75% of our pathology case submissions. Common examples of biopsies received include the "lumps and bumps" surgically removed by the referring veterinarians from any species, but most commonly from companion animals. Additionally, the VDL receives either whole or partial pieces of an organ, such as an enucleated eye, a spleen, or, in this case, a urinary bladder.

The patient is a spayed 9-year-old female domestic long-haired feline that has had recurrent urinary tract infections for the last two years. The referring veterinarian performed a thorough diagnostic investigation, including an exploratory surgery to assess the urinary bladder. The referring veterinarian observed no urinary stones, but the apex of the urinary bladder was thickened and firm. Two-thirds of the urinary bladder mucosa was covered by a firm, white, poorly demarcated crust (Figure 1). The referring veterinarian submitted two punch biopsies of the urinary bladder for histopathology, culture and sensitivity.

On histopathology, the mucosa is diffusely ulcerated and replaced by necrotic debris that is often mineralized (Figure 2). The underlying submucosa is expanded by high numbers of neutrophils admixed with macrophages. The blood vessels within the submucosa are lined by plump endothelial cells (reactive blood vessels). No bacterial organisms were observed. The diagnosis based on histopathology was a suppurative and granulomatous, ulcerative cystitis.

Figure 1.

Urinary bladder intraoperatively. The mucosa is thickened by a firm, white, poorly demarcated crust. (Photo courtesy A. McCormack)





Figure 2. Urinary bladder. The mucosa is ulcerated (arrow) and replaced by necrotic debris that is often mineralized (star). (Photo courtesy Q. Steichen)

One of the biopsies was submitted to microbiology for aerobic culture. *Corynebacterium urealyticum* was isolated and identified. However, the isolate was not viable for antimicrobial susceptibility testing.

Urinary tract infections (UTIs) are commonly diagnosed in cats with a reported incidence of 3%-19%.² The primary predisposing cause of cystitis, or inflammation of the urinary bladder, is stagnant urine.³ Stagnation of urine allows uropathogens with specific virulence factors to breach the urinary bladder mucosa and cause infection.³ In a retrospective study, *Escherichia coli* was the most common species of bacteria cultured, either as a single or concurrent pathogen, causing UTI in cats.⁴

However, in this specific case, the bacterium isolated was C. urealvticum, which is a nonhemolytic, gram-positive, aerobic, rapid urea-splitting, nonspore-forming bacillus.¹ This is an uncommonly isolated pathogen in the lower urinary tract of cats. Due to the ureaseproducing activity, C. urealyticum is a plaqueforming bacterium that causes the encrustation of the urinary bladder mucosa⁵ leading to an encrusting cystitis.¹ This encrustation can be observed in Figure 2. Treatment for this bacterium in companion animals is often challenging due to multidrug resistance.¹ In the current case, a combination of evidence-based medicine and anecdotal advice was used to compile an appropriate list of antimicrobials and a dosing regimen. The animal is doing well after the exploratory surgery and has a scheduled routine recheck exam in a few weeks.

References

- 1. Bailiff NJ, et al. *Corynebacterium urealyticum* urinary tract infection in dogs and cats: 7 cases (1996-2003). *JAVMA*. 2005; 226(10): 1676-1680.
- 2. Byron JK. Urinary Tract Infection. *Vet Clin Small Anim.* 2019; 49: 211-221.
- 3. Cianciolo RE and Mohr FC. Urinary System. In: Maxie MG, ed. *Jubb, Kennedy, and Palmer's Pathology of Domestic Animals.* 6th ed. Vol 2. Philadelphia, PA: Elsevier; 2016: 458-461.
- 4. Martinez-Ruzafa I, et al. Clinical features and risk factors for development of urinary tract infections in cats. *J of Feline Medicine and Surgery*. 2012; 14(10): 729-740.
- Weese JS, et al. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. *The Veterinary Journal.* 2019; 247: 8-25.

Disease Updates

Brett Webb, DVM, PhD, Diplomate ACVP

Investigation of multiple animal acute mortality events

Responding to calls from clients regarding significant acute or peracute mortality events conjures up a myriad of differential diagnoses that can often be overwhelming to even experienced practitioners. However, investigating these cases systematically



Figure 3. Cattle on winter pasture. (Photo courtesy B. Webb)

ensures appropriate sampling and data collection to increase the likelihood that the cause is determined. Although there are a few infectious diseases that can result in loss of multiple animals in a herd, most causes of mass mortality are due to intoxication from feed, water or the environment. Failure to determine the cause of death is most often due to insufficient or inappropriate sampling rather than lack of considering a differential diagnosis. Consultation with a pathologist or toxicologist to discuss sampling strategy and differentials **prior to arriving on site** can be particularly helpful.

Site evaluation

While collecting a detailed history from the producer is critical, it is equally important to evaluate the animal's environment to determine specifically what the animals have access to. Site evaluation should not be limited to only feed and water. It is also critical to consider any plants growing in dry lots, new plant growth, plants that appear to have been grazed recently, supplements (or anything given orally), access to machinery, junk piles/debris and sources of material not naturally present in the environment. The regularity of access to feed and water should also be considered, i.e., the water source, the water source's reliability, water production capacity for the number of animals and consumption is not limited by electric fences or malfunctioning heater units.

Samples to collect: Feed, water, plants being grazed if identity is not known, any potentially toxic plants in pasture and supplements.

Data to collect: Detailed history, including any recent changes and information regarding the environment.

Antemortem assessment

Often, these cases involve additional animals that may be clinically affected but have not died. These animals and their cohorts can provide some of the most important clues regarding the cause. A complete physical exam should be conducted, including a neurologic exam, with neuroanatomical localization of the lesion if neurologic signs are present. Often, the time period between the toxic insult and death are insufficient to enable development of histologic lesions visible at the light microscopic level and some causes of intoxication lack morphologic changes. Thus, samples for a complete serum biochemistry, electrolytes and CBC should be collected. **The importance of clinicopathologic data cannot be understated** as it often substantially narrows the list of differentials by pinpointing the organ system/s affected or specifical physiologic function that is disrupted.

Samples to collect: Serum, whole blood, urine if available.

Data to collect: Clinical exam findings, neurologic exam including neuroanatomical localization of lesion if possible.

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NDSU Veterinary Diagnostic Laboratory

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Disease Updates Continued from page 3.

Necropsy

A complete necropsy of multiple animals should be performed unless there are safety concerns such as indications that Anthrax or other zoonotic diseases are likely responsible for the death losses. Even if clinically affected animals are available for examination, a complete external examination should be conducted before opening the carcass. Proximity of the carcasses to one another and proximity to sources of feed or water, signs of trauma, burns or other external alterations should be noted. A systematic approach aimed at determining the immediate cause of death and determining any alterations in major organs systems should be followed.

Samples to collect: Duplicate fresh and formalin-fixed tissues samples of all organs required for life. Submit one half of the cerebrum in formalin and submit the other half, brain stem and cerebellum fresh. Also include serum and whole blood (if possible), eye or eye fluid and rumen contents (from multiple locations).

Data to collect: Necropsy findings, tentative cause of death if known, pH of rumen fluid.

Sample handling and submission to the laboratory

Ship samples for overnight delivery to the laboratory or drive the samples to the laboratory. A secure after-hours depository for samples and small carcasses (<100 lbs) is available outside of normal business hours. Fresh tissues, water, feed and samples of any plants or fluids should be kept refrigerated and shipped on ice. Rumen contents should be frozen immediately and shipped frozen if nonprotein nitrogen toxicity is a potential differential. As always, if any questions arise, call the laboratory.

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Contact Information

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For more information on this and other topics, see www.vdl.ndsu.edu

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