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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

Happy New Year and welcome to 2024! Upon reflecting over my last two years as laboratory director, I find myself tremendously grateful for the strong commitment to the health of North Dakota herds, flocks and pets exhibited every day by our veterinarians, producers and animal owners.

Over the past few years, there have been multiple challenging disease outbreaks, including epizootic hemorrhagic disease, highly pathogenic avian influenza, anthrax and, most recently, atypical canine respiratory disease. During all these outbreaks, the NDSU VDL has depended heavily on you to provide the best samples for the most reliable results.

As we start this next year, I wish to express how thankful I am for your partnership. We could not perform our duties without you.



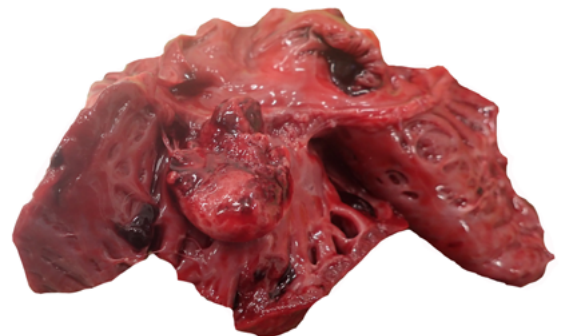
Heidi Pecoraro, DVM, Ph.D., Diplomate, ACVP
NDSU VDL Director and Veterinary Anatomic Pathologist

Mystery Photo

An 8-year-old neutered male mixed-breed dog. Presented to emergency services deceased.

What is the underlying cause?

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



Adult dog, right auricle.
(Photo by H. Mitchell, NDSU VDL Diagnostician)



Briena Meier

(Photo by K. Benson, NDSU VDL chemist)

With the retirement of long-time microbiologist Lynn Schaan, we welcome Briena Meier to the NDSU VDL. Briena has a BS in medical laboratory science from NDSU and is a board-certified medical laboratory scientist (MLS) and a specialist in microbiology (SM). Her qualifications and enthusiasm for microbiology are a great addition to the microbiology section. As a diagnostic microbiologist, Briena interprets bacterial growth on cultures to find significant pathogens and performs susceptibility testing when applicable. She also interprets mycology cultures, performs parasite exams and will be training on BSL3 work and rabies testing. Her favorite part of microbiology is being part of discovering the most likely cause of infection and being able to give patients, veterinarians and pathologists answers that lead to positive treatment outcomes.

Mini Case Reports

Dr. Quynn Steichen, NDSU VDL Veterinary Anatomic Pathology Resident

The VDL received a 4-month-old mixed-breed bull calf for autopsy. The client had noticed sores and scabs on the legs and face prior to the animal's death. This animal was previously treated for lice.

Postmortem examination revealed a carcass in poor body condition score (BCS 2/9) with multifocal crusting and ulceration of the skin along the neck, lateral thorax, all limbs and tail. On section, there were thick, yellow to brown, keratinized crusts and scabs (keratin deposition; Figure 1 arrows). Overall, the stature of the animal appeared stunted. There were no other significant lesions observed on gross examination.

Histologically, the epidermis was markedly thickened by a serocellular crust primarily composed of orthokeratotic keratinosis (keratin), but also inflammatory cells, necrosis, hemorrhage and fibrin. Within the epidermis and the follicular epithelium were innumerable paired bacterial cocci haphazardly arranged in rows and forming long, branching filaments. In addition, hair follicles were markedly dilated and contained neutrophils and macrophages with fewer plasma cells and lymphocytes. The superficial dermis was infiltrated by a similar population of inflammatory cells.

Additional sections of the skin were stained to confirm that the bacterial population was Gram positive (Figure 2). The gross and histologic findings are consistent with *Dermatophilus congolensis* as the cause of the scabs and sores.

D. congolensis, also known as dermatophilosis, is a Gram-positive filamentous bacterium that typically affects young or immunocompromised animals. Dermatophilosis is more commonly seen in horses and sheep and known as "rain scald," "rain rot" or "lumpy wool," although it can be observed in any animal that has trauma to the skin with prolonged moisture. Usually, histopathology is diagnostic, and culture can often be difficult. On histology, the unique, paired cocci forming long-branching filaments is often described as arranged in "train tracks" (asterisk in Figure 2).

In the current case, this animal was extremely deficient in liver copper and selenium, suggesting a compromised immune system. An additional PCR for bovine viral diarrhea virus (BVDV), which can cause extreme immunosuppression, was negative.

Current thought on this case is the animal was immunosuppressed ultimately from the lack of trace minerals. The previous lice infection may have led to skin trauma allowing for the colonization of *D. congolensis*. Normally, *D. congolensis* is a secondary invader; however, no primary causes of infection were identified/observed.

Figure 1. Skin of 4-month-old calf with severe hyperkeratosis (arrows). (Photo by H. Pecoraro)

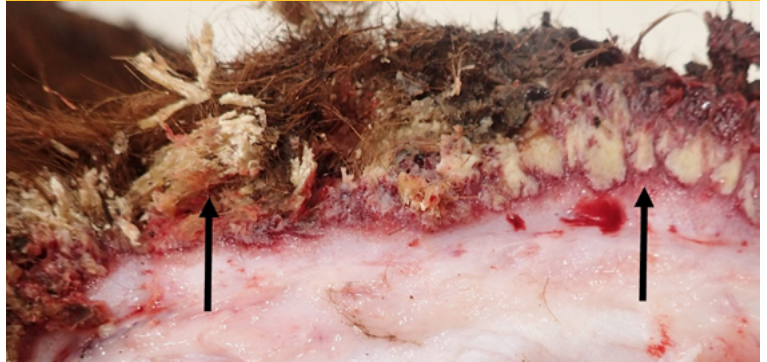


Figure 2. Positive Gram stain of paired cocci forming branching filaments (asterisk). (Photo by S. Gefroh, NDSU VDL microbiologist)



Disease Updates

Canine Infectious Respiratory Disease Complex

Heidi Pecoraro, NDSU VDL Director and Veterinary Pathologist

Warnings of an outbreak of unusual respiratory disease in dogs have been widespread in the media lately. At the NDSU VDL, we have been investigating cases of respiratory disease since last summer. Unfortunately, a common etiology has not been identified despite extensive testing, and a case definition has yet to be established.

Since August 2023, samples from over 30 sick dogs have been submitted to the NDSU VDL. Of these, six have been death investigations. It is important to note that samples submitted to the laboratory are only a subset of hundreds of cases that have been reported by regional clinics. Additionally, in several of the fatal cases, an underlying disease has been determined.

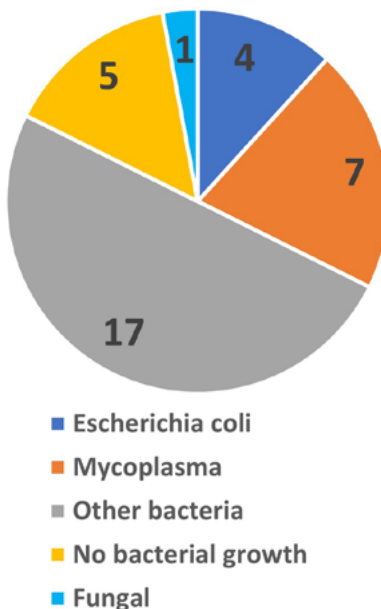
Most of the dogs are known to have been boarded or attended daycare within the week before onset of disease. There is no breed or sex predilection. In this way, the outbreak is like kennel cough or canine infectious respiratory disease complex (CIRDC), which encompasses several viruses and bacteria, including canine parainfluenza virus, canine adenovirus type 2, canine influenza and *Bordetella bronchiseptica*.

What makes this outbreak unusual is that, in most cases, clinical signs tend to last for weeks to months and are refractory to treatments, and none of the common causes of CIRDC appear to be involved.

From the NDSU VDL samples, no viruses have been identified either by PCR or virus isolation, though sequencing analysis is pending. As for cultures, *Mycoplasma* is most frequently isolated, followed by *Escherichia coli*. *E. coli* can certainly cause systemic disease, which may account for the fewer acute cases observed. However, *E. coli* can also be a contaminant in samples. *Mycoplasma* is often isolated in healthy dogs; thus, this finding has also been difficult to interpret.

Veterinary diagnostic laboratories across the U.S. are working together to find the cause of the current outbreak. North Dakota and regional veterinarians are encouraged to submit samples from acutely affected dogs that have presented within three to four days of clinical onset and have not yet been treated with antibiotics or antivirals. Samples requested include nasal and oral swabs, transtracheal washes or bronchial-alveolar lavage fluid and fresh lung tissue. If swabs are submitted, submit two (one each for microbiology and molecular diagnostics testing). If sepsis is suspected, blood and urine cultures may also be indicated. (Pediatric blood tubes are available upon request.)

Canine Respiratory Disease Culture Results (n=33)



Bench Notes

Bromethalin assay – The Toxicology section has recently validated an assay to identify bromethalin in dogs and cats. Bromethalin is a non-anticoagulant rodenticide that is intended to be lethal after ingestion of a single dose. Bromethalin toxicity may cause hyperexcitability, muscle tremors, seizures, hind limb hyperreflexia, CNS depression, hyperthermia and death. Perirenal fat and liver are samples validated for this assay.

Shipping updates – Here's a reminder to our clients of the best practices for shipping samples to the lab. As a submitter, it is your responsibility to ensure that your samples are stored and transported appropriately based on what is being shipped. For instance, the USPS does not accept samples suspected of containing select agents such as anthrax, tularemia and plague. Therefore, these samples must be shipped via UPS or FedEx. Please ensure that all samples submitted to the NDSU VDL are clearly labeled and packaged to prevent any leaks, breaks or punctures during transport. The American Veterinary Medical Association (AVMA) provides guidance for clinics on required training for all employees who package and ship biological samples. You can find their guidance by visiting <https://www.avma.org/resources/practice-management/required-training-packaging-and-shipping-lab-specimens>.

Changes to bovine abortion multiplex PCR panel – Starting February 1, 2024, the bovine abortion multiplex PCR panel will only test for bovine herpes-1 virus and bovine viral diarrhea virus. *Leptospira* spp. will no longer be included due to the low incidence (<0.2% over the last 10 years). However, a *Leptospira* spp. PCR assay is still available as an add-on test. We also offer additional PCR testing for *Ureaplasma diversum* or *Neospora caninum* upon request or at a pathologist's recommendation.

NDSU Veterinary Diagnostic Laboratory

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Calendar: Winter-Spring Closures

January 1 – New Year's Day

February 19 – President's Day

January 15 – Martin Luther King Jr. Day

March 29 – Good Friday

Staff Spotlight

Day in the Life —

Dr. Brianna Stenger

Dr. Brianna Stenger is a senior research scholar and section head of molecular diagnostics and sequencing. She has a BS in zoology and a PhD in environmental and conservation sciences with over 19 years of experience with PCR. Among her job duties, she oversees the daily operations of the lab units, manages supplies, and reviews and clinically validates test results. Besides diagnostic testing, Dr. Stenger is involved in research activities and is principal investigator on several grants. Other tasks include administrative duties and scholarly articles and presentations.



Dr. Brianna Stenger

VDL Molecular and Sequencing
Section Head
(Photo by K. Benson, NDSU VDL Chemist)

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