NDSU Veterinary Diagnostic Laboratory

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In This Issue

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

www.vdl.ndsu.edu

We welcome comments, questions and suggestions. Please email us at vetlab.ndsu@ndsu.edu or call the laboratory at (701) 231-8307.

Director's Corner

This certainly has been a challenging spring and summer with the pandemic affecting most aspects of daily life. Work at the VDL has continued without interruption of services, despite having to make some changes, such as having staff more physically spread out and some working from home.

We had two major staffing changes in recent months with the retirement of longtime VDL pathologist Dr. Teresa Newell and pathologist Dr. Laura Rice relocating to Texas. A national search has been initiated to fill these two critical positions and we are hopeful we will have a good pool of applicants.

The lab's IT group has been working diligently on customizing our new laboratory information system, which will go live this coming spring. As part of the project, we will be upgrading the client portal many of you use to track progress of your cases through the lab. More information will be included in future newsletter editions.

One feature I would like to highlight in this issue is the small-animal antibiogram in the bench notes. Be sure to check out the data on our website and look for additional antibiogram information in upcoming months. We are hopeful these will be useful for practitioners in selecting empirical therapy before culture and sensitivity results are available.

With the North Dakota Veterinary Medical Association meeting moving to a virtual format this year, I will miss visiting with many of you. Please reach out to us if we can be of any help during these difficult times. I hope you and your families are staying safe and well.

Brett T. Webb, DVM, Ph.D., DACVP
NDSU – VDL Director

Dr. Rice's Mystery Photo

Although Dr. Laura Rice is moving on, she has generously left us a treasure trove of great gross images.

This photo is from the autopsy of a 1-year-old, male intact, domestic short-haired cat with a history of progressing weakness, diarrhea and mental dullness. No history of vaccination. Visit the VDL Website (**www.vdl.ndsu.edu**) to see the answer and read more about the case.

NDSU VETERINARY DIAGNOSTIC LABORATORY
North Dakota State University

Bench Notes

Staff Changes

The VDL now has a full-time quality manager, **Dawn Walden.** She has been the part-time quality manager with VDL for the past 12 years and has been key in preparing and successfully navigating the lab through the accreditation process with the American Association of Veterinary Laboratory Diagnosticians (AAVLD). As a full-time staff member, Dawn will have more time to devote to ensuring quality at the VDL, as well as helping in the administrative office answering phones and processing samples.

New Blood Analyzers

The VDL has new hematology and chemistry analyzers. The hematology analyzer performs complete blood counts from dozens more species than the previous system, while the liquid-based chemistry analyzer can run an array of large- and small-animal panels.

In addition, a new point-of-care immunoassay system can determine blood levels of T4, progesterone, fibrinogen, cortisol, phenobarbital and more. The availability of these point-of-care tests will be based on client needs. Please visit **https://tinyurl.com/ya8xtnce** to tell us which tests will serve you and your patients best. All CBCs and chemistry panels are run the same day if received prior to 1 p.m.

Small-animal Antimicrobial Report

The full report can be accessed from the VDL website at **www.vdl.ndsu.edu/wp-content/uploads/2020/08/2019-Small-animal-antibiograms.pdf**.

Antimicrobial data were collected from at least 30 different antimicrobial susceptibility test (AST) reports for *Staphylococcus pseudintermedius, Pseudomonas aeruginosa, Escherichia coli* and *Proteus mirabilis* cultured from cat and dog urine samples and canine ear swabs submitted in 2019. Antibiograms are cumulative AST reports of bacterial isolates intended to show resistance trends through time. They are useful in monitoring antimicrobial resistance in a population and help clinicians choose empiric therapy until an AST report for cultured bacterium is available from the laboratory. However, antibiograms do not represent isolates from all patient populations and may vary greatly by geographic region or species. Thus, antibiograms are intended for use in conjunction with traditional culture and sensitivity testing and samples still must be sent to the laboratory for testing. To obtain reliable results, samples always should be collected prior to administering antimicrobial therapy.

Mini Case Report

Tularemia

The case for this issue is from an **adult cat that mysteriously died** at home. The owner performed the autopsy and brought selected tissues into the referring veterinarian, who submitted them to the VDL for additional testing.

On gross examination, the cat had dozens of 5- to 10-millimeter (mm) diameter raised, firm, tan nodules throughout the spleen (Figure 1A). Microscopically, the splenic nodules corresponded to necrosis and inflammation characterized by eosinophilic cellular and karyorrhectic debris, small to moderate amounts of fibrin, and moderate numbers of degenerate neutrophils with fewer macrophages and lymphocytes (Figure 1B). PCR was positive for *Francisella tularensis,* the causative agent of tularemia.

Multifocal tan nodules in the spleen can denote neoplasia (e.g., lymphoma) or may be due to necrosis and inflammation. Two infectious causes of necrotizing splenitis are tularemia and plague (*Yersinia pestis*).

Dogs, cats and humans can become infected with *F. tularensis* after being bitten by an infected tick. Dogs and cats also may become infected when they ingest infected rodents or rabbits. Infections in people also arise from inhalation of infected aerosols or through ingestion of contaminated food or water.

Cases of tularemia also have been reported in foals and sheep with heavy infestations of ticks. Zoo animals also have been infected with tularemia, especially in areas with heavy rodent or rabbit populations.

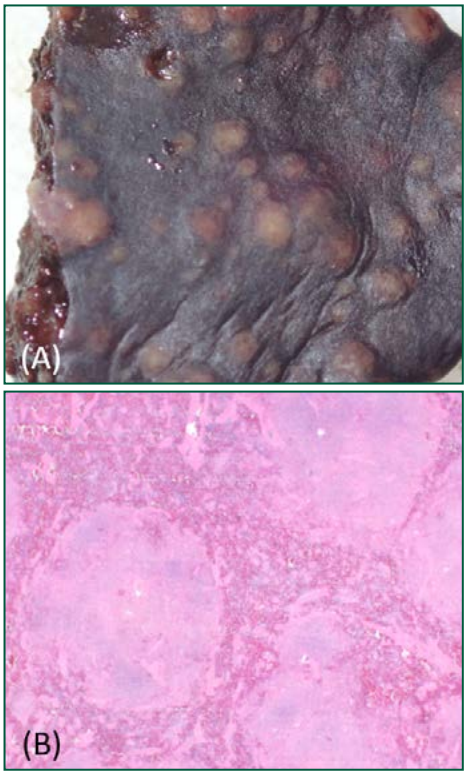

Figure 1: Spleen from a cat. Throughout the splenic parenchyma are variably sized white to tan nodules (A) that correspond to regions of inflammation microscopically (B). (Gross image by L. Rice, NDSU. Photomicrographs by H. Pecoraro, NDSU).

Disease Updates

Concerns for Use of Copper Sulfate Compounds to Treat Harmful Blue-green algae (cyanobacterial) Blooms

Michelle Mostrom, DVM, MS, PhD, DABVT, DABT, VDL Toxicologist

The practice of routinely applying algicides to water sources, whether the use is indicated, should be discouraged.

Livestock producers may ask veterinarians about the use of copper sulfate to treat harmful blue-green algae or cyanobacterial blooms in sloughs or ponds used for livestock water. While copper sulfate can quickly lyse the algal cells releasing algal toxins into the water, the use of copper sulfate in a water body has several requirements in North Dakota. Copper sulfate also has recommended restrictions for use, as well as side effects that potentially can be harmful to the environment.

If using copper sulfate in a body of water in North Dakota, the North Dakota Department of Environmental Quality's water division (701-328-5210) should be contacted to discuss the following requirements:

1) The chemical must be labeled as a pesticide with a manufacturer's label.
2) Applicators must fill out the pesticide applicators notification 20 days prior to application of any pesticide. The pesticide application general permit can be found at https://deq.nd.gov/publications/wq/2_NDPDES/PesticideApp/PesticideDischargeGeneralPermit.pdf.
3) Pesticide application must follow the rates as provided on the manufacturer's label and guidance.

Prior to application of copper sulfate to treat a harmful blue-green algae bloom:

1) Determine the correct copper formulation.
2) Calculate the proper dosage (pounds of copper sulfate per surface acre of water). The dosage application of copper sulfate to water is based on the surface area of water and treatment of the top two feet of lake surface where the blue-green algae grow, not the entire volume of the water body.
3) Know the water hardness and alkalinity. In hard water or alkaline water (high water pH is fairly common in North Dakota), the copper sulfate tends to settle out of water to the bottom within 24 hours after application and is not effective to treat the bloom. Copper sulfate can persist in sediment and become potentially toxic to plant and animal life.
4) Consider target species and potential effects on fish and benthic invertebrates.
5) Be aware that livestock should be prevented from accessing treated water for at least 10 to 14 days post treatment.
6) **Toxins released from lysis of blue-green algae can remain in algal mats on the shore or in the water for up to four- to six weeks and be a hazard to livestock.**

Blue-green algae bloom. (Photo courtesy of Kevin Sedivec, NDSU professor of range science)

Be aware that many copper sulfate products are not allowed for use in water. Aquatic copper products are available. Chelated copper remains in solution longer with greater contact with the algae. Copper not in solution or applied to shorelines is not effective.

Side effects reported after numerous copper sulfate treatment in lakes in the upper Midwest include:

1) Intended temporary killing of algae with recovery of algal population within seven to 21 days post treatment – so very ineffective. **Repeat blooms could be more severe.**
2) Depletion of dissolved oxygen by decomposition of dead algae
3) Accelerated phosphorus recycling from the lakebed
4) Fish kills
5) Copper accumulation in the sediments, which may render the water source not usable for sheep
6) Tolerance adjustments of certain algae to higher copper sulfate dosages
7) Shift of species from green to blue-green algae and from game fish to rough fish
8) Disappearance of macrophytes (large aquatic plants)
9) Reduction in benthic macroinvertebrates

The best method to avoid harmful algal blooms is to develop an alternative water source such as a well with a solar pump and tank. Another option is to fence the water source and establish a vegetated buffer that will filter the water flowing into the dugout. The installation of an intake, solar pump and tank would complete the system. While an algal bloom still may occur, the buffer and lack of cattle loafing in and around the water should improve the conditions.

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Staff Spotlight

This issue's Staff Spotlight brings you another long-timer. Sharon Wilson is a master's level microbiologist who ran the virology lab decades before becoming the head technician of the now combined serology/virology sections. Sharon is our rabies test guru and her expertise is invaluable to the VDL.

How long have you worked for the VDL? 39 years.

What is your favorite dessert? Anything with a homemade buttercream frosting. My favorite was a chocolate cake at Judith's Tea Room in Poulsbo, Wash.

You have to sing karaoke; what song do you pick? "Fishing in The Dark" because my family would not only be singing along, but dancing as well.

Would you rather have invisibility or flight? Flight

Where is your favorite vacation spot? Favorite vacation spots have a sandy beach and water.

Sharon Wilson
(Photo by Kelly Benson, VDL chemist)

Thank you, Sharon, for all your hard work through the years.

Calendar: Summer/Fall Closures

September 7 – Labor Day
November 11 – Veteran's Day
November 26 – Thanksgiving Day

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

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