NDSU Veterinary Diagnostic Laboratory

Summer 2025, Vol. 9, No. 3

In This Issue

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.

Director's Corner

Welcome to the NDSU VDL summer newsletter. By the time this reaches your inboxes, the 2025 NDSU VDL CE day will have been completed, and most cattle will be out on pasture. As we enter the hottest days of summer, the lab's busy spring season transitions to a quieter pace, allowing catch-up on special projects and well-earned time off for faculty and staff.

Rest assured, however, that routine testing is still underway, as is testing for highly pathogenic avian influenza in poultry, wild birds and mammals, and dairy cattle. Rabies is another test performed more frequently during the summer.

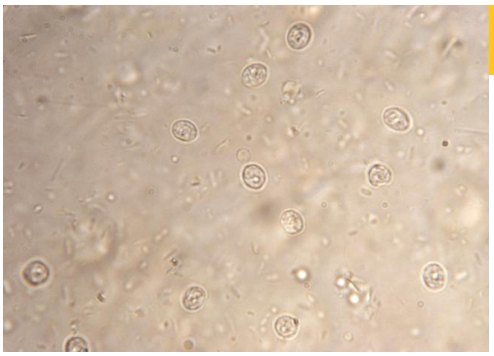
As always, please reach out to the laboratory if you have any questions, concerns or suggestions.

Best wishes for a restful and relaxing summer,

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

Mystery Photo

A fecal sample was submitted to NDSU VDL from a 10-day-old crossbred calf with moderate diarrhea that has persisted for 2-3 days despite treatment. The feces were pale yellow and watery with evidence of mucous. The beef producer has three other calves of comparable age with similar symptoms.



What is your diagnosis?

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

Photo courtesy of S. Gefroh.

NDSU VETERINARY DIAGNOSTIC LABORATORY
North Dakota State University

Bench Notes

EIA testing schedule changes – Starting June 1 to Sept. 30, EIA (Coggins) testing will be performed daily on Monday through Thursday.

Johne's Disease ELISA testing schedule changes – Starting June 1 to Sept. 30, Johne's Disease ELISA testing will be performed on Wednesdays. Samples for serologic testing must be received during business hours the day before scheduled testing to ensure inclusion in the day's test run.

Rejection of unlabeled samples – Any submission with multiple unlabeled samples for regulatory testing (e.g., EIA) will be rejected.

Rabies submissions – The containers in which specimens for rabies testing are submitted will not be returned to the client due to zoonotic disease risk.

Fee schedule increases – Due to rising costs on materials, reagents, equipment and service contracts, there will be a 10% price increase on all tests beginning on July 1. The accession fee will remain at $12.

Digital cytology fee increase – Starting June 2, the Zoetis Vetscan Imagyst digital cytology fee will increase to $104.

Container requirement for Johne's fecal testing – Effective July 1, 2026, all fecal samples submitted for Johne's PCR testing must be placed in rigid, plastic, leak-proof, sterile containers with screw caps. Please consider making the container transition as soon as possible. For detailed guidelines and approved container types, please visit our website at www.vdl.ndsu.edu/7143-2/.

Cyanotoxin testing of water samples – The toxicology lab validated an LC/MS/MS method in water to identify several microcystins (LR, RR, YR and LA), anatoxin-A or previously called "quick death factor," cylindrospermopsin and nodularin. For the best results, submit at least 250 mL of suspect water in an amber glass jar, on ice, and ship overnight. Note that some cyanotoxins can stick to plastic and degrade rapidly at room temperature. Please check our website for specific details regarding cyanotoxin testing at www.vdl.ndsu.edu.

Disease Updates

Photo courtesy of Susan Hoffman, Department of Zoology, Miami University

Brianna Stenger, PhD, Kelli Maddock, DrPH, MS, MLS(ASCP)^{CM}, Heidi Pecoraro, DVM, PhD, DACVP

A "scary" tale in One Health: Multidrug-resistant *Salmonella enterica* Newport in North Dakota zoo mammals.

The following disease update is a summary from a collaborative poster submitted to the American Association of Veterinary Laboratory Diagnosticians (AAVLD) by NDSU VDL, Minnesota Department of Health and North Dakota Department of Health and Human Services personnel. Dr. Brianna Stenger, Dan Evans, Dr. Kelli Maddock, Slate Boyer, Abbey Fraser, Michelle Dethloff, Sarah Gefroh and Dr. Heidi Pecoraro worked collectively to identify multidrug-resistant (MDR) *Salmonella enterica* serovar Newport in exotic mammals from North Dakota zoological facilities.

Since 2021, the NDSU VDL has found MDR *S.* Newport in one Pallas' cat (*Otocolobus manul*), three snow leopards (*Panthera uncia*) and one Eurasian lynx (*Lynx lynx*) from three separate zoos in North Dakota. *Salmonella* serovars Anatum, Altona, Dublin and Typhimurium were also detected in other zoo mammals.

Due to the multidrug resistance and potential human health impacts, the NDSU VDL reached out to the North Dakota Department of Health and Human Services (NDHHS) for assistance with deeper bioinformatic analyses and epidemiology. Sharing of sequencing data allowed NDHHS to search for human cases with related *Salmonella*. While the animal isolates were not genetically identical to specific human infections in North Dakota, the isolates were considered strain REPJJP01, a known "scary" human pathogen by the Centers for Disease Control and Prevention (CDC).

This One Health collaboration has fostered important working relationships with multiple partners and education on mitigation procedures to protect human and animal health.

A case report detailing the disease and characterization of the bacteria in a snow leopard and Pallas' cat has been submitted for publication.

Mini Case Reports

Quynn Steichen, DVM, MS, Diplomate ACVP, Veterinary Anatomic Pathologist

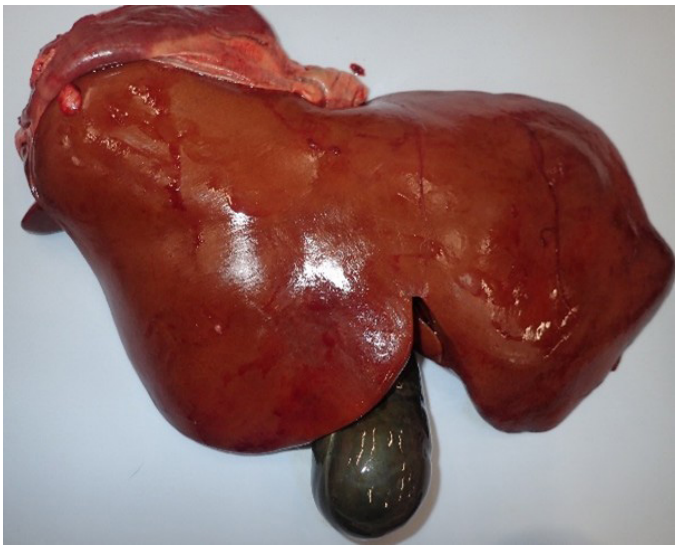
The NDSU VDL received a seven-month-old female Dorset sheep (ewe) for a necropsy examination. The owner did not note any clinical signs of illness prior to death. The flock was sheared two weeks prior and was current on vaccinations.

On gross examination, the ewe had a body condition score of 4/5, and subcutaneous tissues were diffusely yellow. In the abdominal cavity, the liver was red to orange, slightly enlarged and soft (Figure 1). Kidneys were bilaterally deep red to brown to black in color, also known as "gunmetal-colored." Urine was collected via a sterilized syringe from the urinary bladder prior to incision. The urine was dark red with a thin consistency (Figure 2).

On histology, there was degeneration and necrosis within the centrilobular areas of the liver. The kidneys had tubular degeneration and necrosis with areas of tubular protein and hemoglobin casts. From the gross and histopathologic lesions, copper toxicity was highly suspected. Trace mineral analysis was performed to confirm this diagnosis. The copper concentration in the liver and kidney was high to toxic, respectively. Additionally, the iron concentration in the kidney was high. This confirmed our initial suspicions of copper toxicity.

Copper toxicity is often observed in small ruminants, specifically sheep, due to excessive copper intake within the diet. However, copper toxicity can also occur from increased availability of dietary copper from unusually low molybdenum levels or ingestion of other hepatotoxins. Commonly found hepatotoxins are pyrrolizidine alkaloid plants. In sheep, copper toxicosis is often a chronic process; therefore, investigating the cause of increased dietary copper is often difficult.

Figure 1. The liver is red to orange, swollen and soft. (Photo by Q. Steichen)

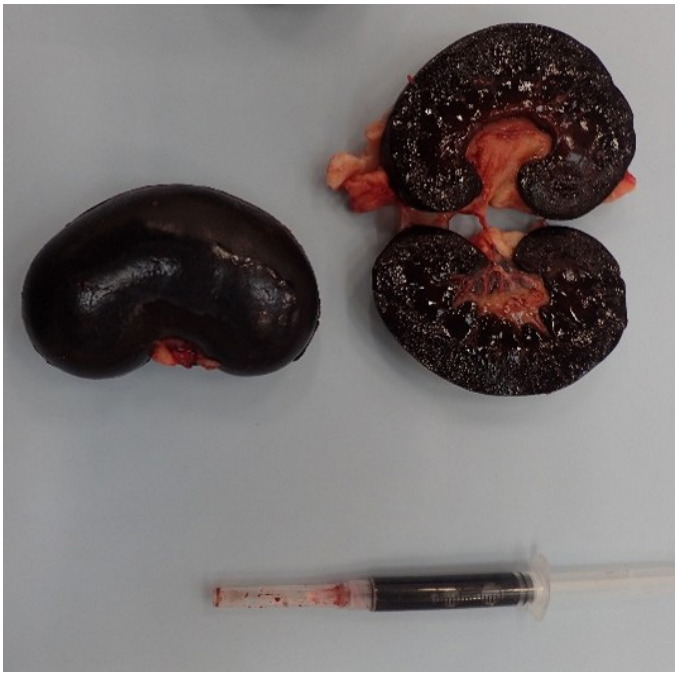


Copper is normally stored in the liver specifically within the hepatocytes, or liver cells. Sheep can consume an excess amount of copper for a long time without any clinical symptoms. However, when there is a stressful event, there is injury to the hepatocytes, and the excess copper is released into the bloodstream. The massive release of copper starts to break down red blood cells, leading to a hemolytic crisis. The hemoglobin from the red blood cells causes injury to the kidney. Death is the result of acute anemia, liver failure and kidney-related tubular injury. Treatment during a hemolytic crisis is often unsuccessful. At-risk animals can be treated with oral therapies with ammonium molybdate and sodium thiosulfate. Additionally, chelating agents can be employed, but these are variably effective.

Copper toxicity can be observed in dogs either from a primary metabolic defect in hepatic copper metabolism, abnormal hepatic function and altered biliary copper excretion, or excessive dietary copper intake. This is also known as Wilson's disease in humans when there is a mutation in the ATP7B gene.

This case presents the classic gross and histopathologic findings for chronic copper toxicosis in sheep. It also demonstrates the importance of trace mineral analysis testing on both the kidney and the liver.

Figure 2. Kidneys (top of the picture) are bilaterally deep red-brown to black (also known as "gunmetal-colored"). The urine in the syringe (bottom of the picture) is dark red (also known as "port wine-colored"). (Photo by Q. Steichen)



NDSU Veterinary Diagnostic Laboratory
P.O. Box 6050
NDSU Department 7691
Fargo, ND 58108-6050

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Spotlight

NDSU VDL Advisory Council

The NDSU-VDL advisory council consists of NDSU VDL leadership and 15 external members and includes veterinarians and representatives from a diverse group of stakeholders across the state. The council provides constructive criticism on laboratory service, strategic advice for laboratory planning and assessing the laboratory's progress relating to ongoing projects and initiatives. The following are members of the advisory council.

North Dakota Government Representatives —
Dr. Ethan Andress, Dr. Beth Carlson, Dr. Margo Kunz, Dr. Charlie Bahnson

North Dakota Commodity Group Representatives —
Pavel Danila, Julie Ellingson, Shawn Schafer, Sharlene Wittenburg

North Dakota Veterinary Representatives —
Dr. Joe Hochhalter, Dr. Angela Steinley, Dr. Abby Sullivan

NDSU Agriculture Representatives —
Dr. Karl Hoppe, Dr. Guillermo Scaglia, Dr. Frank Casey, Dr. Justin Galbreath

Calendar: Summer Closures

July 4 – Independence Day

September 1 – Labor Day

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Contact Information

NDSU Veterinary Diagnostic Laboratory
P.O. Box 6050
NDSU Department 7691
Fargo, ND 58108-6050
Phone: (701) 231-8307

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