



Fall 2021, Vol. 5, No. 4

## In This Issue

Director's Corner  
Calendar

Bench Notes

- EHD outbreak
- EIA testing
- Collection guides
- Johne's disease submission
- UPS shipping

Dr. Broughton's Mystery Photo

Disease Updates

- Rabies cases 2021

Mini Case Reports

- West Nile Virus in a lamb
- EEE in a mare

Staff Spotlight

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

[www.vdl.ndsu.edu](http://www.vdl.ndsu.edu)

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

# NDSU Veterinary Diagnostic Laboratory

## Director's Corner

This fall finds the lab working through our annual case load of herd health testing. We also continue to test human samples for SARS-COV2.

The recent moisture has provided a little relief from a summer plagued by drought, leading to significant forage shortages and poor water quality across the region. On the disease front, there has been a recent outbreak of Epizootic Hemorrhage Disease virus serotype 2, primarily in central North Dakota, affecting cervids, as well as some cattle and bison. Wild and captive cervid death losses reportedly have been high, making many eager for a hard frost.

Laboratory staff recently returned from attending the American Association of Veterinary Diagnosticians annual meeting in Denver. It was impressive to see the number of veterinary diagnostic labs across the country that, like the NDSU VDL, have been aiding public health laboratories by conducting millions of SARS-COV2 tests on human samples.

This note is my last as director of the NDSU VDL. After six years of managing day-to-day operations, I have decided to pursue other professional goals and make way for someone with new ideas and a fresh perspective. It's been enjoyable serving in this capacity, but I strongly believe turnover of leadership every five years or so better serves organizations and keeps them moving forward much faster than entrenched leaders.

The new director will be chosen from an internal search of existing professional staff, from which there are excellent candidates. I will be continuing as staff pathologist, but my effort will be refocused on coordinating laboratory submissions and helping clients directly.

I thank laboratory clients and stakeholders for the pleasure of working with you over the past years.

Sincerely,

**Brett T. Webb**, D.V.M., Ph.D., DACVP  
NDSU VDL Director

## Calendar: Fall-Winter Closures

Nov. 25 – Thanksgiving Day  
Dec. 24 – Christmas Eve  
Dec. 31 – New Year's Eve

Jan. 17 – Martin Luther King Day  
Feb. 21 – President's Day

**NDSU** VETERINARY DIAGNOSTIC  
LABORATORY  
North Dakota State University

## Bench Notes

**Epizootic Hemorrhagic Disease** – Due to the recent outbreak of epizootic hemorrhagic disease (EHD) in North Dakota cattle, bison and cervids, samples suspicious for EHD are being sent to the National Veterinary Services Laboratory to investigate for EHD variants that may be circulating in North Dakota but are not detected with our current assay. Results from this additional EHD testing will be used to refine our current EHD assay. More information will follow in the upcoming months.

**Equine infectious anemia (EIA) testing** – During fall and winter months (October to February), EIA (Coggins) testing is performed on Tuesdays and Fridays. Daily testing will resume in March.

**Collection guides** – The NDSU VDL recently developed a quick reference collection guide (<https://www.vdl.ndsu.edu/wp-content/uploads/2021/08/MIC-and-MOL-Collection-Guide.pdf>) for samples submitted to the Microbiology or Molecular Diagnostics laboratory. Proper sample collection and handling is a critical step in the total testing process that can significantly impact the quality of the test itself and ability for the laboratory to properly interpret the results. Please use our guide as a collection resource. As always, contact the laboratory with any questions.

**Johne's disease submission** – To avoid extra processing fees, submitted samples MUST be labeled consecutively and legibly with the sample ID number, starting with number 1, as on the Sample Identification Form. Please see the submission guide (<https://www.vdl.ndsu.edu/wp-content/uploads/2021/08/Johnes-2021-2022.pdf>), website (<https://www.vdl.ndsu.edu/johnes-submission-examples/>), or call the laboratory if you have questions.

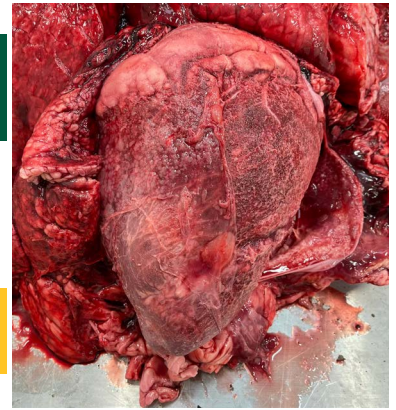
**UPS shipping program** – Due to the reported United States Postal Service delays, this is a reminder that the NDSU VDL has partnered with UPS to offer reliable shipping options. There is overnight service throughout North Dakota and parts of northwestern Minnesota, western Montana and northern South Dakota to ensure sensitive samples arrive to the lab in a timely matter. Visit <https://www.vdl.ndsu.edu/wp-content/uploads/2019/07/UPS-Shipping-072319.pdf> for more information.

## Dr. Broughton's Mystery Photo

What's your diagnosis?  
Other tissues that may be affected?

Photo by L Broughton, VDL pathologist

Visit the VDL Website ([www.vdl.ndsu.edu](http://www.vdl.ndsu.edu)) to see the answers and read more about the case.



## Disease Updates

### Rabies virus

Over 350 rabies virus tests have been conducted this year, which is slightly less than last year at this time. Due to the pandemic, the NDSU VDL is the only laboratory in North Dakota currently performing the rabies direct fluorescent antibody (DFA) assay. Thus far, there have been 11 rabies positive animals submitted to the lab from the tristate region (North Dakota, South Dakota, Minnesota). The number of cases is slightly down from this time a year ago when there were 12 total positive cases.

Like in 2020, most of the positives this year have been from skunks (seven out of 11), while bats make up most of the remaining cases except for one kitten that was submitted early November. Not surprisingly, summer comprises the highest testing months with July having the most submissions and the most positives.

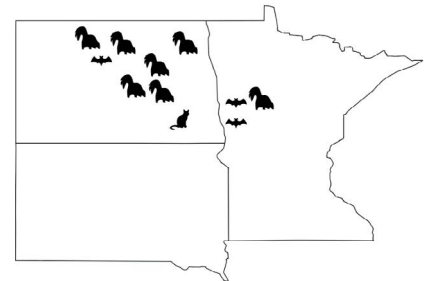
In addition, there have been 21 inconclusive tests. A test must be considered inconclusive if the sample is insufficient or markedly autolyzed (i.e., rotten). Often, the insufficient sample is due to submission of half of the brain in formalin and half of the brain fresh.

Full cross sections of fresh brain, specifically of the brain stem and cerebellum or hippocampus, are required for a valid negative DFA test. However, if any portion of the brain is positive by DFA, the sample is considered positive. If whole fresh brain cannot be collected, the entire head should be submitted for brain extraction by the lab. In cases of human exposure, sections of fresh and fixed brain can be sent to the CDC for immuno-histochemistry.

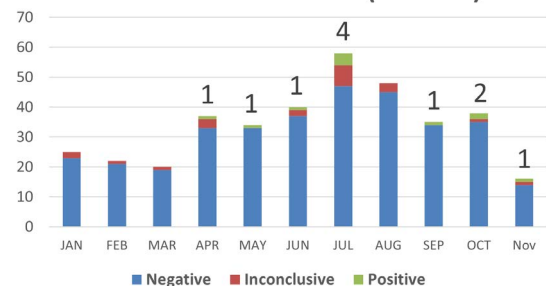
These results are often delayed due to shipping and can only be reported if cross sections of the brain stem are available.

Please review our rabies submission guide for more information (<https://www.vdl.ndsu.edu/wp-content/uploads/2019/10/Rabies-Guide.pdf>).

### Geographical and species distribution of rabies-positive animals submitted to the NDSU VDL from the tri-state area since January 2021.



### 2021 Rabies DFA Results (Jan-Nov)



Temporal distribution of rabies samples submitted to the NDSU VDL through Nov. 15. The number of positive rabies cases is depicted above the columns.

## Mini Case Reports (contributions from Dr. Quynn Steichen, VDL vet path resident)

Both mini case reports in this issue are from neurologic animals suspected to be infected with rabies virus. Common neurologic signs in animals with rabies virus infection range from being down or in lateral recumbency, weakness moving (paresis) or inability to move (paralysis) limbs, incoordination, choking or not being able to swallow, blindness, seizures, behavioral changes and aggression.

**The first case is from a seven-month-old, female Katahdin lamb** who died after becoming recumbent, febrile and depressed and having intermittent seizures.

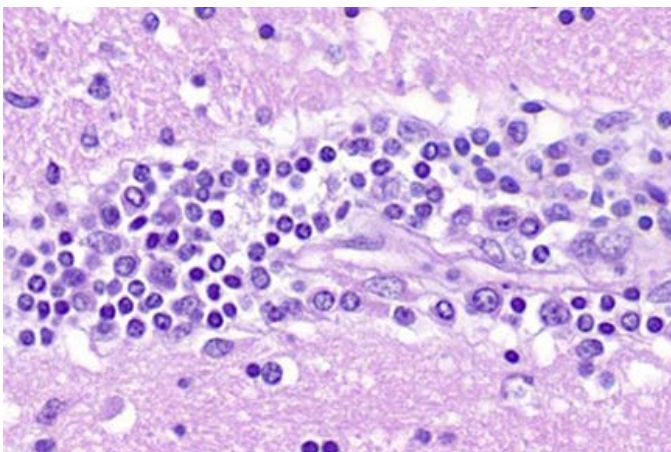
Microscopically, there was inflammation in all sections of the brain with the cerebrum being most affected. The inflammation was characterized by a dense, mononuclear cellular infiltrate expanding the meninges, Virchow-Robins spaces of the blood vessels, and the neuroparenchyma.

Because of the heavy inflammation in the cerebrum, **West Nile Virus (WNV)** was suspected and confirmed by PCR. Rabies was rule out by immunohistochemistry at the CDC.

WNV is an arbovirus with a bird-mosquito-bird lifecycle. However, the virus has been isolated in a variety of other species, including humans. The North Dakota Department of Health has reported 19 human cases thus far in 2021 with 10 of those hospitalized and one death.

Few cases of WNV in small ruminants have been reported in the literature. However, a recent study from the California Animal Health and Food Safety Laboratory diagnosed WNV encephalitis in six sheep from 2002-2014 (Rimoldi et al. *Veterinary Pathology* 2017;54(1):155-158). Clinical signs included fever, anorexia and neurologic signs.

Given WNV disease is likely underreported in sheep, WNV should be on the differential list for small ruminants exhibiting neurologic signs. Other differentials for neurologic disease include viruses such as bluetongue, small ruminant lentiviruses (caprine arthritis encephalitis/ovine progressive pneumonia), rabies and pseudorabies, bacterial, fungal, and parasitic infections, and nutritional causes.



**Mononuclear cells (lymphocytes and histiocytes) expand the cerebral Virchow-Robins spaces of a seven-month-old lamb.** (Photomicrograph by H. Pecoraro)

**Eastern Equine Encephalitis (EEE)** was diagnosed in our second case from a **four-year-old, female Quarter horse** exhibiting ataxia, lethargy, bruxism and eye twitching prior to death.

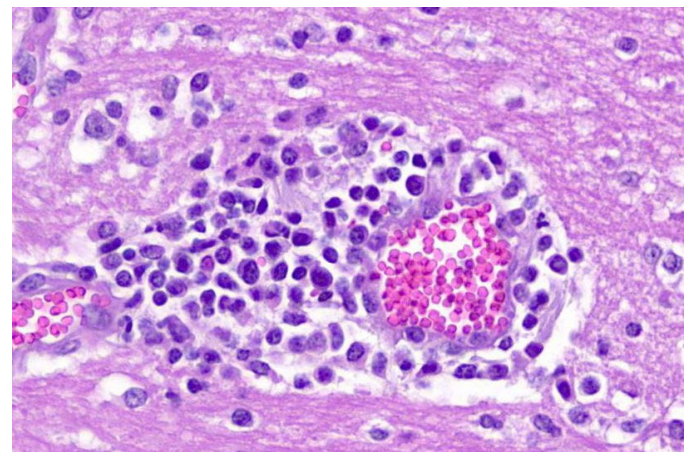
Microscopically, there were extensive areas of gliosis and inflammation consisting of mononuclear cells and fewer neutrophils that expanded the Virchow-Robins spaces of the blood vessels and neuroparenchyma. White matter tracts were variably dilated and contained swollen, hypereosinophilic axons (spheroids).

Given the prominent mononuclear cell infiltrates, viral infection was suspected. The differentials included rabies, WNV, equine herpesvirus-4 (EHV-4), and, especially due to the presence of neutrophils, EEE. Rabies test was inconclusive due to inadequate sample, while WNV and EHV-4 tests were negative. EEE was then confirmed by PCR by an outside laboratory.

EEE, like WNV, is an arbovirus that is transmitted by mosquitos and can infect horses and humans. Horses are a “dead end host” due to >90% mortality in this species. Human infections are extremely rare, but, if contracted, the virus can cause high mortality.

This disease is typically found in the eastern United States, with only a few cases in Minnesota, and no cases historically reported in North Dakota.

The American Veterinary Medical Association labels EEE as a core vaccination, and all horses should receive an EEE vaccine annually.



**Mononuclear AND neutrophils (hypersegmented nuclei) expand the cerebral Virchow-Robins spaces of a four-year-old Quarter horse mare.** (Photomicrograph by H. Pecoraro)

## NDSU Veterinary Diagnostic Laboratory

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## Staff Spotlight

Pathologists rely on high quality slides to make a diagnosis. That is why a good histotechnologist is worth their weight in gold. The NDSU VDL is lucky to have a *great* histotechnologist preparing slides for the necropsy and biopsy services. Meet Jessie Schultz, who has been with the lab for over a decade. She brings her expertise and positive attitude to the lab each day.

### What movie can you watch over and over again?

“Big Fish” is a movie I’ve watched over and over, and I am still delighted by it. Bonus: it’s pretty kid friendly.

**If you could live anywhere in the world for a year, where would it be?** I’m not picky, I’d love to live anywhere that is warm and not heavily populated. Preferably without big spiders.

### Name one cool feature you would add to your dream house.

Realistic feature: a hidden pantry room. Less realistic feature: a trampoline room.

**Are you a cat or a dog person?** Both! I have three Persian cats (Celia, Big Head and Squinty) and one hairless Chinese Crested dog (Dexter), and I love them all dearly.

**What is your favorite Christmas carol?** I know it’s cliché, but I have to go with “Oh Holy Night”. It always gives me chills.



**Jessie Schultz**  
(Photo by Kelly Benson,  
VDL chemist)



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For more information on this and other topics, see [www.vdl.ndsu.edu](http://www.vdl.ndsu.edu)

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