

The University of Wyoming Department of Veterinary Sciences & Wyoming State Veterinary Laboratory Newsletter



Sage Grouse (*Centrocercus urophasianus*)
PHOTO BY Tammy Bartlett

UPDATES

Welcome to the fall issue of the Veterinary Sciences Department / WSVL newsletter. The busy fall semester is going very quickly. While we still have needed restrictions on campus due to COVID-19 things are significantly improved as compared to last fall. In this issue, we highlight the research of Dr. Holly Ernest, a member of our department who is a Wyoming Excellence Chair in Disease Ecology. We also have an article on the pre-veterinary club, and Dr. Sondgeroth presents recent findings on mycoplasma respiratory infection in dogs.

As mentioned in the last newsletter we had a visit by CDC auditors in July to evaluate the University of Wyoming Biocontainment Facility (UWBF) for registration to allow use for select agent research. The visit went very well and we received full approval in October. This is a major achievement for the Department and UW. Many people have been involved in this effort over many years. WSVL director, Dr. Laegreid led the project for 10 years while it was going through the difficult reconstruction phase due to problems in the original design / construction.

We appreciate the many supporters of this project including members of the UW board of trustees, state legislature, WY governor Mark Gordon, and former governors Matthew Mead and David Freudenthal. Currently, we are in the process of doing final preparations for research, which includes required trainings, equipment purchases, and CDC approval of projects. We are planning to have two open days tentatively scheduled for the first week of the spring semester to enable anyone with interest to visit before we actually start using the facility.

Please enjoy reading the newsletter; feel free to provide us feedback or reach out with questions.

**Dr. Jonathan
Fox**
**Department
Head**



College of Agriculture
and Natural Resources
Veterinary Sciences



As I am sure you are all aware, the Wyoming State Veterinary Laboratory is part of the University of Wyoming. As such, WSVL faculty, in addition to their diagnostic duties, perform biomedical research, write grants and scientific papers, and teach both graduate and undergraduate students in a variety of classes. What may not be as well known, is the key role of undergraduate students within the WSVL. In every section of the WSVL, from sample receiving through laboratory testing to invoicing and billing, student workers are not only involved but are essential to the operation of the lab. At any given time, the WSVL employs (these are paid positions) 20-40 undergraduate students. Most start with little background or experience but with a drive to learn. They receive some initial training on basic lab procedures and safety, then the WSVL staff and faculty work with them at the bench to give them hands-on training in necropsy, virology, bacteriology, what ever the job demands. Many of these students develop a very high level of proficiency in their jobs and become extremely valuable contributors to the diagnostic mission of the WSVL. In addition to this practical training, our students get to experience veterinary medicine and public health from a very different perspective, that of the laboratory diagnostician. They get to read the case histories, understand what the referring veterinarian needs, see how the lab results may affect patient outcomes and hopefully, experience some of the satisfaction that comes from serving the animal and public health needs of Wyoming and the surrounding region. It would be hard to overestimate the value of this type of experiential learning.

So, I would like to take this opportunity to give a shout out and thanks to our student employees at the WSVL, we really appreciate your hard work. And for those of you who submit cases to the WSVL, please remember that in addition to getting your diagnostic results, your submission is helping to train the next generation of veterinarians, researchers and maybe even the diagnostic faculty who will handle your cases in the future.

**Dr. William
Laegreid**
**WSVL
Director**



WYOMING STATE
VETERINARY
LABORATORY



About the Author

Dr. Holly Ernest is Professor and Excellence Chair in the Department of Veterinary Sciences. She is a research veterinarian (MS and DVM from Ohio State University College of Veterinary Medicine) and wildlife population health ecologist (PhD from University of California Davis). In the Wildlife Genomics and Disease Ecology Lab at UW, Dr. Ernest and her team use genomic tools to examine how disease, genetics, and landscape features affect wildlife population health.

Chronic Wasting Disease (CWD) is a serious illness causing losses in populations of members of the deer family (Cervidae; including deer, elk, and occasionally moose). Prion is the name of the infectious abnormal protein that spreads via secretions such as saliva, feces, and urine among animals. After exposure to and ingestion of CWD prions, deer and elk become progressively sick, “wasted” (extreme weight loss), have a “spongy brain”, and invariably die. Dr. Elizabeth S. Williams and colleagues first detailed the pathology in 1980 and went on to publish more groundbreaking CWD research papers for two more decades. Infectious prions in CWD cause proteins to fold incorrectly and accumulate in the central nervous system, including the brain. Several studies have identified mutations in a gene (called “PRNP” for Prion Protein) that changes protein structure. This change can reduce the speed that normal proteins get converted to diseased CWD proteins – thus slowing the progression of the disease. Animals with the PRNP mutation (called ‘slow’ genetic variant) still die from CWD but take longer to do so.

Key questions for wildlife disease management include, how does the PRNP gene affect the spread of CWD across deer populations and how does the spread of CWD across deer populations affect the variation in PRNP gene in populations? Does CWD cause disease-driven evolutionary selection? Our research shows that it does. Dr. Ernest recruited UW PhD student (now Dr.) Melanie LaCava to work on this and other questions about mule deer population health and ecology. Melanie analyzed the DNA of over 1000 samples from hunter-killed mule deer. Using the resulting PRNP gene data, along with CWD prion test data from Wyoming Game and Fish Department as well as mapping data of deer locations, our work



Figure 1: Dr. Melanie LaCava preparing deer sample.



Mule Deer buck, near Laramie, WY
PHOTO BY Holly Ernest

demonstrated that individuals with the ‘slow’ genetic variant were less likely to test positive for chronic wasting disease when harvested by hunters, and that the slow genetic variant was more common in herds that had been exposed to chronic wasting disease for longer time periods. We also found that, in the past 20 years, the frequency of the slow genetic variant increased more in herds with higher chronic wasting disease prevalence. Mule deer numbers are declining across the mountain west, including Wyoming. Knowing how CWD is affecting them allows wildlife managers to better predict the spread and impact of the disease. The study was published in the journal, [Royal Society Open Science in August 2021](#) and involved coauthors in Wyoming Department of Game and Fish (Hank Edwards and Dr. Samantha Allen) and the Department of Veterinary Sciences (Dr. Jennifer Malmberg and Laura Johnson).

In another study published in the Journal [Ecography](#) in 2021, Dr. Ernest, Dr. LaCava (now a postdoctoral researcher at UC Davis), and collaborators examined the landscape genomics of mule deer – the study of how landscape variables such as land cover (vegetation, highways, rivers, etc.) and topographic features (elevations, slope, etc.) affect how deer populations are genetically grouped and the level of ‘functional connectivity’. Functional connectivity describes how successful animal movement with subsequent reproduction is among populations. In this study, mule deer were found to have genetic groupings in the western, northern, and southern sections of the state. Computer modeling revealed the importance of low elevation grassland (important winter breeding habitat) for genetic connectivity among populations. We also found that forests (important components of summer range habitat) played a vital role in promoting genetic connectivity.

MULE DEER CHRONIC WASTING DISEASE AND GENOMIC RESEARCH

By: Dr. Holly Ernest
MS, DVM, PhD



The western genetic group had more migration movements than groups in the rest of state. We found that highways were a significant barrier to genetic connectivity in the northern genetic group.

Taken together, these two studies inform us that mule deer habitat and disease affect populations in ways that vary greatly across the state and across the years. Effective mule deer population management and conservation will need to take these spatial and temporal factors into account. Understanding these processes and outcomes is essential for effective management and conservation of natural populations. ▣



The problem.

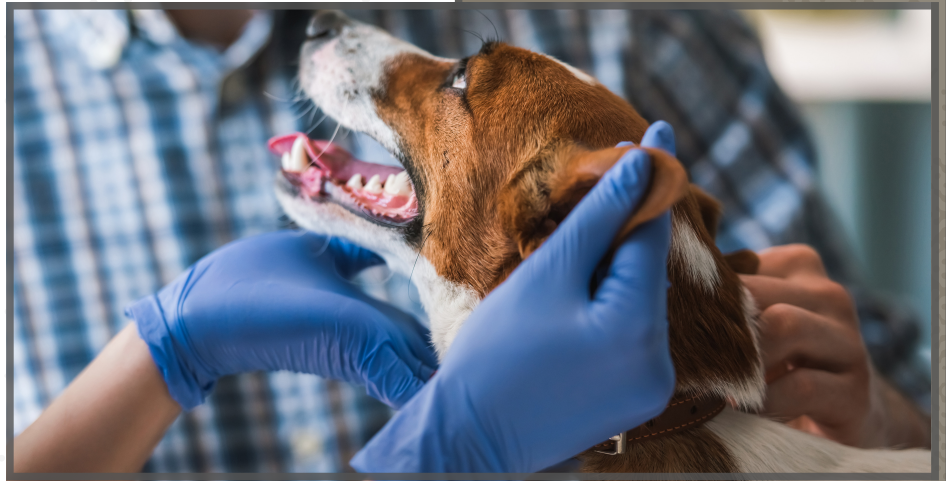
In July, 2021 the WSVL began receiving reports from multiple practitioners in Sheridan, WY about a curiously high number of coughing dogs. Most dogs were responsive to tetracycline, and although many animals were affected; there were few deaths. The concern of the practitioners was that the respiratory panels being used to screen the dogs for the typical bacterial and viral etiologies of kennel cough, were negative. We received nasal swab samples in June, and broadened our typical upper respiratory work-up to include specialized cultures for virus and Mycoplasma.

What we found.

The virus culture was negative, however, we isolated a Mycoplasma spp. There are certain Mycoplasma species that have been associated with upper respiratory infections in dogs including *M. canis*, *M. cynos*, and *M. spumans*. Many reference labs have diagnostic PCR assays that specifically identify *M. canis* and *M. cynos*. However, without additional sequencing, other species of Mycoplasma can/will be missed. Additionally, since most Mycoplasmas do not grow on routine culture setups, they can also be missed unless a Mycoplasma culture is specifically requested.

Taking the next step.

Additional cases were reported to us by practitioners in Laramie, WY; as well as a few around the state (Figure 1). Case presentation varied from mild upper respiratory signs (dry cough, nasal discharge), to more severe signs including fever, vomiting and lethargy; most dogs affected had a complete recovery. We alerted other diagnostic labs in the region and received a sample from the Montana Veterinary Diagnostic Lab.



From these samples we were able to 1) Make a diagnosis of Mycoplasma based on colony growth (n=37), 2) Obtain a fingerprint using our mass spec (Figure 2), and 3) Perform sequencing on the DNA to determine what species of Mycoplasma we were finding.

Preliminary results.

We have performed whole genome sequencing on 4 of the isolates, and all have been identified as *Mycoplasma edwardii*. This species of Mycoplasma is not typically considered pathogenic, and from the protein fingerprint (Figure 2) and genetic sequence data we have determined that it is different from other species of Mycoplasma typically associated with kennel cough in dogs.

Now what?

We are encouraged by the curiosity of practitioners around the state to recognize clusters of cases that don't seem to fit routine diagnostic results. We are excited to be able to figure out the etiology behind the coughing dog outbreak. And we look forward to developing a more efficient laboratory assay for diagnosing these cases in the future! □

MYCOPLASMA IDENTIFIED AS CAUSE OF INCREASED KENNEL COUGH SUMMER 2021

By: Dr. Kerry Sondgeroth
MS, DVM, PhD

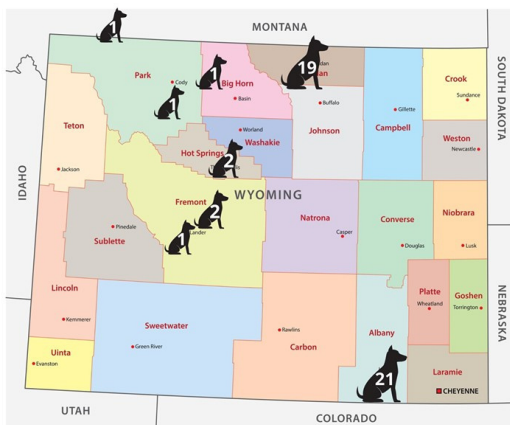
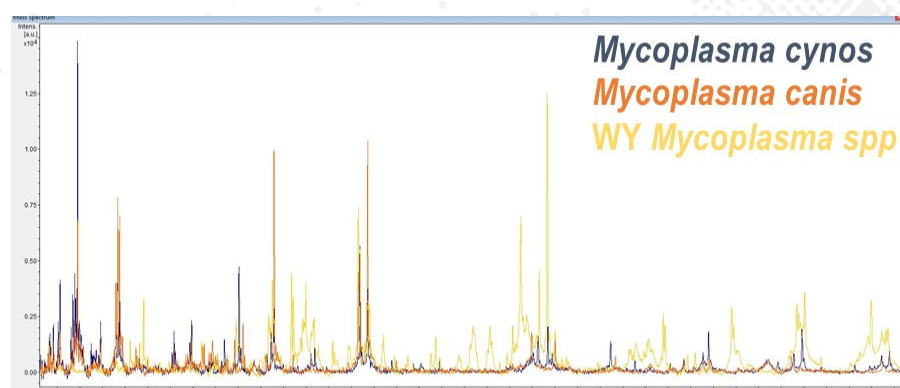


Figure 1. Map showing the location of samples received for additional testing. These samples are only a portion of those that were reported to clinics by concerned owners.

Figure 2. Protein "Fingerprint" of 3 Mycoplasma isolates. Each peak corresponds to a protein, and different species will have different proteins. The blue and orange spectra are similar, and the gold spectra is unique. Blue=*M. cynos*, Orange=*M. canis*, Gold=outbreak isolate





Wyoming Pre-Veterinary Club at the University of Wyoming AG Day BBQ

THE WYOMING PRE-VETERINARY CLUB

By: Emily Eck
Wyoming Pre-Veterinary Club
President



Hi, my name is Emily Eck, and this year I am serving as the President of the Wyoming Pre-Veterinary Club. The Pre-Vet Club is a Recognized Student Organization (RSO) at the University of Wyoming.

The mission of our club is to provide students with opportunities to gain exposure to the various branches that comprise the field of veterinary medicine. Additionally, we offer community service and educational opportunities that are beneficial to students who seek a future in veterinary medicine, by preparing them for the veterinary school application process.

This year, we are excited to welcome many new and returning members in addition to a new faculty advisor, Dr. Jennifer Malmberg, and the 2021-2022 officer team! This year's officer team includes President: Emily Eck, Vice President: McKenzi Davison, Co-Secretaries: Madison Blaeser and Mackenzie Faircloth, Treasurer: Riley Rux, Public Relations: Lindsay Rinner, Historian: Alex Booth, and our Executive Committee: Emily Purifoy.

This past month marked the first time in over a year that club members were able to reunite to hold our first in-person meeting of the semester. We held our meeting in the Wyoming State Vet Lab conference room, where we provided a safe and socially distanced environment. At this meeting we gave an introductory

presentation about the club and what we do as well as covered important announcements regarding upcoming events.

In addition to our meeting, club members recently had the opportunity to participate in various in-person community service events. These activities included volunteering at the campus-wide Involvement Fest and the Ag Day BBQ, hosted by the College of Agriculture and Natural Resources. We look forward to our upcoming club activities; among these are The Big Event, Homecoming Parade, and Fall Pet Wash/Greenbelt Clean-Up.

Having the opportunity to connect with each other and work together at these events has allowed our new and returning members to enrich their academic experience by making connections with hard working and like-minded individuals who are driven toward achieving a common goal. This year, we will be working together to facilitate club activities that cater to the diverse interests of all members to ensure everyone feels engaged and enthusiastic about the experiences that we will be offering. We are all excited to accomplish the goals that we have set for the club!

I look forward to a fun and productive year ahead with a dynamic group of individuals whose goals are to learn more about animal health and veterinary medicine as it pertains to their future aspirations. I am proud to be a member of the Wyoming Pre-Veterinary Club and I am very grateful to be working alongside my wonderful and hardworking peers. I am excited to see what we accomplish as a team this year! ▣

ODDS AND ENDS

2021 UNIVERSITY OF WYOMING GIVING DAY TOTAL CANINE DYSAUTONOMIA RESEARCH
\$12,589

CONGRATULATIONS TO THE WYOMING PRE-VETERINARY CLUB!

2021 UW HOMECOMING PARADE WINNER "BEST USE OF THEME"

COMPETITIVE GRANTS

Title: Upper Powder River Mule Deer Survival
Sponsor: Wyoming Game and Fish Department
Faculty: Dr. Jennifer Malmberg
Amount: \$6,400

Title: Mycoplasma Bovis Emergence in Pronghorn
Sponsor: Wyoming Game and Fish Department
Faculty: Dr. Jennifer Malmberg
Amount: \$20,000

Title: RT-QuIC for CWD in Wyoming Cervids
Sponsor: Wyoming Game and Fish Department
Faculty: Dr. Jennifer Malmberg
Amount: \$11,800

Title: Investigating a potential role for canine distemper virus as a cause of demyelinating disease in African pygmy hedgehogs
Sponsor: Association of Exotic Mammal Veterinarians
Faculty: Dr. Rae Van Sandt
Amount: \$5,000



FACULTY AND STAFF

FACULTY

Dr. Jonathan Fox
Department Head of Veterinary Sciences, Professor, Pathologist

Dr. William Laegreid
WSVL Director, Professor

Dr. Gerard Andrews
Associate Professor, Director - Microbiology Program

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Dr. Elizabeth Case
Assistant Professor, Scientific Director UW Biocontainment Facility

Dr. Todd E. Cornish
Associate Professor, Pathologist

Dr. Holly Ernest
Wyoming Excellence Chair/Professor

Dr. Jacqueline Kurz
Assistant Clinical Professor, Pathologist, Supervisor of Necropsy/Trimming/Receiving

Dr. Jennifer Malmberg
Assistant Professor, Pathologist, Supervisor of Histology

Dr. Myrna Miller
Associate Professor, Veterinary Virologist, Supervisor of Virology

Dr. Donal O'Toole
Professor, Pathologist

Dr. Kerry Sondgeroth
Riverbend Chair, Associate Professor, Veterinary Bacteriologist, Supervisor of Bacteriology and Serology

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Madison Vance
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Ashley Smith
Laboratory Technician III, Necropsy, Trimming, Receiving

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Computer Support Specialist, Quality Manager

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Laboratory Technician II, Regulatory Serology

Samantha Clinton
Laboratory Technician III, Regulatory Serology

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Research Scientist, Brucellosis Research Coordinator

Dr. Amy Wray
Post-Doc Research Associate, Malmberg Laboratory

Dr. Rae Van Sandt
Research Scientist, Associate, Fox Research Laboratory

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TOXICOLOGY

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Jennifer McKenna
Laboratory Technician III, Virology

Marce Vasquez
Laboratory Technician III, Virology

TAKE PICTURES?

Send your wildlife photography to us for a chance to be featured in our next newsletter. Send photographs to glattime@uwyo.edu.

HAVE FEEDBACK?

Please let us know if you have any suggestions or feedback on this newsletter. Send comments to glattime@uwyo.edu.

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THE WORLD NEEDS
MORE COWBOYS.