

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



UPDATES

Welcome to the winter/spring issue of the Veterinary Sciences Department / WSVL newsletter. While our aim has been to have four newsletter editions a year, the front office is currently understaffed, so we decided to combine the winter and spring issues. We have some good news to announce!

Early in 2022, we interviewed two candidates for tenure-track faculty positions in the department. I am pleased to announce that as a result Dr. Brett Webb will be joining the department this June. Dr. Webb is an anatomic pathologist and former director of the North Dakota State University Veterinary Diagnostic Laboratory. He will bring with him broad diagnostic anatomic pathology experience, as well as a research expertise focused on infectious disease of livestock. We are excited to have him join the department/WSVL. We currently have another open pathologist position that we are hoping to fill soon.

This newsletter highlights some of the undergraduate and graduate research we have in the department. Undergraduate research experience is not a required part of our degree offerings at UW. However, many students seek out research experiences during their degrees; our faculty provide them a variety of research projects and invaluable hands on training. Departmental graduate students are engaged in a number of projects, including studies on diseases of importance to Wyoming including bighorn sheep pneumonia, coccidiosis, chronic wasting disease, and ruminant mycoplasmosis. Our student researchers provide new ideas, energy, and enthusiasm that is not only essential for their research, but also adds to the vibrancy within our unit.

As you will see from Dr. Laegreid's introduction, he is stepping down as WSVL director this June after 10+ years in the position, and is staying on as a departmental faculty member. Dr. Laegreid has had considerable achievements here including maintaining the WSVL's AAVLD accreditation status, moving the WSVL to a tier II NAHLN member, and also stepping up early in the pandemic to lead the Universities human COVID surveillance and testing. I want to thank him for all he has done, and hope that many of you will also. Please enjoy reading the newsletter; feel free to provide us feedback or reach out with questions.

Dr. Jonathan Fox Department Head



When you submit diagnostic samples to the Wyoming State Veterinary Laboratory you have every right to expect the highest quality testing will be performed on them. But how do you know? You could take our word for it but there is a better way to judge. The American Association of Veterinary Laboratory Diagnosticians (AAVLD) is an organization of nearly 1,000 veterinary diagnosticians worldwide and is the oldest veterinary diagnostic accreditation program in the world. The AAVLD has established guidelines and procedures for veterinary diagnostic testing and quality management. Our diagnostic faculty and staff, led by Quality Manager Mark Davidson, work diligently every day to meet these standards, everything from calibrating pipets and thermometers to ongoing proficiency testing of our technicians and validation of testing protocols. All of these efforts must be carefully documented so that we may demonstrate, on any given day, that our people, equipment and procedures are providing accurate results. Every five years, the WSVL is audited by the AAVLD to be sure the quality of our diagnostic testing program meets standards. Our latest audit was performed over three days in September, 2021, and I am pleased and proud that the WSVL was once again granted full accreditation by the AAVLD for another five years.

The COVID testing performed in the WSVL, since it involves human testing, is not covered by AAVLD but is regulated under the Clinical Laboratory Improvement Amendments administered by the Centers for Medicare & Medicaid Services (CMS) within the U.S. Department of Health and Human Services. The requirements and documentation under CLIA are somewhat different from those of AAVLD but the basic process of training, recordkeeping and audits is similar. Our COVID testing program was audited this past year and was granted a Certificate of Compliance for High Complexity COVID testing. So, whether it is animal testing or human COVID testing, when you submit samples to the WSVL you can be sure that the results you receive are accurate as possible. And you don't have to take my word for it.

A couple of personnel notes. Our longtime Accountant and all-around office guru, Marjorie Jaeger left the WSVL to become the Executive Business Manager in the U.W. Office of Student Affairs. Congratulations to Marjorie on the promotion, we will certainly miss her in the WSVL. Finally, this will be my last piece for the newsletter as I will be stepping down as WSVL Director at the end of June. The last ten years have been a real joy for me, working with excellent staff, faculty and students, and getting to know many of the veterinarians and animal owners and managers around Wyoming. Thank you all for making my tenure as Director such a rewarding experience. I think the WSVL is one of the best diagnostic labs in the country and I am sure this will continue in the future.

Dr. Will Laegreid WSVL Director



Undergraduate Student Research



OLIVIA BOWERS SONDGEROTH RESERACH LAB

Year at the University of Wyoming.
Senior

What do you like most about Laramie and the University of Wyoming?
I love Laramie's outdoorsy atmosphere and all the great people at the University of Wyoming.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

This summer I worked on a sheep *Pasteurella* project with Dr. Kerry Sondgeroth. I especially liked helping with sample collection at the University sheep facility. Now, I am working on extracting DNA from samples for various other research projects.

What are some of your hobbies? What do you like to do in your spare time?
My hobbies are dancing ballet and Lindy Hop, riding horses, and hiking.

Any pets?
I have five horses and two dogs back home.

Anything else you would like to share about yourself.
I am from the Appalachian Mountains of Virginia.

MAGGIE RINGLEY SONDGEROTH RESERACH LAB

Year at the University of Wyoming.
Senior

What do you like most about Laramie and the University of Wyoming?
I love the family atmosphere and pride everyone has for the UW. You can walk down the street and just be filled with Poke pride, and I think that is really something special.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?
Since January 2021, I have been working to identify the bacteria from some of the samples we have been getting in the Bacteriology Lab-specifically from Equine samples. This has moved forward with the help of Dr. Kerry Sondgeroth, Hally Killion, Chris MacGlover, and Molly West.

The goal is to ID the bacteria so that we can give more thorough results to clinicians. This project has helped teach me a wide variety of skills that I will be able to use in the future. I feel that the most significant aspect of my research so far was having the opportunity to give an oral presentation at the Annual AAVLD Meeting in Denver back in October 2021! I plan to have this project completed this semester! I have just recently started a second project with Dr. Sondgeroth, but it is still in the beginning stages. There is not a lot to report about this project yet.

What are some of your hobbies? What do you like to do in your spare time?
Most of my free time is filled with studying. However, when I have time, I like to go hike, watch movies, spend time with friends, or catch up on sleep!

Anything else you would like to share about yourself.
I am looking forward to where the future takes me, and I am trying to keep my options open. I love learning new skills and techniques! I also think bacteria are really cool!



Undergraduate Student Research



MCKENNA KAIL **CANINE DYSAUTONOMIA** **RESEARCH**

Year at the University of Wyoming.
Sophomore

What do you like most about Laramie and the University of Wyoming?

In Laramie, I love that there is an emphasis on embracing, and learning, about new cultures and topics without losing a sense of the down-to-earth attitude that accompanies most rural communities. As for the university, I most enjoy being able to learn, grow, and create new relationships with peers that I would not typically be surrounded by if it weren't for the University of Wyoming.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

My research involves investigating the cause of Canine Dysautonomia: a fatal disease affecting the autonomic nervous system in dogs. The working hypothesis is that the dogs are exposed to anaerobic bacteria in the soil that can produce toxins. These toxins may be responsible for the dysfunction of the autonomic nervous system seen in patients with dysautonomia. My role in this research project, under the direction of Dr. Rae Van Sandt, is to develop a PCR method that can detect microbial neurotoxins. Recently, we received soil samples from isolated properties in North Carolina and Missouri that are linked to cases of CD.

I seek to identify bacterium in the soil samples that may have been ingested by the dog, which could have caused dysautonomia.

The most interesting part of my research is how important exact precision is within the process of a research experiment. With PCR, we are working with extremely small amounts of liquid, and misplacing as much as a microliter of liquid can ruin the experiment. Although others may think it easy to become "lazy" when following an experimental procedure, there is little-to-no room for mistakes with our PCRs!

What are some of your hobbies? What do you like to do in your spare time?

My hobbies include singing, country swing dancing, drawing, skiing, snowmobiling, four wheeling and just about any other activity you can come up with in the middle of Wyoming.

Any pets?

I unfortunately don't have any pets, but I used to have a succulent named Jordan that used to live on my desk. He has since been relocated to my home in Lander and has been replaced by a stand-in until I can find a new one!

Anything else you would like to share about yourself.

I have really enjoyed working on this project in the Wyoming State Vet Lab, and I have learned more than I ever thought I would about the scientific process and how researching in a lab is coordinated. Additionally, I would like to invite anyone that would want to dance with me to country swing dancing on Thursdays in the Wyoming Union - I would love to have more dance partners!



Undergraduate Student Research

ERIN SCHWALBE MALMBERG RESEARCH LAB

Year at the University of Wyoming:
Junior

What do you like most about Laramie and the University of Wyoming?

My favorite thing about the University of Wyoming is the opportunities available to students. Being able to find great mentors willing to take the time to teach undergrads how to conduct research and have their own projects is something that I don't think I would have been able to find anywhere else. My favorite thing about Laramie is almost everything is in walking distance which is a great way, specifically in the summer, to get around while also getting some fresh air and exercise.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

I am a Wyoming Research Scholar, working in the Malmberg Lab with Katie Schwartz on trying to determine the optimal sampling method for detection of *Mycoplasma bovis* in North American bison (*Bison bison*). This has involved collaborating with producers and the National Parks Service to collect deep and superficial nasal swabs from both apparently healthy and sick bison.

Results from the swabs are then compared to determine if there is agreement between the two swabs of the same individual or if they differ. These results will ultimately aid in future projects and contribute to the knowledge base required for development of effective vaccines and treatment techniques for mycoplasmosis in bison.

The most significant and interesting aspect of my research so far has been how much I have learned about conducting research in general. I've learned how to extract DNA and run qPCR which are just a few of the things that I've learned that I will continue to use in the future. I've also learned that things not going as planned or as expected happen a bit in research and learning how to overcome those things and analyzing why they might be happening is an essential skill when doing research.

What are some of your hobbies? What do you like to do in your spare time?

Some of my hobbies are reading, hiking, and traveling. In my spare time I like to spend time with my friends and family. I also enjoy coaching gymnastics and being in the gym! I was a gymnast for 16 years, and it's still a big part of my life.

Any pets?

I have a dog named Bronco. He's a Shih Tzu but the name fits because he thinks he's a big strong German Shepard.

Anything else you want to share?

I'm from Reno, NV and am currently applying to vet school.



DEPARTMENTAL GRANTS

TITLE: Canine Dysautonomia Research Grant

SPONSOR: Paws to People

FACULTY ASSOCIATED: Dr. Jonathan Fox, Dr. Kerry Sondgeroth, Dr. Rae Van Sandt

\$13,500

TITLE: "Uncovering the Contribution of *C. burnetii* Developmental Stage to Intracellular Pathogenesis"

SPONSOR: Wyoming INBRE Thematic Research Grant Award

FACULTY ASSOCIATED: Dr. Elizabeth Case

\$150,000

TITLE: "Comparative Genomics of *B. abortus* Isolates from Elk of Western Wyoming"

SPONSOR: Wyoming Brucellosis Research Grant

FACULTY ASSOCIATED: Dr. Elizabeth Case

\$20,414.20

Graduate Student Research



MD ASHRAFUL ISLAM BHUIYA BANGOURA RESEARCH LAB

Year at the University of Wyoming.
Second year. Ph.D.

What do you like most about Laramie and the University of Wyoming?

Peaceful and safe environment. UW: Everyone is very friendly and helpful.

Tell us a bit more about the research work you are doing and your collaborators?

Share the most interesting or significant aspect of your research so far?

Investigating the prevalence of roundworm infection in domestic ruminants and cattle and their cross-transmission at domestic – wildlife interface in Wyoming. Comprehensive study to evaluate the prevalence of roundworms in domestic ruminants and cattle in Wyoming has not been done in about the past 40 years.

What are some of your hobbies? What do you like to do in your spare time?

Playing, recitation, watching tv etc. Usually play tennis, watching tv.

MICHELLE KILPATRICK BANGOURA RESEARCH LAB

Year at the University of Wyoming.
Second year Masters student under Berit Bangoura.

What do you like most about Laramie and the University of Wyoming?

I love all the opportunities that Laramie has for outdoor recreation. There is something for every season! I also enjoy the people and local eateries. The small classroom sizes of UW have always appealed to me and the faculty that I have had the opportunity to work with and learn from are great.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

My research project is to develop a testing assay that will allow us to look for drug resistance in *Eimeria bovis*. I think the most significant thing about my project is the interest people have expressed. It's always fun to have people be as excited and curious as I am about what my results might show.

What are some of your hobbies? What do you like to do in your spare time?

I love doing anything that involves being outside- hiking, snowshoeing, horseback riding, fishing, camping - you name it! If I can't be outside, I enjoy crafting and am also a major foodie so I spend a lot of time cooking and baking.

Any Pets?

I have 2 cats, 2 horses, and a dog.

Anything else you would like to share about yourself.

One of my biggest fantasies is to complete a variation of the Seven Summits!



Graduate Student Research



TESIA LIN

SONDGEROTH RESERACH LAB

Year at the University of Wyoming.
First Semester MS

What do you like most about Laramie and the University of Wyoming?

I love how small the town is! Everything is super accessible and quiet, and for the most part you have the undivided attention of faculty if you need their help.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

My research explores pathogens that are associated with respiratory infections in Bighorn Sheep.

These range from different genetic strains of bacterial M. ovi to identifying the presence of viral coinfections. This project collaborates with the Malmberg lab, Wyoming Game and Fish, and other researchers at the University of Idaho. While I'm just in the starting phases of this project, I imagine that it will be most significant in aiding with the management of bighorn sheep and understanding more about pathogens at the wildlife-livestock interface.

What are some of your hobbies? What do you like to do in your spare time?

In my spare time I like to climb, surf (the many vast oceans of Wyoming), and feed into my codependent relationship with my dog. I also play the violin and will be auditioning for the orchestra next month!

Any Pets?

I have a 7 year old mini Aussie named Kanna (which means a strong spirit/apple of my eye) whose birthday is five days after mine!

CHRIS MACGLOVER

SONDGEROTH RESERACH LAB

Year at the University of Wyoming.
4th Year Doctoral Candidate

What do you like most about Laramie and the University of Wyoming?

I love everything about Laramie, including the wind and the cold. Every day is a chance to learn something new!

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

I use mass spectrometry and next generation sequencing techniques to investigate bacteria biotypes and microbiomes associated with

respiratory diseases of bighorn sheep. I collaborate with fish and wildlife agencies in Wyoming (Game and Fish and the Haab School), Alaska, Colorado, Idaho, Nebraska, Nevada, and Washington.

What are some of your hobbies? What do you like to do in your spare time?

I enjoy a wide range of activities. In particular I find myself ice fishing, snowmobiling, snowboarding, flying, and working on home renovation projects.

Any pets?

Gifford (Catahoula) is my main plus one. Also in my household are two step-doggos, Castiel (Weimaraner) and Behlen (lab/husky), and 1 ¾ special needs cats, Riesling and the Abominable Yeti. Merida, the very dainty horse, stays outside attempting to eat her equivalent volume of hay every day. I am in constant need of pet sitters.



Graduate Student Research

GUNNAR MALMSTROM BANGOURA RESERACH LAB

Year at the University of Wyoming.
1st Year Masters Student

What do you like most about Laramie and the University of Wyoming?

I enjoy Laramie for the small-town atmosphere and well-rounded environment. The University of Wyoming is a welcoming community.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

My research focus is on co-infection of enteric pathogens in calves in the commercial cow-calf setting. Young calves are exposed to many disease agents in their first few months of life, including bacteria, parasites, and viruses.

It is well known that each of these pathogens impacts animal health, however little is known about their interaction and the clinical conditions arising from multiple concurrent infections. Currently my adviser is Dr. Bangoura, with collaborators, Dr. Sondergroth and Dr. Holinger. This study is primarily statewide (Wyoming) visiting private producers, allowing us to find what enteric pathogens are common throughout many Wyoming cattle herds. One of my main goals of this study is to help bridge the gap between producers and academia, furthermore, being able to identify a prevention/treatment option for cattle producers.

What are some of your hobbies? What do you like to do in your spare time?

My hobbies include fly-fishing, hunting, caring for cattle, and rodeoing. I have a hard time sitting still so my wife probably thinks that I have too many hobbies, but I enjoy doing about anything outside.

Any pets?

2 horses (Big John, and Sloan), 2 working dogs (Poke, and Scrat), 1 inside dog (Wilson), and 1 inside cat (Blueberry)



KATIE SCHWARTZ MALMBERG RESERACH LAB

Year at the University of Wyoming.
Doctorate, although I already have my DVM.

What do you like most about Laramie and the University of Wyoming?

I haven't been here long, but love how close we are to beautiful public lands.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

I'm studying *Mycoplasma bovis* infections in wildlife and bison herds; right now we are trying to figure out appropriate testing methods to detect *M. bovis*, and eventually hope to use whole genome sequencing and mass spectrometry to understand the relatedness of the different strains, and possibly how and why it is infecting these species, when its historical primary host is cattle.

The most interesting aspect honestly is that there is so much we don't know about this pathogen in wildlife and bison – there are so many questions to ask and answers to pursue! We are working with a number of collaborators, including National Park Service, USDA, USFWS, tribal governments, and private ranchers/landowners.

What are some of your hobbies? What do you like to do in your spare time?

I enjoy lots of outdoor activities such as hiking, camping, kayaking, and birding. When I'm stuck indoors, I like to read, as well as make art; I primarily use charcoal, pencil, ink, colored pencils and marker, and my subjects are usually animals or nature. I currently have a piece of art selected for and being displayed for the University of Wyoming Student Art Show. It's also been selected to go to a gallery in Jackson, WY for the summer when the student show ends. I don't take commissions, but hope to make prints of my artwork available online soon.

Any Pets?

Three, currently. Two dogs (Annabelle and Sorcha) and one cat (Finbar).



Graduate Student Research



SYLVIA THIONG'O CASE RESEARCH LAB

Year at the University of Wyoming.
1st year, working towards a Doctorate

What do you like most about Laramie and the University of Wyoming?

I like that the University is in a small town. I look forward in engaging in outdoor activities available in Laramie. I am yet to arrive in the US, and I feel I will enjoy my stay in Laramie. All the staff I have interacted with from the University have been extra helpful.

Tell us a bit more about the research work you are doing and your collaborators? Share the most interesting or significant aspect of your research so far?

I will be working in the Case lab,

where we will be studying various virulence factors of *Coxiella burnetii*, the causative agent of Q fever. This bacterial pathogen exists in two forms; small cell variant and large cell variant. One of the goals of our research will be to understand and describe the molecules affecting the infectivity of the two cell variants as it is still not well understood.

What are some of your hobbies? What do you like to do in your spare time?

I enjoy being outdoors. Motorcycling, travelling and swimming are my main hobbies, and I hope to start hiking in Laramie. When indoors, I enjoy reading fiction stories.

Anything else you would like to share?

I am from Kenya, and I look forward to the cowboy experience in Wyoming, and learning American culture from various states.

DEPARTMENTAL PUBLICATIONS

1. Griffith SM, Gigley J, Fox J, Bangoura B (2021) Identification and characterization of *Eimeria* spp. in western north American Bison (*Bison bison*) herds and potential risk of cross-species transmission. *Vet Parasitol Reg Stud Reports*. 26:100627. doi: 10.1016/j.vprsr.2021.100627.
2. Vandendoren M, O'Toole D, Gigley J, Zhang R, Bangoura B (2022) Establishment of a cell culture-qPCR system to quantify early developmental stages of *Eimeria zuernii*. *Vet Parasitol*. 301:109621. doi: 10.1016/j.vetpar.2021.109621.
3. Mitchell S Szymczak, Will K Reeves, Myrna M Miller. Further Characterization of Rio Grande Virus and Potential for Cross Reactivity with Rift Valley Fever Virus Assays. *Viruses* 2021 Aug 30;13(9):1719.
4. Mackenzie, Adrienne M. (co-first author), Dudenhoeffer, Megan (co-first author), Berit Bangoura, Ravinder N. M. Sehgal, Lisa A. Tell, Braden L. Godwin, Holly B. Ernest. Prevalence and diversity of haemosporidians in a migratory high-elevation hummingbird in North America. 2022. *Parasitol Research*.
5. Korrapati V Sathyasaikumar, Verónica Pérez de la Cruz, Benjamín Pineda, Gustavo Ignacio Vázquez Cervantes, Daniela Ramírez Ortega, David W Donley, Paul L Severson, Brian L West, Flaviano Giorgini, Jonathan H Fox, Robert Schwarcz. (2022) Cellular Localization of Kynurenine 3-Monooxygenase in the Brain: Challenging the Dogma. doi: 10.3390/antiox11020315.
6. Johnson, M., MacGlover, C., Peckham, E., Killion, H., Allen, S. E., Creekmore, T., ... Malmberg, J. (2021, December 21). Source and seasonality of epizootic mycoplasmosis in free-ranging pronghorn (*Antilocapra americana*). <https://doi.org/10.32942/osf.io/ksngd>

A NOTE FROM THE LAB

Attention – Coggins Sample Submitters

Please consider utilizing serum separator tubes or manually separating serum prior to submission for Coggins' samples. Serum separated from the clot is much more durable in shipping than serum left on the clot. Temperature extremes, shipping delays, and road closures, are all common in WY during winter and summer. Every year, our serology laboratory must request new serum specimens when they get hemolyzed blood for EIA tests. Your clients, patients and staff will appreciate timely results when you don't have to replace hemolyzed specimens during adverse weather.



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

Dr. Berit Bangoura
Assistant Professor, Veterinary Parasitologist, Supervisor of Parasitology, Clinical Pathology

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

BACTERIOLOGY

Hally Killian
Laboratory Technician III, Bacteriology

Madison Vance
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Gabriel Lattimer
Office Associate

Lindsey White
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Joan Edwards
Laboratory Technician III, Diagnostic Serology

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Rodney Rogers
Manager, Vet Sci Facilities & Animals

GRADUATE STUDENTS

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Rachel Griess, HTL(ASCP)^{CM} QIHC
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Leslie Sims
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BreAnna Bustos
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Ashley Smith
Laboratory Technician III, Necropsy, Trimming, Receiving

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Laboratory Technician III, Parasitology

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Mark Davidson
Computer Support Specialist, Quality Manager

REGULATORY SEROLOGY

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Samantha Clinton
Laboratory Technician III, Regulatory Serology

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Research Scientist, Brucellosis Research Coordinator

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

SEQUENCING/BIOINFORMATICS

Molly West
Laboratory Technician III, Sequencing/Bioinformatics

VIROLOGY

Elizabeth Butkus
Laboratory Technician III, Virology

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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College of Agriculture
and Natural Resources
Veterinary Sciences

THE WORLD NEEDS
MORE COWBOYS.