

The Inside Scoop

Animal Sciences | Spring 2024



WASHINGTON STATE
UNIVERSITY

APPLIED RESEARCH • EXTENSION & OUTREACH • INNOVATION & TECHNOLOGY • TEACHING

NOTES FROM THE CHAIR

It was another successful year for the Animal Sciences department, not one without challenges, but rather one where the hard-work of the students, staff, faculty and our valued supporters prevailed.

Our department witnessed a significant recovery in our undergraduate student enrollment numbers, an important accomplishment post-COVID.

We were fortunate to receive WA State resources in the form of \$10 million dollars to make long-overdue repairs and improvements at our Knott Dairy Center.

Our Meat Judging team won a national championship in their inaugural return and our Dairy Challenge team competed and placed regionally and nationally.

Our Student Swine Co-op and Cooperative University Dairy Students organizations had great participation and provided unquestionably valuable learning opportunities for those students under the watchful guidance of the faculty advisors.

Animal Sciences faculty were awarded several competitive grants, creating graduate student and undergraduate student research training opportunities.

The fact that for the most part cattle prices were good in 2023 translated into good news for our beef unit.

Our aquaculture facilities were improved and our Meat lab, Feed Mill, and Cattle Feeding lab had investments in them as essential facilities to our land-grant mission.



Gordon Murdoch

Our students were the recipients of scholarships and support from our alumni, industry, and supporters allowing us the privilege to prepare them for animal science-related careers, a responsibility and privilege that we do not take lightly. The future of our program is bright, our students, staff, and faculty are even brighter. Thank you to each and every one of you that have supported my opportunity and privilege to be a part of this amazing department, college, and institution.

GO COUGS!!!

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The Inside Scoop

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We invite you to visit us in person or online.

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On the cover: WSU Miss J126 is a heterozygous polled purebred Wagyu heifer with lots of mothering instinct. Her calf, WSU Miss Mo8, is her first calf. They represent some of WSU's newest Wagyu genetics. Photo credit: Brent McCann

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KIMBERLY DAVENPORT

*Integrating Basic Research with
Outreach & Extension*

Dr. Kimberly Davenport joined the department as an assistant professor in August 2023 following a nationwide search. She was hired as part of the WSU Functional Genomics Initiative, a multidisciplinary collaboration among the Department of Animal Sciences, the Center for Reproductive Biology, the School of Molecular Biosciences, the Department of Veterinary Microbiology and Pathology, and the School of Politics, Philosophy, and Public Affairs. This initiative began in 2016 with an ultimate goal to use gene-editing technology to enhance livestock production and address social and ethical concerns associated with using this technology.

BACKGROUND

Davenport is a native of the Palouse, growing up just eight miles to the east of Pullman in Moscow, Idaho. She was interested in agriculture and animal science at an early age because of her experiences in 4-H and her love of horses.

"My grandfather lived on a farm in Weiser, Idaho," Davenport said. "He traded a ton or two of alfalfa hay for my first pony when I was about 8 years old. The pony had never worn a bridle or saddle. We learned together!"

She earned her undergraduate and graduate degrees in animal science at the University of Idaho, graduating in 2021 with a PhD. She studied with Dr. Brenda Murdoch and her research focused on the assembly and functional annotation of genetic regulatory elements in the sheep genome. Subsequently, she was a postdoctoral fellow at the University of Missouri where she studied reproductive developmental biology in cattle under the mentorship of Dr. Thomas Spencer.

"I really wanted to expand my knowledge in reproductive biology because I am especially interested in the integration of reproduction and genomics. I want to use genetics as a tool to better understand reproductive processes to help solve problems in livestock species," she explained.

ROLES AT WSU

Davenport's appointment at WSU is split between Extension and teaching. Her research program will be geared to uncovering genetic and epigenetic mechanisms governing economically important traits in livestock. She will translate this work to educate and equip producers with beneficial new technology and tools to improve sustainability and profitability of their operations.

"The cool thing about Extension is that I think I can really make a difference," she said.

OUTREACH

Dr. Davenport is currently working on a developing a general needs assessment and plans to use a combination of informal interviews at conferences and producer meetings. She will also use secondary data collected by the state of Washington to determine livestock producer's knowledge, needs, and interests.

"Most livestock producers have not yet adopted genetic technologies," Davenport said. "I want to educate them about the technology so they are prepared to adopt it when gene-editing methodology is readily available."

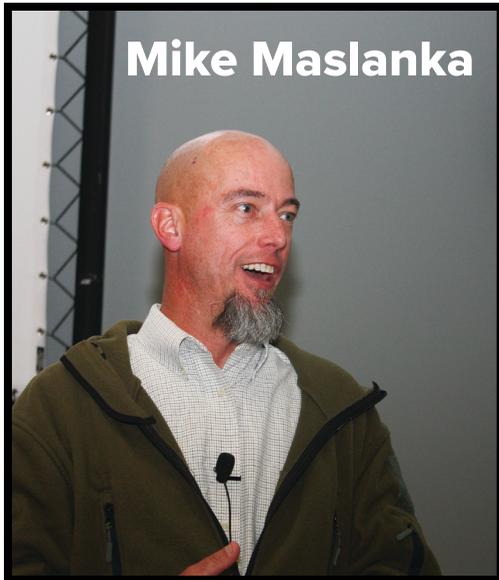
TEACHING

Davenport took the teaching reins immediately upon arriving in Pullman, teaching Animal Genetics (ANIM SCI 330) in Fall 2023 semester. She will be teaching this undergraduate course each fall for the foreseeable future. She is also developing a new UCORE (WSU Common Requirements General Education program) class for spring 2025. The new course will focus on biotechnology, gene editing, and society and will be available to students from all majors. She will coordinate the course and capitalize on the wide variety of expertise across disciplines. Davenport's overall goal for this course is to educate undergraduate students about gene editing so they are not afraid of it and can talk about it and the associated ethical and societal issues. She is also brainstorming the creation of a future graduate course.

To unwind, Davenport makes time to ride her horse at least three times a week.

"This is my escape, my therapy!"

Diary of a Comparative Nutritionist



The 2024 Halver Lecture Series enabled the department to bring Mike Maslanka to Pullman in February when he spoke to a diverse and interested audience. He is the senior nutritionist and head of the Department of Nutrition Science at the Smithsonian's National Zoo and Conservation Biology Institute, which is home to more than 2,200 animals representing almost 400 species. He leads one of the broadest and most respected zoo nutrition programs in the world.

Maslanka's road to the National Zoo may be somewhat unexpected. He received a BS in forestry and wildlife science from Virginia Polytechnic Institute and State University. His interest in nutrition began as an undergraduate student after his involvement in research at the university's dairy, which ultimately led to an MS in nutritional physiology from the Department of Animal Science at University of Minnesota where he worked closely with dairy cows. After graduate school, he completed a zoo nutrition residency at the Brookfield Zoo in Chicago. Prior to joining the team at the National Zoo, Maslanka worked at zoos in Memphis and Fort Worth, and was the nutritionist at the Georgia Aquarium in Atlanta.

IMPORTANCE OF NUTRITION

During his lecture, Maslanka recounted several diet-related clinical cases from notes he has collected thus far in his career and of interest from a comparative nutrition perspective.

"Anyone who is working with a live animal collection has to focus on nutrition because it is integral to every single day of their existence and is imperative for their welfare," Maslanka said.

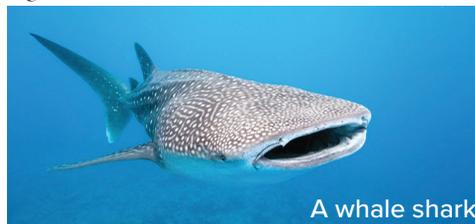
During his residency program at the Brookfield Zoo, Maslanka recalled that their team wanted to figure out why a small group of vampire bats

at the zoo was not thriving. He explained that vampire bats must consume blood meals at least every 48 to 72 hours to avoid starvation. So, the bats were fed anticoagulated blood at 110% of their body weight every day. Even though they had plenty to eat, the bats still weren't doing well. The team was baffled. Was the anticoagulant diluting the energy content of the blood? Was the roost space too large or not maintained at the correct environmental conditions? Maslanka and the rest of the team dug deeper and realized that this cauldron of bats was assembled from several smaller groups of 'misfit' bats. Vampire bats are very social and food sharing is important. The bats that do not leave the roost are fed by their 'friends.' They determined this group of vampire bats wasn't a family and was therefore floundering. Ultimately, the bats were transferred to a different location to improve their social structure.

"Natural history plays a huge role in managed care," he said. "Sometimes we recognize it early. Initially, we didn't dig deep enough to consider the social component for the struggling vampire bats."

The Halver Lecture is funded by the family of the late Dr. John E. Halver, III (1922 – 2012), a WSU alumnus who received a BS in chemistry at Washington State in 1944. He is known as the "Father of Fish Nutrition" because of his nutrition research with salmon that established the basis of commercialized fish feed.

While at the Georgia Aquarium, Maslanka tried to determine why a couple of whale sharks in the exhibit were not eating. He focused on their diet and consulted the Nutrient Requirements of Fish, published by the National Research Council and the 2nd Edition of Fish Nutrition, written by the late Dr. John Halver, the benefactor of the Halver Lecture. Unfortunately, both publications are geared toward fish production. He needed to know what a whale shark, the world's largest fish, eats in the wild?



"If you want the answer, sometimes you're not going to find it in a book," he said. "If there isn't

enough information in the literature then you have to go out in the field to find answers."

SWIMMING WITH WHALE SHARKS

So, the man who couldn't swim endured seasickness aboard a boat amid the world's largest feeding aggregation of whale sharks in the ocean off the Yucatán peninsula. He and the team used plankton tows to collect samples right next to feeding sharks and used a microscope to determine what they were eating. He noted the whale sharks fed for eight hours and each shark consumed about 25 kg of zooplankton a day. Armed with this knowledge, Maslanka went back to Georgia and purchased 100,000 copepods, a planktonic crustacean. Excited that he had found the solution to the whale sharks' anorexia, he poured the copepods into the water and watched the sharks reject the food source and then witnessed \$70,000 worth of copepods get sucked into the water filtration system. Maslanka and his team then tube fed the whale sharks countless times to unsuccessfully save their lives.

"Necropsy is the last lesson an animal teaches us. This provides a ton of value," Maslanka said. "We performed the first clinical necropsy of a whale shark, documenting new anatomical structures. The challenge of solving anorexia led to new discoveries that may assist us in the future."

WORLD'S LARGEST ANIMAL MILK REPOSITORY

A unique contribution the National Zoo provides to the zoo world is that it maintains the largest repository of animal milk in the world, containing more than 16,000 samples. The Cincinnati Zoo reached out to Maslanka in 2017 for help following the premature birth of a hippopotamus calf now known as Fiona. Unfortunately, there was no hippo milk in the collection and zoo staff members had to learn how to milk a hippo so they could analyze the milk's nutrient composition and replicate the formula to the best of their ability. Fiona is now a thriving, normal hippo and is only one example of how the scientists at the milk repository help save and preserve endangered animals.

Maslanka closed his presentation with some advice for the audience that included WSU students, staff, and faculty, and the late Dr. John Halver's sons, John and Peter.

"We work with animals but to be successful you must work with people and be good at it. Many people made my stories possible. Consider that it is a little about the animals and a lot about the people. Continue to build relationships and make sure that they are functional because that is how we save species."

JENNIFER HERNANDEZ GIFFORD

Distinguished Graduate in Science, Education, and Technology

We proudly announce that Dr. Jennifer Hernandez Gifford was selected as the department's Distinguished Graduate in Science, Education, and Technology for 2024. She is a professor of animal science in the Department of Animal and Range Sciences at New Mexico State University (NMSU) and was recently appointed as the undergraduate research director for the College of Agriculture, Consumer, and Environmental Sciences at NMSU.

Hernandez Gifford grew up in Roswell, New Mexico, and did not have a background in agriculture before attending university. Thinking she wanted to pursue a degree in veterinary medicine because of her love for animals, she chose to study animal science as an undergraduate student. However, a job as lab aide in an endocrinology lab in the Department of Animal and Range Sciences at NMSU, led by the now late Dr. Dennis Hallford, changed her career trajectory. She quickly tossed the idea of vet school aside after she discovered a passion for animal science, endocrinology, and learning through her experiences in the lab and at the sheep barn. She graduated from NMSU with a BS in animal science in 1999 and stayed in Dr. Hallford's lab, earning an MS in 2001.

CHOOSING WSU

Wanting to work with the best researcher in reproductive physiology, Hernandez Gifford came to WSU as a PhD student in Dr. Jerry Reeves' lab in the Department of Animal Sciences. At first, she was homesick and experienced extreme culture shock her first semester in Pullman.

"I didn't visit Pullman before coming here, so I didn't know what to expect. August was okay but the first winter was bad because it was dark ALL the time!" she said. "Dr. Reeves told me he wasn't sure I would come back to Pullman after I went home that first Christmas."

But she did come back and earned her PhD in animal sciences in 2004. Her research focused on determining the effectiveness of a vaccine against luteinizing hormone releasing hormone (LHRH) on sterilization of bulls. Some of her most unforgettable memories during her PhD program came from the summers she spent in Brazil vaccinating bulls and collecting carcass data.

"The ranches we went to were remote. We flew into them in small, private airplanes and then had to ride out to the bull herds. I had never ridden a horse before," Hernandez Gifford said with a little chuckle. "The cowboys gave me a mule that was deemed safe because he was 'almost dead' and would stop if I fell off. Well, that mule was SO slow, and I got SO far behind. It wouldn't move any faster, even when prodded by me and the cowboys who had to keep circling back to check on me."

CAREER

After she received her PhD, Hernandez Gifford stayed at WSU as a postdoctoral research associate in the School of Molecular Biosciences. She moved to Las Vegas, New Mexico, in 2008 where she was a visiting assistant professor in the Department of Biology at New Mexico Highlands University. In



December 2009, she accepted a position as assistant professor of animal biotechnology in the Department of Animal Science at Oklahoma State University and was promoted to associate professor in July 2015. Later, fate intervened as NMSU actively recruited her to return to the Department of Animal and Range Sciences in July 2016 where she has been ever since, first as an associate professor and then earning a promotion to professor of reproductive physiology in July 2023.

"My career has definitely gone full circle," Hernandez Gifford said. "I came back to the where it all began. I teach some of the same courses I took as a student, work in the same lab, and oversee the West Sheep Unit where I was originally trained."

RESEARCH PROGRAM

Overall, Hernandez Gifford's research program has focused on female fertility, specifically identifying ovarian signaling pathways that regulate estrogen production and fertility. She hopes that increased understanding will improve fertility in both women and livestock. To accomplish her research goals, she has been awarded more than \$2 million in extramural funding and published more than 50 papers. She received the Mobley Family Endowed Distinguished Research Award in 2022 and the Western Section American Society of Animal Sciences Young Investigator Award in 2017.

The future of animal science and livestock production agriculture is in the capable hands of people like Hernandez Gifford. Students and student training are integral to her success, and she is passionate about cultivating new professionals in the field. She has mentored countless undergraduate and graduate students throughout her career. She is extremely excited about the potential impacts she may have on students through her new role as undergraduate research director.

Hernandez Gifford is married to Dr. Craig Gifford, an Extension beef cattle specialist at NMSU. Together they have two children, Jett (13) and Liliana (8). They breed and raise bucking bulls and enjoy the craziness that comes with working with these animals and competing at bucking bull futurities, which are competitions where a bull's bucking abilities are showcased and judged.



PAUL PATTERSON

Outstanding Alumnus

We are excited to announce that **Dr. Paul Patterson**, professor emeritus of poultry science at Pennsylvania State University (PSU), was recognized as the department's Outstanding Alumnus for 2024.

EDUCATION

Patterson was born in Lafayette, Indiana, but grew up in Pullman after his father joined the WSU Horticulture Department as a faculty member. After graduating from Pullman High School, he attended WSU and graduated with a BS in animal sciences in 1979. Continuing his education, he worked in Dr. Craig Coon's lab at WSU and investigated the protein requirements of mature working horses, earning his MS in animal sciences in 1982. He looks back fondly at his education at WSU.

"I got a super education at WSU," Patterson said. "The breadth of my experience was fairly broad. Back then there were no graduate student assistantships, so to pay for school I held various jobs at Hilltop stables and the feed mill.

While working on his MS degree, Patterson was also involved in an unrelated study that sparked an interest in poultry nutrition, which led him to the University of Wisconsin where he earned a PhD in poultry sciences and nutritional sciences in 1988. He began his career as an assistant professor and Extension specialist in the Department of Animal Science at the University of Hawaii before returning to the mainland in 1992 when he was hired by PSU. He was later promoted to associate professor in 1998 and full professor in 2005.

CAREER

As an Extension Specialist, Patterson designed his research and outreach program to address nutrition, egg quality and safety, and environmental

management, which are many of the poultry industry's greatest challenges. For example, he investigated methods to recycle nutrients and reduce discharges to improve soil and minimize impacts on water and air quality. He championed the use of vegetative buffers at livestock and poultry farms to not only beautify the property but to also screen barns and activities at the urban-rural interface, protect flocks and livestock from extreme weather conditions, provide biomass crops for bedding and renewable fuels, conserve energy as windbreaks, and decrease environmental impacts by trapping or treating farm emissions.

Patterson's prolific career generated more than \$8 million in extramural funds. He supervised 28 undergraduate research projects, mentored and advised 36 graduate students and six postdoctoral researchers and visiting scholars. He was the author or coauthor of more than 80 refereed journal articles, 130 proceedings papers, 7 books or book chapters, and 124 Extension and outreach documents. In addition, he presented more than 170 conference abstracts and spoke at over 470 Extension and outreach programs, many times as an invited speaker at national and international forums.

COMMITMENT TO THE POULTRY INDUSTRY

Dr. Patterson is committed to the safety and future of the poultry industry. He played a key role in the Pennsylvania Egg Quality Assurance Program, which implemented management practices to prevent contamination of eggs with *Salmonella enteritidis*, a bacterium that is a common cause of foodborne illness in humans. He is the current Director of the National Egg Quality School and as an instructor he has taught shell quality, hen nutrition, pest eradication, Salmonella control, and FDA environmental and egg testing procedures to more than 2,300 egg industry professionals. As

a crucial member of the Pennsylvania HPAI Task Force that was deployed in response to the catastrophic mortality caused by Highly Pathogenic Avian Influenza in 2015 and 2022, Patterson demonstrated a virus inactivation system by ensiling dead hens that allowed safe storage of one million birds in a 600-ft long Ag-Bag.

A long-time member of the Poultry Science Association, Patterson has served on the Board of Directors, as Secretary/Treasurer, and was a member or chair of numerous committees. He has been an editor, reviewer, or ad-hoc reviewer for numerous peer-reviewed journals, including Poultry Science and the Journal of Applied Poultry Research. He is an active member of both the American Poultry Historical Society and the World's Poultry Science Association, having served as President in the former organization and as a USA Branch Representative, on the Board of Directors, and as Vice President in the latter.

AWARDS

To recognize his dedication to the poultry industry and for his excellence in Extension and outreach programs, Patterson was the recipient of the Poultry Science Association's Phibro Extension award in 2005, PSU's Faculty Outreach award in 2017, the Mid-Atlantic Nutrition Conference Work Horse award in 2012, and the Purina Research Fellowship award from 1993 to 2004. He was named a Poultry Science Association Fellow in 2022.

Patterson and his wife, Nüket Acar Patterson, PhD, reside in Pennsylvania. They have two sons and a grandson. He returns to the Palouse on a regular basis to visit his father who still lives in Pullman. An avid horseman, he hopes to get approval and funding to create a bridle path around Kamiak Butte, a national natural landmark that rises to 3,641 feet a few miles north of Pullman.

AUSTIN ALLRED

Distinguished Service



The department's **Distinguished Service Award** is given to those who have provided exemplary support to our core mission – advance knowledge through research, innovation, and creativity, and to apply animal science knowledge to improve the quality of life for people and animals and enhance local and global economies. This year we are pleased to honor **Austin Allred** with this award.

Allred owns and operates two dairies in central Washington – Royal Dairy and Moxee Dairy – and milks about 10,000 cows between the two. The dairies are part of Royal Family Farms, a third-generation family farm founded in 1962 by Allred's grandparents, that encompasses diverse agriculture operations from crops like potatoes, hay, and sweet corn to orchards and beef cattle. Allred and his brothers believe in regenerative farming and use a closed-loop system to decrease the farm's environmental footprint, and improve soil health, resource use efficiency, biodiversity, and profitability.

For example, more than 90% of the feed for the dairy and beef cattle is produced by the farm. Moreover, beef that is grown and packaged locally is produced from steers that are a result of beef-on-dairy crossbreeding practices in which dairy cattle, like Holstein and Jersey cows from the Royal Dairy, are inseminated with semen from beef breeds, like Angus and Simmental bulls. Once the cattle reach market weight, they are harvested at a nearby, farm-owned processing plant.

Even the waste from the dairy is upcycled at the farm. Almost all the solid waste is composted and added to the farm's soil. Wastewater is cleaned using vermifiltration, an innovative biofilter system that uses a combination of wood chips and earthworms to biologically remove almost all nitrogen and phosphorus, and produces effluent water that can be reused and safely applied to nearby fields. Moreover, as the wastewater passes through the vermifilter, the earthworms reduce the farm's greenhouse gas emissions and produce castings, the normal end product of digestion, that are eventually harvested and used as a valuable soil amendment. A visionary in sustainable practices, Allred installed the vermifilter at Royal Dairy in 2017 and its five-acre footprint is the largest in the world. His commitment as an environmental steward and use of sustainable modernization technologies to lessen the en-



vironmental impact of dairy farming was recognized in 2018 when he was awarded the Outstanding Dairy Farm Sustainability Award by the Innovation Center for U.S. Dairy.

Allred is a big proponent of educating everyone about how the farm and the dairies work together and routinely hosts tours for student groups and the public. He is passionate about his cows and how they are an integral part of a sustainable operation.

"Dairy cows and the ag industry have a symbiotic relationship," he said. "Cows are rightfully considered to be a massive part of sustainability."

He enthusiastically shares his vision for the future of the U.S. dairy industry and is one of the first to adopt new and innovative technologies like the vermifilter. His transparency and willingness to collaborate with scientists and researchers from WSU and other institutions and groups will lead to scientific evidence that backs up theories that improve sustainability and biodiversity and decrease agriculture's environmental impact.

"I learn as much from the people that come out to the dairies as they do," Allred said. "I am energized by our shared visions."

Allred is excited to fulfill a dream of a family farm that uses management practices and technologies to preserve the environment and the planet for future generations. He hopes to someday pass on the farm and ranch to his five children to continue the Allred legacy in the Columbia Basin.

MIN DU

Maternal obesity, AMPK and Developmental Programming

Over 40% of pregnant American women are obese, which negatively affects fetal development with long-term consequences for offspring health. Fibrosis, characterized by excessive accumulation of connective tissues, is responsible for functional deterioration of various organs and tissues. Previous studies found that maternal obesity leads to fibrosis in offspring with unknown mechanisms. We hypothesize that maternal obesity (MO) enhances the formation of fibrogenic cells during embryonic development, leading to fibrosis in offspring. Metformin, a common drug used to treat diabetes, activates AMP-activated protein kinase (AMPK), which is a master regulator of energy metabolism. We hypothesize that metformin can effectively suppress fibrogenic cell formation in MO fetuses by activating AMPK, improving the health of offspring born to the increasing number of obese mothers. Currently, we are conducting mouse studies to test our hypotheses.



HOLLY NEIBERGS

Validation and characterization of loci associated with fetal loss in dairy cattle



Reproductive efficiency is critical for the cattle industry. Although fertilization rates are higher than 90%, many heifers and cows (30 to 56%) will lose their pregnancy during the first 42 days (embryonic loss) and more (3 to 11%) will abort before full term (fetal loss). This represents an annual economic loss of more than \$1 billion. One cause of poor fertility in cattle is poor genetics. This study will focus on identification of the genetic source of poor fertility and provide a tool to select fertile cattle for the next breeding generation.

More than \$ dollars was a Animal Science research



MIKE PHELPS

Decoding the Salmonid Genome Project: A national resource for the large-scale functional characterization of genomic elements using gene edited rainbow trout

We are embarking on a groundbreaking study to understand how genetic changes influence salmon and trout growth and their ability to handle changing environmental conditions. The research is using large-scale CRISPR gene-editing technology in combination with high-throughput phenotyping and machine learning methods to identify regions of DNA that can improve growth and environmental resilience in rainbow trout. This study will provide insight into how fish grow and cope with varying environments in order to identify ways to improve the sustainability and productivity of fish culture while shedding light on the ways that wild salmon may adapt to future water conditions.

MARCOS MARCONDES

Inclusion of Brominata™ on the digestion and performance of dairy cows

Evaluation of ZEOLITE on digestibility, nitrogen metabolism, methane production and microbial population of dairy cows

We are evaluating the effect of adding an extract from the red algae, *Asparagopsis taxiformis*, to the diets of Holstein dairy cows on methane (CH₄) emissions. If the supplement successfully decreases CH₄ without compromising the health or productivity of the cows, this research could offer a sustainable solution for reducing CH₄ emissions from dairy cattle, contributing to global efforts in climate change mitigation.

In another study we are exploring how different levels of zeolite clinoptilolite, a naturally occurring mineral, affects the ruminal microflora responsible for CH₄ production using an artificial rumen fermentation system. The reduction of CH₄ emissions is crucial not only for environmental sustainability but also for enhancing the feed and energy efficiency of dairy cattle.



ZHIHUA JIANG

Assembly of the bovine pan-transcriptomes for improved genome annotation and phenome prediction

To determine the connection between the genetic makeup of an animal (genome) and the observable physical or physiological traits or characteristics (phenome) in ruminant species, we will generate pan-transcriptomes in four ruminant species/sub-species. A pan-transcriptome is a combination of a transcriptome (complete set of RNA molecules in an organism) and a pan-genome (entire set of genes in a species). Successful completion of bovid pan-transcriptome resources will be used to understand the origins of 1) species/sub-species divergence, 2) sexual dimorphisms and 3) resistance and/or susceptibility to disease and stress.



\$4.5 million
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h in 2023

GORDON MURDOCH

Technology to manage livestock location within RANGE and REALITY

Each year ranchers struggle repairing fence, installing new fencing in challenging terrain, and rounding up livestock that have escaped areas of intended retention. All of this comes at great financial and labor cost. We are focusing on developing a low-cost technological livestock containment system to manage herd/flock location and access to land. We will refine and test an ear-tag based virtual fence for livestock containment and exclusion.



KRISTEN JOHNSON

Worms working for change: How vermifiltration of dairy nutrients relates to carbon trading

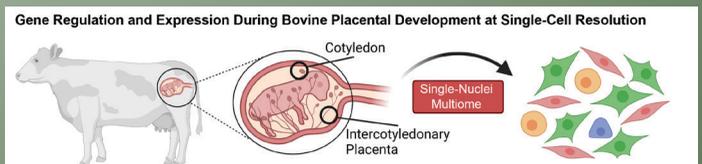
Dairy producers need a variety of options to consider when working with wastewater. One such option might be vermifiltration, an aerobic process used to remove solids, nitrogen and phosphorus while reducing greenhouse gas emissions. Manure must be managed to return appropriate nutrients when and where they are needed for soil health and food production, while protecting both water and air quality. Achieving synergy between animal production and environmental health requires an approach that supports new technology implementation to preserve nitrogen and prevent losses (e.g., GHG, nitrate). Harnessing and adapting current technologies for animal agriculture could generate significant economic savings on manure management costs, reduce nutrient losses to air and water, and provide an income stream through use of C-markets. Vermifiltration systems are emerging as low-cost and sustainable wastewater treatment technologies that convert agricultural water into valuable byproducts and are of great interest to diverse agricultural industries including dairies.



KIM DAVENPORT

A single-cell chromatin accessibility atlas of the developing bovine placenta

Only 30% of animals conceive and carry pregnancy to term, amounting to almost \$1 billion per year in lost revenue on beef and dairy farms. Placental development is essential for successful reproduction. This project will use cutting-edge genomic technologies to understand genetic regulation of placental development at single cell resolution, and utilize this knowledge to further understand the influence of genetic variation on fertility traits in cattle. Further, it will allow for more precise identification of reproductively superior animals with the use of genomics, which will contribute to more profitable and sustainable cattle operations.



UNDERGRADUATE STUDENTS

COOPERATIVES

Students own and learn to operate and manage their own animals. Members in SSC purchase 10 feeder pigs each semester, feed and harvest them when they reach market weight, and sell the pork to the public. Members of CUDS manage a 35-cow milking herd, plus young stock and dry cows. They market their milk to the WSU Creamery where it is used to make Cougar Gold Cheese and Ferdinand's ice cream.



COOPERATIVE UNIVERSITY DAIRY STUDENTS (CUDS)

Advisor: Dr. Marcos Marcondes
Email: marcos.marcondes@wsu.edu



STUDENT SWINE COOPERATIVE (SSC)

Advisor: Dr. Kristen Johnson
Email: johnsoka@wsu.edu

CLUBS

Several active clubs provide social and educational events that cater to students interested in animal sciences.

Collegiate Horsemen's Association
wsucollegiatehorsemen@gmail.com

Companion Animal Club
martin.maquivar@wsu.edu

Dairy Club
martin.maquivar@wsu.edu

CONGRATULATIONS GRADUATES

DECEMBER 2023

Gladiola Banuelos
Noelle Belanger
Mercedes Benz
Caroline Cave
Genevieve Del Rosario
Lorelei Derenne
Teddy Grogan
Daniel Han
Megan House
Emilee Keppelmann
Samantha Merriott
Lauren Mora
Marissa Morin
Demetria Nice
Hunter Parbo
Tia Rich
Jessica Scheenstra
Catherine Sepulveda
Sienna Wayner
Makenzie Zessin

MAY 2024

Joan Baldovinos Albares
Connor Beene
Isabella Berglund
Kalvin Bowers
Jayde Chapman
Alyssa Chun
Taylor Dantine
Sierra Di Carlo
Savannah Dominiak
Madison Fallang
Emma Ferari-Zimmerman
Kealey Fife
Bryan Finley-James
Macy Green
Summer Greene
Judith Guerrero Lara
Holly Guest
Rachel Hanson
Madeline Hassett
Lindsey Holmquist
Emilie Hooker
Spencer Jameson
Taylor Jones

Sydney Kish
Samantha Klover
Joseph Koenig
Jessica Konop
Samantha Larson
Kaycie Leslie
Zoe Logan
Brook Mac
Noelia Madrigal Orozco
Hannah Martin
Tori McCary
Emma Melito
Luna Mooney
Mikayla Morgan
Reece Mueller
Savannah Mueller
Alexandra Nelsen
Kenneth Newman
Elizabeth Prozanski
Abraham Reguero
Heston Richmond
Shaelyn Rieger
Anna Roh
Reagan Ruggiero

Alysha Saya
Hallie Sciera
Roselynn Suchting
Jenna Tanna
Remi Tapak
Alyssa Taylor
Olivia Thompson
Anais Vazquez-Ruiz
Erick Vergara Barrios
Juliann Weigel
Emily Welcome
Abigail Wright
Mariele Yong
Rachelle Young
Camilla Zaffram

AUGUST 2024

Kyle Beck
Christina Green
Abby-Lyn Orman
Jonah Maysam
Juliann Vander Haegen



**MACKENZIE
AUSTIN**

Eye-opening dairy farm internship teaches undergraduate student new skills and builds confidence

Austin spent a week at the calf hutches, riding on the bottle trailer, and observed calves for signs of pneumonia. She learned how to move cattle with low-stress techniques, using only her body position and voice.

In the reproduction rotation, she was taught how to recognize cows that were in heat, watched artificial insemination technicians breed cows, learned how to do pregnancy checks, and observed embryo transfers.

During the nutrition rotation, she learned how to inspect the cow's rations for ingredient consistency and distribution in the feed bunks and learned how to determine the dry matter content of the diet. She even spent a day with a crop specialist, learning about how important it is to time the harvest and curing of alfalfa hay for optimum nutritional value.

In the milking parlors, Austin audited the robots that prepared the teats for the milking machines to ensure that they were effectively cleaning and drying the teats. She said this was an interesting process because the robots were extremely fast.

FAVORITE MANAGEMENT ROTATION

Austin's favorite rotation was the time spent in the hospital pen. She learned how to identify and treat animals with pneumonia, ketosis, and displaced abomasums. She treated cows with calcium boluses, learned how to collect blood from the tail vein, and gave cows intravenous fluids.

"It was fun to learn how to tail bleed a cow and I got really good at placing an IV line in the jugular vein," she said. "I really enjoyed the hospital rotation because I was helping to alleviate an animal's discomfort."

At the end of the summer, Austin returned to Pullman with a new enthusiasm for dairy farming and to start her junior year of college with a Threemile Farms-sponsored scholarship.

"The internship at Threemile Farms was an amazing experience! The eye-opening experiences I had there made me realize that my decision to pursue a career in agriculture, dairy farming, or veterinary medicine is right for me," she said. "The opportunities available at the dairy are numerous and you get as much out of the experience as you put into it. Everyone there was so willing to teach me!"

CAREER GOAL

Austin's current career goal is to become a large-animal veterinarian. She is shadowing a local large-animal veterinarian to learn more about the profession. However, she is also looking into getting some experience in scientific research.

She said, "I am curious about research and want to explore other career options. I may not get into vet school, or I might change my mind. I want to broaden my horizons."

Mackenzie Austin, an undergraduate animal sciences student from Pasco, completed a summer internship program at Threemile Canyon Farms in Boardman, Oregon, in August 2023. She learned of the program at the CAHNRS Career Fair and Networking Night. Representatives from the farm explained that they are committed to the future of agriculture and offer high-class internship programs in crop farming and sustainable dairy farming to college students and entry-level workers.

Austin applied to the internship program because she wanted to learn more about dairy cows and milk production. The once-aspiring equine veterinarian had discovered a new passion – dairy cows – because of her experiences in AS 101 (Introduction to Animal Sciences) at the WSU Dairy. Although she was worried that her application would not be considered because she did not have farming or livestock experience, she was selected as one of three dairy interns.

"Don't let the fact that you don't have the experience stop you from applying. The fact that you are willing to learn shows a lot about you as a person. Push yourself to learn new material and new things from everyone you meet," Austin said.

LEARNING THE IN-AND-OUTS OF DAIRY FARMING

Austin was paired with a mentor at the farm and was immersed in the day-to-day operation of the dairy. She moved to a different management section every week. In addition, she was given an assignment – determine how to improve calf health and reduce cost. She collected data, recorded observations, and presented her recommendations to the dairy team. Austin said this experience pushed her to ask questions and learn new skills.

One of her favorite rotations was in the maternity pens. She helped with calving, checked colostrum quality, and ensured calves consumed colostrum, which stimulates immune system and intestinal development.

"I loved helping the cows calve and the overall birthing process. It is such an amazing thing watching a calf come into the world!" Austin said.



First row (L to R): Max Butensky, Giulia Berzoini Costa Leite, Jera Monaghan, Isabela Carrari, Alexander Iritani, and visiting scholars Luiza DaSilva and Luiza Vitarelli. **Second row (L to R):** Sabrina Haney, Makenzie Melby, Michee Van Rooyen, Sharmeen Islam, Adriana Zaragoza, Valerie Achziger, Priunka Bhowmik, and Xinrui Li. **Third row (L to R):** Emaly Suarez, Allison Herrick, Victoria Kelson, Kassie Stadler, Tholen Blasko, Md Nazmul Hossain, and Zhongyun Kou. *Not pictured: Shane Carrion, Jose Francisco Martinez, Nafise Noroozi, and Emma Wheeler.*

VALERIE ACHZIGER (MS, Marcondes)

Hometown: Eastvale, California

RESEARCH FOCUS: Identification of effective dietary strategies that balance dairy cattle health and sustainability

GIULIA BERZOINI COSTA LEITE (MS, Marcondes)

Hometown: Juiz de Fora, Brazil

Research focus: Use of rBST as an alternative strategy to overcome constraints on mammary gland development of dairy heifers subjected to high feeding levels and early breeding practices

PRIUNKA BHOWMIK (PhD, Jiang)

Hometown: Dhaka, Bangladesh

Research focus: Identify DNA and RNA variants associated with endometritis in dairy cows

THOLEN BLASKO (MS, Phelps)

Hometown: Sultan, Washington

Research focus: Applying CRISPR-Cas12 diagnostic capabilities to detect target species' environmental DNA (eDNA)

MAX BUTENSKY (PhD, Phelps)

Hometown: Los Altos, California

Research focus: Maturation process in Pacific salmon

ISABELA CARRARI (PhD, Marcondes)

Hometown: Curtibaba, Parana, Brazil

Research focus: Effects of seaweed (*Asparagopsis taxiformis*) on the digestion, performance, and enteric methane emissions by dairy cows



MAKENZIE MELBY
Outstanding MS Student



VALERIE ACHZIGER
3rd Place Graduate Student Competition
Pacific Northwest Nutrition Conference

CLASS OF 2024

Tholen Blasko, MS

Shane Carrion, PhD

Yao Gao, PhD

Victoria Kelson, MS

Makenzie Melby, MS

Jera Monaghan, MS

Emaly Suarez, MS

Emma Wheeler, PhD

SHANE CARRION (PhD, Jiang)

Hometown: Jackson, Mississippi
Research focus: The link between APA site use and phenomics

SABRINA HANEY (PhD, Phelps)

Hometown: Ogden, Utah
Research focus: Understanding the evolution of viviparity in sharks using comparative genomics

ALLISON HERRICK (PhD, Neibergs)

Hometown: Bliss, New York
Research focus: Utilizing genomic selection as a risk management tool for commercial dairies

MD NAZMUL HOSSAIN (PhD, Du Lab)

Hometown: Magura, Bangladesh
Research focus: Effect of obesity on epigenetic reprogramming of germ cells and embryonic organogenesis

ALEXANDER IRITANI (MS, Phelps)

Hometown: Seattle, Washington
Research focus: Understanding the environmental impacts that influence spawning success in Pacific salmon

SHARMEEN ISLAM (PhD, Du)

Hometown: Mymensingh town, Bangladesh
Research focus: Effects of maternal obesity on offspring muscle development and properties by programming insulin growth factor 2 signaling

VICTORIA KELSON (MS, Neibergs)

Hometown: Molino, Florida
Research focus: Identify genes associated with embryonic loss in high-production Holstein dairy cows

ZHONGYUN KUO (PhD, Du)

Hometown: Yunnan, China
Research focus: Effect of maternal obesity on early embryonic vasculogenesis and hematopoiesis

XINRUI LI (PhD, Du)

Hometown: Shanxi, China
Research focus: Elucidate the intricate network of epigenetic factors that dynamically regulate gene expression and cellular differentiation during

early embryonic development

JOSE FRANCISCO MARTINEZ (PhD, Maquivar)

Hometown: Mexico City, Mexico
Research focus: Endometrial gene expression profiles related to resilience to metritis and endometritis in organic dairy herds

MAKENZIE MELBY (MS, Adams Progar)

Hometown: Pleasanton, California
Research focus: Impact of cow health status on risk of injury to handlers in human-dairy cow interactions

JERA MONAGHAN (MS, Johnson)

Hometown: Burlington, Wisconsin
Research focus: How vermifiltration (worm-powered manure management) affects greenhouse gas emissions, wastewater nutrient profiles, and farm economics on dairies

NAFISE NOROOZI (PhD, Du)

Hometown: Tehran, Iran
Research focus: Calf nutrition during the pre-weaning period

EMALY SUAREZ (MS, Neibergs)

Hometown: Yakima, Washington
Research focus: Identification of genomic regions and genes associated with spontaneous abortion (fetal loss) in dairy cows

MICHEE VAN ROOYEN (MS, JIANG)

Hometown: Pretoria, South Africa
Research focus: Transcriptomic profiling of Karakul sheep to determine relationships between genetic expression patterns and functional characteristics

EMMA WHEELER (PHD, JIANG)

Hometown: Emporia, Kansas
Research focus: Neuroscience and genomics of chronic cannabis use in rodents

ADRIANA ZARAGOZA (MS, Maquivar)

Hometown: Los Angeles, California
Research focus: Identification of transcriptomic changes in endometrial cells in response to pathogenic contamination in organic dairy cows

Outstanding Undergraduate Students



MADDIE REED
AnSci Outstanding Sophomore
Hometown: Mead, Washington



JADEY ONG
AnSci Outstanding Junior
Hometown: Lynnwood, Washington



SPENCER JAMESON
Ralph E. Petty Family Outstanding Senior
Hometown: Kennewick, Washington

DANA DEREGO CATRON

A Grad's Success Story



Dana DeRego Catron (middle) stands next to NMSU colleagues Dr. Craig Gifford (left) and Dr. Jennifer Hernandez Gifford (right). She currently assisting Dr. Gifford to protect and commercialize a health test for cattle

Dana DeRego Catron ('09 BS) grew up in Port Orchard, Washington, and knew she wanted a career in the livestock industry but was not sure exactly what avenue to pursue. When she was a student at South Kitsap High School a fortuitous visit by student ambassadors from the WSU College of Agriculture Human, and Natural Resources Sciences (CAHNRS) steered her toward WSU and a degree in animal sciences.

WSU WAS THE RIGHT PLACE!

“Once I got to WSU, I knew I was in the right place – I loved my classes, I had the opportunity to work on research projects, and I gained skills that I continue to use in my current career,” she said. “My animal science degree ingrained in me skills such as critical thinking, the ability to problem solve, and high standards for communication and writing. These [skills] have translated well into every project and position I’ve had since I graduated from WSU.”

Many times, there are people who are especially influential to a student’s present and future successes. DeRego Catron mentions two animal sciences professors – Dr. Zhihua Jiang and Dr. Kristen Johnson - who stand out and still motivate her to work harder and reach higher.

“Dr. Jiang was my undergraduate advisor and was my biggest cheerleader through the ups and downs of a rigorous program. He encouraged me to step out of my comfort zone and engage in undergraduate research,” she said. “His mentorship extended past graduation and I’m fortunate to still be in touch with him today.”

“Dr. Johnson was also pivotal [to my success] at WSU and continued to have an influence once I started graduate school,” she remarked. “While one of the toughest and most rigorous professors I’ve had to-date, the lessons from both inside and outside the classroom, and influence she had has encouraged me to embrace challenges as opportunities for growth, maintain high standards in

my work, and persistently pursue excellence in everything I do.”

BENEFITS OF A BS IN ANIMAL SCIENCES

After graduating from WSU, DeRego Catron began graduate school at New Mexico State University (NMSU) and earned a master’s degree in rhetoric and professional communication in 2011. She is currently working toward a PhD in the same field. The education and skills she gained during her degree program in animal sciences at WSU were invaluable for her post-graduate education and current career.

“I was able to bring a unique perspective to my classes and discussion because no one else had any background in animal sciences and I was able to blend my interest in the livestock industry with what I was engaged in during graduate school,” she said.

During her MS degree program, DeRego Catron was involved in an internship with the New Mexico Livestock Board, whose mission is to protect the state’s livestock from disease, theft, or other losses. She learned the details of brand inspections and brand requests and was even involved in the preparation of a grant proposal focusing on methods to eradicate bovine tuberculosis, a prevalent challenge for the state of New Mexico at the time.

CAREER PATH

As a graduate student, DeRego Catron was fortunate to secure a graduate assistantship at Arrowhead Center, NMSU’s intellectual property and technology transfer office. Her unique skillset that included an ability to write about technologies and innovation, was invaluable to the center and led to her eventual appointment as deputy director in 2021. In this role, she oversees the center’s programs and uses her expertise and insights to foster growth and innovation in the region. She is currently the principal investigator on numerous federal funding awards and oversees more

than 20 innovation and entrepreneurial-based programs and almost 40 staff members.

MAINTAINING TIES TO AGRICULTURE & THE LIVESTOCK INDUSTRIES

Although she works with clients across the New Mexico, DeRego Catron still uses her background in animal sciences and pursues projects related to agriculture. For example, she secured funding and deployed the state’s first Agriculture Venture Center, which supports agriculture-based businesses throughout the state. She also spearheaded efforts to support the town of Taos, New Mexico, as they deployed a Mobile Matanza unit, a semi-mobile meat processing facility that increases the local animal harvesting capacity for ranchers in northern New Mexico. DeRego Catron is also working with Dr. Craig Gifford, an Extension beef cattle specialist at NMSU to protect and commercialize his BoviPrime Health Test, which identifies bulls who may produce calves with increased resistance to severe cases of bovine respiratory disease.

ADVICE FOR STUDENTS

DeRego Catron knows firsthand that choosing a career path is challenging and offers some advice for today’s students in animal sciences.

“Embrace the challenges of the [animal sciences] program and explore alternative careers that still allow you to be involved with the industry,” she said. “Invest time in building relationships with your professors and immerse yourself in the extracurricular programs available to you. Don’t hesitate to seek assistance when needed.”

DeRego Catron is married with two girls (ages 4 and 7). They recently moved to a property outside of Santa Fe where they have room for horses, cattle, and other livestock. Although she is kept busy with work and coaching a swim team, she makes time to enjoy the homestead life and figure out what she can grow in her garden in the high desert.

Hellos and Goodbyes



Joseph W. Blake
3/13/1928 - 2/22/2024



Daniel J. Coonrad
12/18/1940- 12/6/2022



William T. Bennett
11/28/1927 - 10/21/2019

We sadly say goodbye to three men who made a lasting impact on students, staff, and faculty. Joe Blake served WSU for 37 years as the Knott Dairy Center herdsman. Dan Coonrad retired in 2003 after working as the Ensminger Beef Center herdsman for 36 years. Bill Bennett was beef cattle herdsman from 1957 to 1963 before starting the BB Cattle Company in Connell, Washington. Conversely, we welcome the six individuals pictured below who play vital roles in the department's success.



Dr. Kathleen Sullivan is an instructor for the department's Applied Animal Behavior class. She is comparative animal nutritionist who is an expert in mineral metabolism and a leading authority in rhinoceros nutrition and welfare, currently working out of Disney's Animal Kingdom near Orlando, Florida. She has a PhD in nutritional biochemistry from the University of Florida.



Alex Borden joined the department in October 2023 as a maintenance mechanic at Farm Services. His work helps keep the animal centers operational. He is from Moscow, Idaho, and graduated from Moscow High School in 2021. Prior to coming to WSU, he worked for several local farmers.



Scott Brown joined the department in May 2023 as the Academic Coordinator and Advisor. He provides students a supportive educational environment and imparts guidance and academic advising to help students succeed in their academic careers. He received a BA in history in 2016 from Boise State University and a MEd from the University of Miami in 2018.



Kelsie Magnuson began working at the WSU Knott Dairy Center in December 2023 as a milker. She grew up in Scappoose, a small town about 20 miles northwest of Portland, Oregon. She graduated with a BS degree in animal sciences from Oregon State University in September 2023.



Bailey Graham started on March 4, 2024 as the Beef Operations Assistant Manager. She grew up in Northern California where she was involved in a cow/calf operation. She has a BS in ranch management from Feather River College. Before coming to WSU, she was a 4-H program assistant for the University of Arkansas in Bentonville.

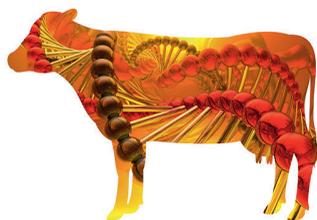
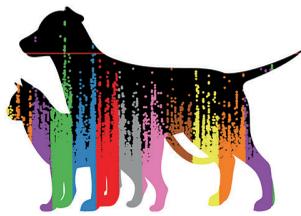
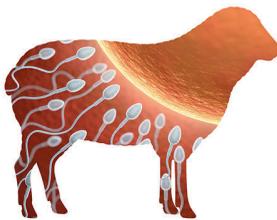


Stanislav Kyslynskyi joined Animal Sciences in March 2024 as the newest Personnel and Finance Specialist. He is from Ukraine and got an MA in Finance from Chernihiv National Technological University in 2013. Prior to coming to WSU, he worked for several international and local pharmaceutical and insurance companies.



WASHINGTON STATE UNIVERSITY
Department of Animal Sciences

ANIMAL SCIENCES



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