

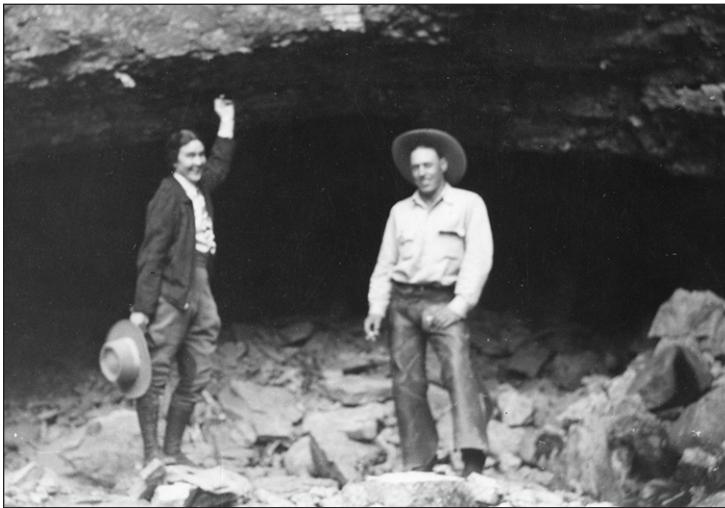


# animal & range sciences newsletter

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## Harriette Cushman

### An Extraordinary Ordinary Woman of Montana State University



In 1922, the Extension Service at Montana State College in Bozeman hired Harriette Cushman to be Montana's poultry specialist. Over the next thirty-two years, Cushman worked to build a profitable poultry industry that proved an economic godsend during Montana's prolonged economic depression. A woman of many interests, Cushman also championed the Indian Center at Montana State University and advocated for libraries, museums, and the arts. She was also a lifelong supporter of 4-H, an environmental advocate, and a prolific writer. Harriette Eliza Cushman was born in Alabama in 1890. She graduated from Cornell University in 1914 with a degree in bacteriology and chemistry. In 1918 she earned a poultry specialist degree from Rutgers University and became one of the few women pursuing a career as a poultry scientist.

As Montana's poultry specialist, Cushman traveled the state, educating farmers on breeding, culling, egg and bird grading, poultry housing, proper feed, and poultry health. She authored numerous seminal poultry-raising manuals that emphasized the application of scientific methods and utilized local demonstration flocks for hands-on instruction.

Montana's poultry industry expanded significantly under Cushman's guidance. Prior to Cushman's tenure as state poultry specialist, individual poultry growers worked independently, selling birds locally for whatever price they could get. In the 1920s, Cushman helped to form the nation's first egg and turkey wholesale cooperatives, enabling Montana poultry growers to negotiate top prices. As the first poultry grader for the newly formed Northwest Turkey Federation, Cushman secured nationwide markets for Montana's premium quality "Norbest"

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Happy New Year! We've had a lot of exciting things happening in our department over the last few months. And, we anticipate the upcoming semester will be no different.

One of the biggest highlights was The Bair Ranch Foundation Seminar Series. We had a variety of engaging speakers visit our campus. You can read about the program in this newsletter. The series will continue this semester, so look for announcements coming soon. Again, our sincerest thanks to the Bair Ranch Foundation for their support.

We have some new faces in the department. Brent Roeder started his new position as Sheep Extension Specialist in November. In May, Carla Sanford will join us as our new Beef Extension Specialist. And, although she's been here since last summer, we welcome Amanda Reuland as our department Accounting Associate.

As we welcome these new arrivals, we say goodbye to others. Jim Berardinelli retired after teaching animal science for 37 years. Tom Murphy took a new position with the USDA Agricultural Research Service in Nebraska. Charles Boyer, Vice President of Agriculture and College of Agriculture Dean, retired in December.

We currently have a couple of searches underway in the department. The search committee for the Ranching Systems Program Leader position is currently reviewing applications. We will be interviewing candidates for the Assistant/Associate Professor Animal Reproductive Physiology position in January.

We wrapped up a successful fall semester with student numbers around 380, down slightly from our high of 400 in 2017. Our faculty taught 56 classes in 2018 reaching 2,320 students with an average course rating by students of 4.5/5.0.

Highlights from a few of our students are in this newsletter, as they received awards and scholarships.

In research, the awarded new external competitive grants for the period January 1, 2017 to July 1, 2018 was \$1,473,241 with 33 successful grants. Research Expenditures January 1, 2017 to July 1, 2018 were \$3,818,355.

Research highlights:

- 68 working grants
- 51 grants submitted
- 22 refereed publications
- 1 book chapter
- 9 reviewed publications
- 46 media presentation
- 5 proceeding/abstract
- 34 popular press articles
- 88 other forms of scientific presentations



Dr. Patrick Hatfield  
Department Head

Some of our Extension highlights:

- 183 programs delivered in 2017 ranging from 1 day events to week long programs
- Average audience size = 51 people total reached = 9379
- In addition - 1000's of hours collaborating with extension agents, producers, and land managers
- \$115,774 in new grants (faculty as PI)
- \$756,226 in active grants (faculty as PI)
- \$402,485 in active grants (faculty as CoPI)

Dr. Tim DelCurto, Nancy Cameron Endowed Chair, has been the driving force to establish a Registered Black Angus herd at MSU for research and education benefiting both academia and students, as well as the Angus producers of the state. The goal for this program to is to be a self-sustained, revenue generating endeavor. We are close to 30 donated heifers this year from Montana Angus Producer. A big thank you to the Montana Angus Association for this partnership and support.

Our department is excited to welcome the new Dean and VP of Agriculture, Dr. Sreekala Bajwa. She begins her tenure on January 14, 2019. She will also be the featured speaker at The Bair Ranch Foundation Seminar Series at the Museum of the Rockies on January 31, 2019. The public is invited.

In celebration of MSU's 125th anniversary, the President's Commission on the Status of University Women honored women who have had an impact on the status of women at MSU. The cover story in this newsletter is the history of Harriette Cushman, MSU poultry specialist. During a time when there were very few women pursuing a career in agriculture, particularly poultry, Harriette essentially generated a thriving poultry industry. Her commitment to generations of poultry farmers cannot be understated.

So, as we look forward to the upcoming semester, we are excited to continue the growth and success in the Animal & Range Science Department.



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turkeys making Montana's turkey industry the most profitable in the nation during the Great Depression. Today, Norbest, LLC is Utah's largest turkey producing and processing company.

Cushman regularly worked six and a half days a week, even after the legislature slashed the Extension Service's budget during the 1930s. Much of her time was spent traveling, often by train, to meet with poultry growers. Between January and August of 1942, Montana's poultry specialist logged over ten thousand miles—a distance she repeated year after year.

Cushman inspired many new poultry growers in Montana. She introduced poultry production into Montana's 4-H clubs, teaching youngsters how to raise exceptional flocks, grade eggs, and judge poultry. She particularly liked working on Montana's Indian reservations, where profound poverty and lack of economic opportunity were most persistent and where poultry raising made tangible positive impacts. Cushman was deeply pleased when the Blackfeet, in gratitude, made her an honorary tribal member.

Harriette devoted much of her life to the betterment of her community.

In 1948, she helped found the Montana Institute for the Arts to promote the arts throughout the state. She also actively supported Montana's libraries and the development of the McGill Museum (now the Museum of the Rockies), founded by Bozeman physician Dr. Caroline McGill in 1957.

After retiring in 1954, Cushman devoted herself to promoting the success of Indian students at Montana State University. In 1969, nine years before her death in 1978, Cushman sent out six hundred handwritten invitations to her own post-life celebration and asked her many friends to contribute to the Indian Center in lieu of mourning. She willed her estate to the university, providing funds for both the Indian Center and a scholarship for outstanding American Indian students.



Cushman earned numerous awards during her lifetime, including three writing awards from the Montana Institute of the Arts. She was named a fellow of that organization in 1954. She was inducted into Mu Beta Beta, a 4-H honorary society, in 1959; a decade later the Cooperative Extension Service awarded her the Epsilon Sigma Phi "Ruby Award" for distinguished service. Montana State University dedicated its Little International Stock Show to Cushman in 1962 and bestowed an honorary Doctorate of Agriculture on her in 1963. In 1973, she received the Blue and Gold Award from the university for her lifetime service to Montana.

In celebrating MSU's 125th anniversary, the President's Commission on the Status of University Women honored women leaders, problem solvers and innovators from today and throughout MSU's history. Harriette Cushman was one of those selected from almost 400 nominations from across the state who have had an impact on the status of women at MSU and are inspiring or have inspired others by their example.



*Cushman was an avid outdoorswoman and an outspoken environmentalist.*



## MSU animal science professor uses genetics to find answers in dairy cattle disease

An international team of scientists that includes a Montana State University animal geneticist may have discovered why some dairy cows get sick from a particular diet while others don't. The unique genetic makeup of a cow can influence the microbial populations that live inside its stomach to help digest food. Therefore, each cow varies in how it utilizes feed, said **Jennifer Thomson**, associate professor of animal genetics and genomics in the Department of Animal and Range Sciences in MSU's College of Agriculture and co-author of a paper explaining those findings. The paper was published earlier this year in the journal *Frontiers in Genetics*. Calling the genetic-microbial connection a significant discovery, Thomson said the paper is the first "that's really quantifying how an animal's genetic make-up affects the microbial population of the rumen."

"The implications of this paper are that we may ultimately be able to select cows with a rumen microbial population more adept and efficient at using high energy diets," said Patrick Hatfield, head of MSU's Department of Animal and Range Sciences. The rumen is the largest of four compartments in a cow's stomach and the place where microorganisms are involved in digestion. Another focus of the study was acidosis, the buildup of acid in blood and tissues that can lead to a decline in milk production. "The genetic makeup and diversity of rumen microbes in a cow's stomach is critical to optimum nutrient digestion," Hatfield said. "Unlike humans in which acid and enzymatic digestion is the first process to take place in the human digestion track, microbial digestion of the feeds and forages a cow consumes is the first line of digestion."

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*Jennifer Thomson, associate professor of livestock genomics in the Department of Animal and Range Sciences in the College of Agriculture, is part of an international research team that recently published a significant study in animal genetics and cattle production.*

Thomson was asked to join the project by Ian Lean, an Australian researcher who is a leading authority in the medicine, nutrition and management of dairy cattle and winner of the Gilruth Prize, the most prestigious award given by the Australian Veterinary Association. He is founder and managing director of Scibus, an Australian company that conducts research and provides consultation services to dairy and beef producers. Thomson was the only geneticist and American on the team.

Lean said he had been working on ruminal acidosis for about 15 years and had, along with his students, developed a more precise diagnostic test for acidosis. However, they recognized a need to explain a marked variation in the way individual animals responded to dietary challenges. He said the groups' vision was to link the host animal genome to the composition of microbes in the animal's gut and then to the digestive functions of the animal's gastrointestinal track. "These differences in response are important to understanding health risks and productivity of ruminant livestock," Lean said.

Researchers in the dairy cow study fed diets high in grain and sugar to heifers (15 to 21 months old, all but four pregnant) in an effort to induce acidosis. Although many large dairies have nutritionists, and dairies do a lot to prevent acidosis, it can still develop, Thomson said. "We feed a fairly concentrated diet to meet their requirements for milk production," she said. "That might predispose them to acidosis." Thomson noted that there's a "huge variety in diets fed to dairy cows." Sources of sugar added to their feed for energy for milk production, for example, might include such things as cakes, cookies and chocolate candy bars that are considered unfit for humans, beer-soaked grain, grape skin and seeds, orange juice pulp and potato waste from making french fries and hash browns.

"We (the general public) are big proponents of cost-effective feed sources that use something that was a byproduct of human food products," Thomson said. "By-product feeding, using products that aren't fit for human consumption, allows us to make nutritious animal food for healthy livestock production." The dairy project was a fairly small pilot study involving 40 Holsteins, but it provided the rationale for a larger field study, Thomson said. The same researchers that conducted the initial project are now carrying out the expanded study with 300 Holsteins, the most common breed of dairy cows. "I'm thrilled. I think this is a really exciting area of research," Thomson said. She added that the results of both studies should apply to other breeds, including the beef cattle that are much more common in Montana than dairy cattle. "I think this will definitely have applications for feedlot cattle," Thomson said. Dairy cows are the focus of these studies, in part, because they are fairly genetically uniform. "They have been selected heavily for milk production," Thomson said. Also, significant data had already been collected from these cows.

As they did in the first study, the Australians are collecting DNA from Australian heifers and microbial information from their rumens. They will send samples to MSU for DNA extraction and then the DNA samples will go to Neogen, an agricultural genomics laboratory in Lincoln, Nebraska, for analysis. Thomson will then interpret all the data, a time-consuming process since she usually receives -- for each animal -- about 150,000 genotypes and 100 different data points about the microbial community that lives in its rumen. "From the time all the samples arrive, it will probably take me six months," Thomson said.

She will run her analyses while continuing to teach and work on other research projects, Thomson said. Her primary research involves beef cattle. She is also part of an MSU team that studies Rocky Mountain bighorn sheep in Montana and Wyoming and just published a paper about evaluating sample sizes in wild populations.

The first author of the paper titled, "Genetic Markers are Associated with the Ruminal Microbiome and Metabolome in Grain and Sugar Challenged Dairy Heifers," was Helen Golder, a doctoral student at Scibus and the University of Sydney. Co-authors, in addition to Thomson and Lean, were Stuart Denman and Chris McSweeney from the "Agriculture and Food" research area of the Commonwealth Scientific and Industrial Research Organization (CSIRO).



## MSU faculty publishes breakthrough animal health discovery in Nature's Scientific Reports

A Montana State University faculty member has found that, like most good things in life, a majority of healthy microbes in newborn cattle come from their mothers. **Carl Yeoman**, associate professor in the Department of Animal and Range Sciences in the MSU College of Agriculture, recently published findings in *Scientific Reports*, a publication of the prestigious science journal *Nature*. The paper, Yeoman said, is the first to demonstrate the maternal influence on calves' earliest gut microbes, primarily where they come from and how they assemble in differing regions of the gut.

Yeoman, who researches and teaches about the microbial ecosystems in various animals, including cattle and sheep, said the paper is part of a five-year research project he began when he joined the faculty at MSU. He added that its findings "have the potential to contribute greatly to the field of animal health and production." "Gut microbes, particularly the earliest gut microbes of livestock and other mammals, play important roles in animal health, including aiding the maturation of the animals' immune systems and sustaining nutrition," Yeoman said. "Understanding the routes of transmission of these important gut inhabitants allow us to influence their dissemination to future generations and provides motivation to protect these maternal microbial reservoirs."

In the paper, Yeoman and his co-authors describe finding that a large portion of microbes that colonize a cattle's gut were derived from contact with the mother — during and after birth. Additional authors on the paper include Suzanne Ishaq, a former postdoctoral fellow in the Yeoman lab, now a research assistant professor at the University of Oregon; Elena Bichi from the Department of Animal Sciences at the University of Leon in Spain; Sarah Olivo, MSU research assistant, James Lowe, director of the College of Veterinary Medicine at the University of Illinois Urbana-Champaign and Brian Aldridge, professor of veterinary clinical medicine at the University of Illinois at Urbana-Champaign.

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*Carl Yeoman, right, associate professor in the College of Agriculture at Montana State University, guides microbiology senior Deanna DeSon through sample collection at MSU's teaching and research farm.*



By examining microbes present in 10 regions of a calf's gastrointestinal tract during the first 21 days of its life, the study showed that many important microbes are transferred to the calf from three unique maternal reservoirs. "We show that, on average, 41 percent of microbes in gut mucosa (surface) and 46 percent in the gut lumen (gut contents) of calves are acquired from their mother's vagina, colostrum and the skin around the udder," Yeoman said. "The udder, in particular, had more influence than we expected." The gut mucosa is the largest immunological environment of the body. Colostrum is the first form of milk produced by mammals immediately after giving birth. Microbes such as methanogenic archaea, which remove inhibitors of the break down of dietary fiber, but, in so doing, produce the potent greenhouse gas methane, were also found to be uniquely acquired from the mother cow's vagina, he said.

According to Yeoman, almost all studies to date have focused on microbes of the rumen — the largest of four stomach chambers in cattle that serves as "a large fermentation vat where bacteria and other microorganisms break down feed." But Yeoman and his fellow researchers believe there are more "good" microbes to discover elsewhere in a cow. "We show that the microbes in the rumen are very different from those in other parts of the gastrointestinal tract, and there is good reason to think microbes in other parts of the gut are also important to nutrition as well as health," he said. Yeoman published similar results to the cow study about lambs in the *Journal of Animal Science* last year. Those findings show that microbes vary through differing regions of the lamb's gut and that fiber-degrading bacteria exist both in the rumen as well as the colon. Yeoman said these microbes, along with other health-promoting bacteria in the small intestine, were all found to be important to feed efficiency of the animal. Feed efficiency is a measurement to determine the ability of livestock to turn feed nutrients into milk and meat, measured in pounds of milk or meat produced per pound of dry matter consumed.



*Carl Yeoman, right, associate professor in the College of Agriculture at Montana State University, and Deanna DeSon, a senior in microbiology, remove feed from a cannulated cow to gather rumen fluid at the university's Bozeman Agricultural Research and Teaching Farm.*

Both findings pave the way for a better understanding of how to optimize livestock gut microbiota during the early stages of life, Yeoman said, which could lead to healthier and more productive livestock. "Dr. Yeoman is using cutting-edge microbiological science to find answers to some of agriculture's big problems," said Patrick Hatfield, head of MSU's Department of Animal and Range Sciences. "The overall health of an animal, its ability to reproduce and how well it can fight off disease happens on the molecular level. His research is providing the agricultural industry with insight into the earliest interactions of an animal that has a life-long impact."

Yeoman's research is supported by the Montana Agricultural Experiment Station, the Bair Ranch foundation, and Land 'o' Lakes. His work has also received funding from the U.S. Department of Agriculture's National Institute of Food and Health multistate research projects, which connects Yeoman's research expertise to other groups throughout the U.S. Yeoman's USDA-NIFA multistate project uses molecular tools in order to enhance the competitiveness and value of U.S. beef. "There are a lot of unseen interaction that you can only pick up through molecular tools," Yeoman said. "The way microbes interact with the animal host and with each other occur at the molecular level. Understanding these interactions is critical for the success of animal and the producer's ability to be economically and ecologically sustainable."

## Beef 101 helps producers promote beef cuts

A bottle of any “ole” Italian dressing from any “ole” grocery store will work wonders for just about any “ole” cut of beef that needs a little tender loving care – and many do, according to a university meat scientist. “Meats cuts with high connective tissue need more help,” said Jane Ann Boles, a meat scientist at Montana State University’s Department of Animal and Range Sciences, who spoke at the Montana Cattlewomen Mid-Year Meeting & Workshop presented by Yellowstone Cattlewomen June 1 and 2 in Billings.

The official creed of the Montana Cattlewomen and the American National Cattlewomen is to promote the livestock industry through information and publicity, including serving beef at community events. “We are educating ourselves about how to prepare beef, so we can be knowledgeable when we do this in public,” said Kelsi Gambill, secretary of the Yellowstone Cattlewomen.

A lot of people don’t understand the value-added cuts, in part because of the lingo, said Boles during her Beef 101 presentation. Steaks from the loin, rib and sirloin are “grill ready,” meaning whether they’re cooked over charcoal, gas, or in a converted file cabinet – she showed a photograph – they don’t need much in the way of tenderizing before cooking. Cuts like flank, round, back ribs, short ribs, round steaks, shoulder cuts and some chuck do. This can be accomplished in a number of ways, Boles said.

Moist heat, such as that generated by slow cooking, softens collagen and boosts tenderness, an essential factor affecting consumer ratings of beef. It also guarantees internal temperatures and helps develop a “special flavor,” she said. Mechanical disruption – disturbance of the muscle fibers and collagen by needle, cubing, injection and tumbling – can also improve tenderness, but isn’t easy to do at home. Marinating is Boles’ preferred method of tenderizing beef, as “acidity softens collagen.” Marinating by soaking, vacuum or injection – as long as that injection isn’t given using your cows’ nasal needles, she joked – is the gold standard, said Boles. The added bonus: lots of flavor.

Boles loves vinegar in a marinade, particularly Balsamic. She also likes lemon or lime juice, beer and raw fruit, especially kiwi, pineapple, figs and papaya, which all have plenty of collagen-softening enzymes to break down the muscle protein. Cooks can make their own marinades, as long as they have plenty of acid. For ease, nothing beats commercial Italian dressing, which has plenty of vinegar to soften the collagen. Boles cautions against some store-bought marinades, many of which have a lot of flavor, but not a lot of acid. Same goes for barbeque sauce: tasty, but ineffective alone against tougher cuts of meat.

Because the workshop’s focus was on how to run a successful beef demonstration, Boles reviewed the basics of food safety. “If you have charring and the internal temperature is not what you want, either the grill temperature is too high or the product is too thick,” she said. The color of the cooked juices isn’t a good indication of endpoint temperature, either, she said. “You need a reliable meat thermometer,” she said.



*Jane Ann Boles, a meat scientist at Montana State University’s Department of Animal and Range Sciences, spoke at the Montana CattleWomen Mid-Year Meeting & Workshop presented by Yellowstone CattleWomen in Billings.*

She also cautioned never to put cooked meat on plate that carried raw product. “Soap and water is relatively cheap and doesn’t mess with your environment,” she said. Boles also addressed the perennial consumer grass vs. grain debate. She counseled the group to inform consumers that all cows are grass-fed most of their lives – conventional animals spend 3 to 5 months on grain – and that all meat is a “natural” and “nutritious, powerful protein.”

While beef is a natural source of more than 10 essential nutrients, grass-finished beef is generally leaner and higher in omega 3s and a few other essential nutrients. Those differences in omega 3s are negligible, Boles said, especially if you consider the drawbacks: beef from animals raised on all forage diets have lower quality grades, yellower fat and darker color, less tender and have a distinct flavor difference some find less palatable.

“I’m going to eat salmon if I want omega 3’s,” she said. “There is more vitamin A and vitamin E, but I can get the same stuff in higher quantities out of olive oil or corn oil.” With a new generation of home cooks and grilling enthusiasts, beef promoters are needed to share and demonstrate the best methods for a high-quality beef cooking eating experience. Young home cooks also need information about preparing low-cost/high-value meals. “The beef tri-tip is a good, inexpensive cut for demonstrating how to cut against the grain to make the muscle fibers shorter and the meat more tender,” Boles added.

*Story by Sarah Brown, The Prairie Star*

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## MSU hires Roeder as new Extension sheep specialist

**Brent Roeder** has been selected as the university’s Extension Sheep Specialist. Roeder, who has served as the agriculture and natural resources agent in Teton County since 2015, received his bachelor’s degree in animal science from Texas A&M University and his master’s degree in ruminant nutrition from Montana State University.

Prior to becoming an Extension agent, Roeder was a research associate in the Department of Animal and Range Sciences, in MSU’s College of Agriculture. During this time, he worked with state sheep and range specialists in programs including Undaunted Stewardship, the Joe Skeen Center for Rangeland Research and the Montana Sheep Institute. Roeder also conducted large-scale trials to determine the interaction between livestock grazing and biological control agents on noxious weeds.



As the new statewide specialist, Roeder said he recognizes the vital role that the sheep and wool play when it comes to wool products and Montana’s economic development. “I see great opportunities for the industry to engage new producers and consumers through increased lamb consumption, using more sheep and goats for vegetation management, and improved opportunities for locally produced, value-added Montana products,” he said.

“We are excited that Brent Roeder will be joining our faculty, as he brings a wealth of both academic and real-life experience to MSU’s sheep and wool program,” said Patrick Hatfield, professor and head of MSU’s Department of Animal and Range Sciences. “Brent’s background in production, research, and extension will be an asset to both our department and Montana’s sheep and wool producers.”

Cody Stone, director of MSU Extension, said Roeder’s appointment impacts MSU’s Extension ability to work alongside regional sheep producers. “His knowledge, expertise and relationships within the sheep industry will allow him to make immediate impacts; we’re excited about having him.”



## At MSU's dining halls, local ingredients connect university with Montana agriculture

Among the many dishes Montana State University serves to its students, staff and visitors, it's hard to find a recipe that doesn't include at least one ingredient that came from a Montana farm or ranch. Strolling among the cuisine counters at Miller Dining Commons recently, Kara Landolfi, MSU's Farm to Campus Coordinator, noted wood-fired pizzas topped with bacon from Montana 4-H pigs, taco meat from MSU-raised steers and Gallatin Valley kale at the salad bar. A unique salad topping — Montana wheat berries popped in Montana safflower oil — was yet another example of MSU's myriad local offerings. "It's integrated into everything," Landolfi said.

In July, Landolfi and other MSU Culinary Services staff members received a major award — the Silver Award for Sustainability for Procurement Practices — at the National Association of College and University Food Services convention in Providence, Rhode Island. "It's extremely encouraging for all of our staff," Landolfi said of the award. "It shows that what we're doing is meaningful on a national level." MSU buys meat, vegetables, fruits and other ingredients directly from more than 100 Montana producers. Since 2005, MSU's Farm to Campus initiative has sought to use MSU's large purchasing power — a result of serving more than 12,000 meals daily — to contribute to the state's agricultural economy, Landolfi said. Currently, MSU spends more than \$1.75 million annually on Montana-sourced foods — about a quarter of the university's total food purchases.



*People sample locally-raised food at the Forge 406 counter at MSU's Rendezvous Dining Hall. MSU Culinary Services received a national award highlighting its use of local ingredients, including meats raised by MSU students and 4-H participants.*

The sustainability award highlighted MSU's growing use of local meats. All lamb served at Miller comes from Montana Highland Lamb near Whitehall and from MSU's Red Bluff Research Ranch near Norris. MSU has purchased more than 60 pigs raised by 4-H kids around the state. And last year, MSU's Culinary Services purchased 30 cattle from MSU's Steer-A-Year program, in which MSU students raise livestock donated by Montana producers. "It's a win-win," said **Hannah DelCurto**, an instructor in MSU's Department of Animal and Range Sciences and the coordinator for the Steer-A-Year program. She noted that the proceeds from the sale help fund student travel to livestock judging competitions and other events. The Steer-A-Year cattle are processed at Pioneer Meats in Big Timber and are used for anything from large rotisserie roasts to stroganoff to osso buco, an Italian stew that uses tenderized shanks. One of the finest cuts, New York strip steak, is grilled at the First Meal event, when up to 4,000 new students gather for an outdoor picnic at MSU's Romney Oval.

"It gets the cooks excited, and makes them take special interest in preparing the food in the best way possible," said Jill Flores, MSU's interim executive chef. "We notice that students appreciate it," added Flores, who participated in 4-H as a kid and spearheaded the effort to buy 4-H pigs three years ago. "We hear them comment that it's like something they'd get at home." Sourcing Montana products is more work than getting everything in a weekly delivery from a distributor, Landolfi said. But there are benefits beyond supporting Montana agriculture, including fresher ingredients. That's one of the reasons why MSU Culinary Services is expanding its use of local ingredients at Rendezvous Dining Pavilion, which opened Aug. 13. And there's another benefit to using local ingredients — one that can't be tasted or tallied as a dollar figure, she said. "There's a connection that you have," Landolfi said, "when the steak you're eating was raised by the student sitting next to you."

*Story by Marshall Swearingen  
Photo by Adrian Sanchez-Gonzalez*

## Avery spreading his wings!

*This is a story written by Jennifer Groneberg for the Eagle Mount newsletter, "Wings". Avery is the son of Jennifer and Tom Groneberg, Livestock Operations Manager.*

My name is Jennifer Groneberg, and I'm wife to Tom and mother to three sons, Carter, Bennett and Avery. Avery and Bennett are twins, born prematurely at 33 weeks in the NICU in Missoula, MT. At 5 days old, we learned Avery had extra genetic material at the 21st chromosome, which most people know as Down syndrome.

That was 15 years ago. In that time, we've moved all over Montana pursuing work as a ranch family. We've lived in Polson, Eureka, Miles City, Melville, Wolf Creek, Roundup, Geysers, and now Bozeman, where Tom works for Montana State University as the Livestock Operations Manager.

One of the new opportunities we have in Bozeman is the chance to participate in therapeutic recreation with Eagle Mount, which we learned about from Tom's co-workers at MSU. I picked up a New Parent Handbook, and Avery and I read through it together. He paid close attention to the photos of the kids doing awesome things, like swimming or riding horses or whitewater rafting. Two phrases jumped out at me: "The Courage to Try" and "Smiles". Those two things described Avery perfectly, and so I hoped we'd make a good start.

There was just one problem. Avery had begun having what I called panic attacks. Sometimes, he would become almost frozen with his emotions, to the point where he couldn't even speak about what was happening to him. I'd heard about these sorts of attacks happening during adolescence to another boy with Down syndrome, and for that family the solution was medication. I was hoping to avoid this outcome, but I didn't know what else to do.

So there we were. Avery, wanting these new experiences, and me, wanting to give them to him, to get him to a place where he could have fun and feel safe and supported, not panicked and frozen. But for all that to happen, Avery would have to avoid a panic attack. He'd have to get out of the car and walk through the Eagle Mount doors.

He did it. We did it, holding hands, going slow. We walked through the doors and passed photos of smiling kids and families who looked just like ours. We met Vasu Sojitra (Adaptive Sports Director) and talked about what sort of things Avery would need to feel comfortable and to do his best. And we signed up for swimming and horsemanship.



*Avery with his horse Ritzy at Eagle Mount.*



Each day since that first day, it's gotten easier. If Avery holds my hand, it's because he wants to, not because he needs to. He is riding and swimming, and added horticulture and Saturday Night Out to the list of things he can do. We attend Parent Support Group each month, where I can meet parents who understand some of the same struggles, and Avery can see his friends.

This summer, Avery stretched his wings even farther by participating in Adventure days. On Wednesday mornings, I'd drop him off and wonder, "How will he do?" In the afternoon, I'd pick him up and he'd tell me about kayaking or whitewater rafting or hiking the M Trail. I'd marvel at it, and think about how we'd come such a long way: from panic attacks to zip-lining!

I know we couldn't have done it without the people and families of Eagle Mount. Here, Avery learned about self-confidence and self-help. He made new friends, learned he could do hard things, and found out how to speak up for himself. We even got to attend Family Camp this year, where Avery stood in front of the group and introduced himself and each of us with confidence.

Avery says it best about Eagle Mount, "I'm happy. People help me. They are beautiful people."



Above: Avery zip-lining in Big Sky. Below: Avery, center, rafting with his family at Family Camp.





In their annual photo contest, the American Sheep Industry selected three images with connections to our Animal and Range Sciences Department. We have two here, and the third on the back cover. Tracie Roeder received First Place Action. Ryan Knuth and Devon Ragen (see back cover) received Honorable Mentions.



*“Morning Crossing”*. Tracie Roeder, wife of Extension Sheep Specialist Brent Roeder, took this photo at the historic Arnott Ranch south of Utica, Montana. “We have the privilege of summering our sheep along the Judith River on a prescription leafy spurge grazing project. The owner, Billie Lou Arnott, is 89 years old and has been a tremendous mentor to our family. Despite her age, she is still a central figure in the daily operation of the ranch.”

*“King of the Mountain”*. Ryan Knuth, Graduate Research Assistant, took this picture in March at the Fort Ellis Research and Teaching Farm. “These wethers are part of a research project designed by Dr.’s Jane Ann Boles and Tom Murphy along with their collaborators at the University of Wyoming and Texas A&M University. The project seeks to quantify the effect of sire breed and harvest age on feedlot performance, carcass characteristics, meat flavor compounds, and overall consumer acceptance. These wethers were processed at Pioneer Meats (Big Timber) and meat was purchased by MSU Culinary Services to be featured in their Farm to Campus program. This is one of many ongoing projects of the MSU Sheep Program that demonstrates strong collaboration with other universities and stakeholder groups.”





## MSU hosts new seminar series in agricultural and natural resource topics

A philanthropic foundation dedicated to agricultural research and educational programs has funded a new academic seminar series at Montana State University. The Bair Ranch Foundation Seminar Series, housed in the Department of Animal and Range Sciences, part of MSU's College of Agriculture, will bring nationally renowned experts in agricultural and natural resources to MSU and the Bozeman community to share their expertise. The series is funded by the Bair Ranch Foundation, part of the Charles M. Bair Trusts, which operates a working, educational ranch in Martinsdale for the benefit of research and education.



The series begins this 2018-2019 academic year, and will include experts on topics related to agricultural policy, wildlife, livestock genetics and the United States beef industry. Seminar scholars will visit MSU during the year to deliver both a research seminar for MSU faculty, staff and students, in addition to an evening talk open to the public. **Carl Yeoman**, associate professor of molecular biology, and **Lance McNew**, assistant professor of wildlife habitat ecology, both in the Department of Animal and Range Sciences, submitted a proposal for the series' organization.

Yeoman said the dedicated research series will provide opportunities for students to engage with nationally recognized professionals. "Thanks to the Bair Ranch Foundation, we can bring together national research leaders with our faculty, students and the agricultural community, and provide meaningful opportunities for professional interactions around innovative research into agricultural and natural resource issues," Yeoman said.

McNew said the series is intended to benefit both MSU's community of students and faculty, in addition to Montana stakeholders, on topics that directly affect Montana's agricultural and natural resource economies. "Not only will the seminars bring cutting-edge science in agriculture and natural resources occurring outside MSU to our community, they will also facilitate interaction between local to internationally recognized professionals and our students, faculty and managers from around Montana," McNew said.

Kevin Peterson, development director with the Montana State University Alumni Foundation for the College of Agriculture, said the Bair Ranch Foundation has a long history of supporting educational opportunities for agriculture students at MSU. "Support from the Bair Ranch Foundation has been vital to the success of many of our applied research projects, and they have positively contributed to the success of a large number of agriculture students at MSU," Peterson said. "Their support of the Bair Ranch Foundation Seminar Series is just another example of their focus on education and impacting future generations."



Here are some highlights from the fall schedule of the Bair Ranch Foundation Seminar Series:

- Vince Smith, professor in the Department of Agricultural Economics and Economics, presented a research seminar at noon. His seminar is titled “Food Aid Cargo Preference: Costs, Benefits and Implications for U.S. Humanitarian Aid Efforts.” In the evening, Smith delivered a community talk, “U.S. Agricultural Policy: Where Have We Been and Where Are We Going?”
- Kevin Ellison, grasslands ecologist at the World Wildlife Fund, presented a research seminar at noon titled “Landscape Scale Interactions between Birds and Agriculture.”
- Amilton de Mello, meat science and food safety program leader at the University of Nevada, Reno, presented a research seminar at noon titled “Bacteriophage Applications in the Meat Industry.” In the evening, de Mello delivered a community talk, “Beef Industry in the U.S.: Challenges and Perspective.”
- Matthew Cronin, scientist with Northwest Biology Company, presented a research seminar at noon, “Population Genetics of Wildlife and Livestock.”
- Matthew Spangler, professor and beef genetics specialist at the University of Nebraska, Lincoln, presented a research seminar at noon, “Past, Current and Future Approaches to Genomic Selection.” In the evening, Spangler delivered a community talk, “Genetic Selection of Livestock: Why it Matters to You.”

Charles M. Bair first brought his sheep operation to Martinsdale in 1913. Bair, a prominent sheep man and entrepreneur, recognized the potential of the land along the Musselshell River. He amassed a significant fortune through both his ranching and entrepreneurial endeavors. His death in 1943 left operations of the ranch in the hands of his daughters. In 1998, The Bair Ranch Foundation was formed as an educational research foundation, with the intent of collaborating with universities to conduct applied research projects on a working ranch.





## Report highlights MSU's ag research in 2018

Montana State University has released a report summarizing the university's agricultural research on subjects ranging from beef breeding to optimizing the protein content of pea crops.

The **2018 Research Report**, authored by MSU Extension and MSU's College of Agriculture, highlights 11 studies conducted by MSU faculty throughout Montana.

"It's practical information that we make readily available so it can be easily used," said **Megan Van Emon**, assistant professor in MSU's Department of Animal and Range Sciences and a beef cattle specialist in MSU Extension.

"Each year, we hear back from producers and Extension agents that this report is extremely helpful with answering their questions," Van Emon said. The report has been published annually since 2015.

Each chapter of the report summarizes findings from MSU studies that have been, or will be, published in peer-reviewed science journals. Topics include soil fertility management for pulse crops, breeding of South African Meat Merino sheep, behaviors of sheep guard dogs and using beavers for restoring riparian areas.

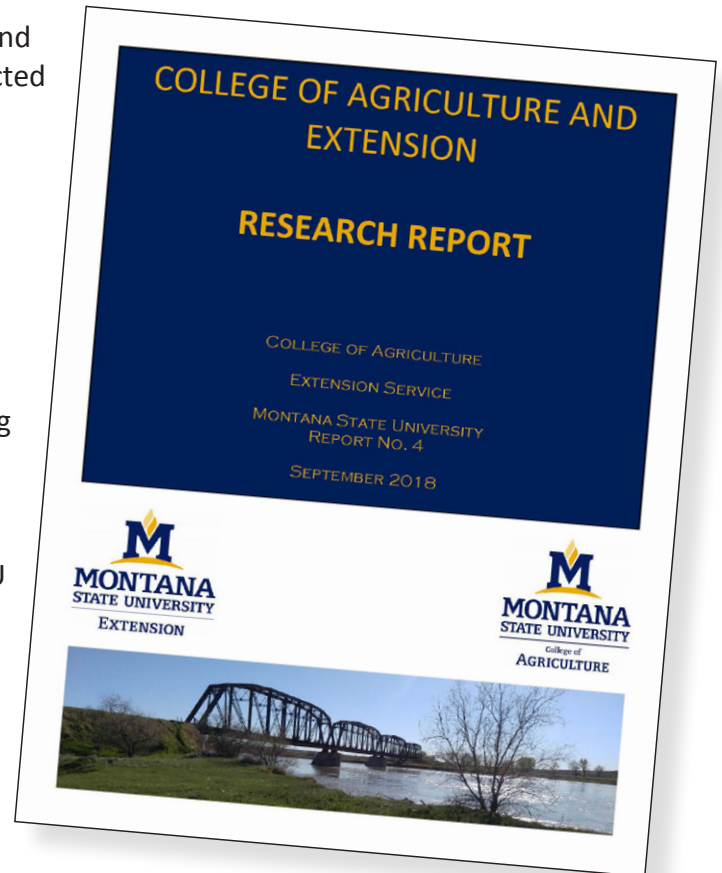
"Everything is presented in layman's terms," Van Emon said. "We write this for a wide audience."

The goal of the report is to enhance agricultural production in Montana by providing information that can help producers make decisions, Van Emon said, adding that producers are encouraged to offer their feedback and suggestions for future research.

The 2018 research report is available online at <http://coa.msuxtension.org/>. Featured collaborative research reports from the Department of Animal & Range Sciences include Jennifer Thomson, Ryan Knuth, Jane Ann Boles, Amanda Williams, Emily Meccage, Jeff Mosley, Brent Roeder, and Lance McNew.

The mission of the College of Agriculture and Extension Research Report is to enhance agricultural production within Montana by disseminating readily available and accessible research-based information to producers and agriculture agents.

For more information, contact Megan Van Emon, [megan.vanemon@montana.edu](mailto:megan.vanemon@montana.edu), 406-874-8286 or Emily Meccage, [emily.meccage@montana.edu](mailto:emily.meccage@montana.edu), 406-994-5688.



## Sreekala Bajwa named new MSU vice president of agriculture

Montana State University selected Sreekala Bajwa to become its next vice president of agriculture. Bajwa has been serving as chair of North Dakota State University's Department of Agricultural and Biosystems Engineering and professor of agricultural engineering since 2012.

As the vice president of agriculture, Bajwa will oversee a teaching, education and research network that stretches across Montana with seven agricultural research centers, five academic departments and five Bozeman-based campus farms and ranches. The College of Agriculture and Montana Agricultural Experiment Station collectively conduct research to address production challenges to benefit the agricultural industry in Montana.

"The College of Agriculture and the Montana Agricultural Experiment Station are cornerstones of our land-grant mission," said MSU President Waded Cruzado. "Our search produced many strong candidates, but in Dr. Bajwa, we have found someone extremely qualified to lead agriculture at Montana State into its future through her pioneering vision for new applications in agriculture and natural resources."



Bajwa said she is honored to be chosen as the next vice president of agriculture. "I'm grateful for this opportunity to join a thriving university with a deep commitment to excellence and innovation," she said. "I intend to continue supporting the university's diverse agoscience research while promoting MSU's students, faculty and programs in line with its land-grant missions. I very much look forward to getting to know the Big Sky state and working with our stakeholders and partners."

Bajwa has an extensive background in agricultural engineering and developing technology for smart agriculture. She is a highly regarded researcher of precision agriculture and has provided international leadership into research and education for applying remote sensing and unmanned aerial systems to agricultural systems. Under her leadership, NDSU was ranked 18th in the world for precision agriculture by Precision Agriculture Professionals, and she led the development of that university's academic major and minor in precision agriculture. She has worked collaboratively with NDSU Extension, the agricultural experiment station, USDA-ARS, and many industries including Fortune 500 technology companies on a multi-million dollar initiative to improve smart farming.

Her technological accomplishments include four inventions in digital agriculture and bio-based materials, and she has been lead investigator or co-investigator on 45 grant-funded projects worth more than \$19 million. She is the author of five book chapters and more than 68 journal articles. Bajwa received her bachelor's degree in agricultural engineering from Kerala Agricultural University in India, her master's degree in agricultural engineering from the Indian Institute of Technology Kharagpur in India and her doctorate of agricultural engineering from the University of Illinois at Urbana-Champaign.

Bajwa replaces outgoing Vice President of Agriculture Charles Boyer, who retired in December. She will be the guest speaker at The Bair Ranch Foundation Seminar Series on January 31, 2019 at the Museum of the Rockies. An hors d'oeuvres and no-host bar reception will be held in the Bair Lobby at 5:15 followed by Bajwa's presentation at 6:00 in the Hager Auditorium. All are welcome.



## Jim Berardinelli Retires after 37 Years

For the last 37 years, Jim Berardinelli, professor of animal science in MSU's Department of Animal and Range Sciences, has taught students how to be familiar with the rear end of a cow. In more than three decades of teaching and researching animal reproductive science at MSU, about 2,500 students have passed through his classrooms and labs, some of them spanning generations from the same family.

Many of Berardinelli's students have taken skills they've learned from his classes and labs back to family ranches or to their professions. Over the years, Berardinelli's emphasis and instruction on new technologies in cattle breeding has helped transform many next-generation cattle producers, while impacting the genetics of Montana cattle herds through the use of artificial insemination.

A retirement reception, hosted by the Animal and Range Science Department, was held for Jim last August.



Top right: Jim receives a painting from Bozeman artist, Karen Boylan. Pat Hatfield presents the gift n behalf of the department.

At left: Jim finally gets the vest he's always wanted!



At right: Jim and his wife, Lucretia.

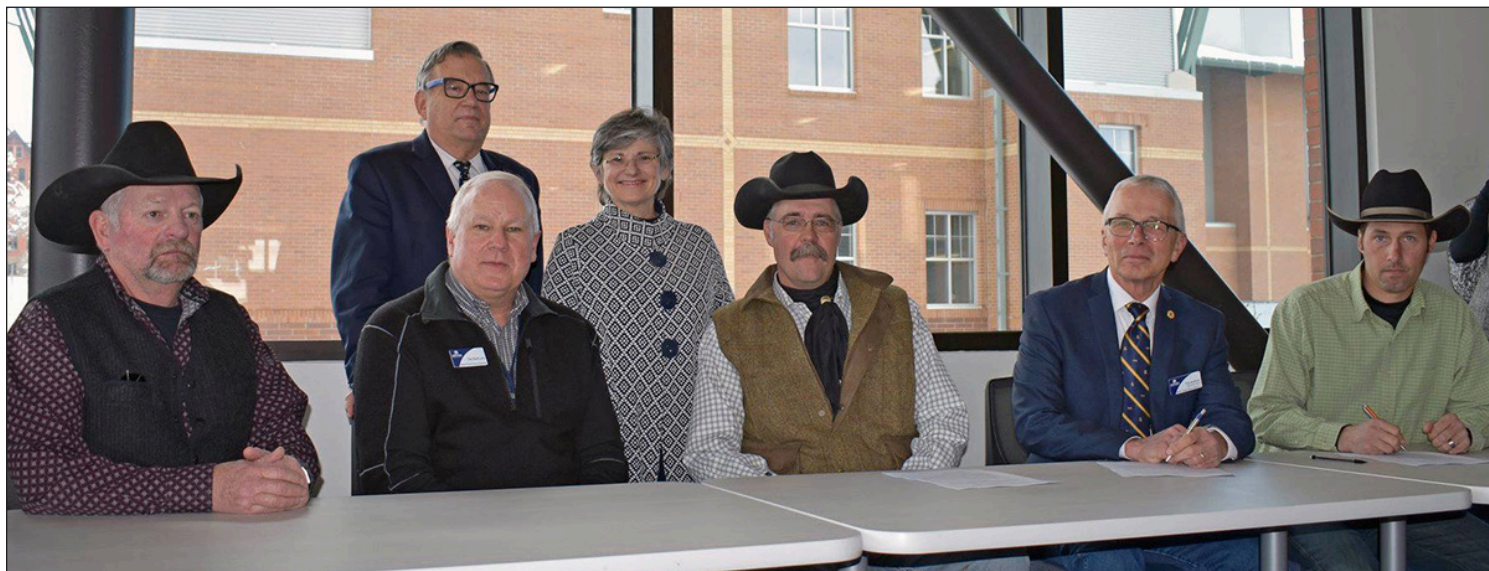


On November 8, 2018, the Montana Angus Association and Montana State University, the states land grant university, officially engaged in a meaningful partnership that has created the MSU Angus Program. Because Montana is the top regional producer of Angus genetics, this collaboration enables MSU to conduct research and educate students on the Angus breed and seedstock operation systems.

The goal is to provide a registered Angus beef cattle herd and management system that optimizes opportunities for MSU's students and faculty. The MSU Angus Program will:

- Provide a future platform for excellence in teaching and research.
- Encourage and enhance collaboration with the Montana beef industry.
- Offer opportunities through collaboration with MAA and its members for student interaction, job opportunities, and internships within the beef industry.
- Develop teaching and research programs that reflect the needs of beef producers in the state of Montana.

For more information, contact Tim DelCurto at 406-994-3708 or [timothy.delcurto@montana.edu](mailto:timothy.delcurto@montana.edu).



Jake Callantine, 2nd Vice President, Montana Angus Association, College of Agriculture, Vice President, Dean and Director Dr. Charles Boyer, Dr. Tim DelCurto Professor Range Beef Cattle Nutrition and Management, President, Montana State University, Dr. Waded Cruzado, Darrell Stevenson, Director, Montana Angus Association, Dr. Patrick Hatfield, Department Head of Animal and Range Sciences and Tim Skinner, MSU Angus Committee Chair, Director, Montana Angus Association. *(photo courtesy of Montana Angus Association)*



Clayton Marlow's summer class at the Bandy Ranch.





We said goodbye to **Dr. Tom Murphy**. Tom accepted a position with the USDA Agricultural Research Service as a sheep geneticist at the U.S. Meat Animal Research Center in Clay Center, Nebraska. He is excited for the opportunity to continue to serve the U.S. sheep industry, but said, “It’s certainly a bittersweet move. Montana is home to some of the greatest sheep producers in the world, many of whom have become my good friends. I want to thank them and my colleagues in the department for making Montana feel like home these past two and a half years. My wife Megan has always been by my side, she’s supportive of my career and never complains when work gets in the way of life. We’re looking forward to our new adventure in the good life!” Tom’s last day was November 16, 2018.

Team Geometric Brownian Motion takes third place in the Ranch Run, hosted by the Montana Cattle Women on August 25th. The course is a 25-mile run through three multi-generation ranches and U.S. National Forest land. The run is intended to “introduce you to the beauty of Montana’s farms and ranches as well as educate the running community about the importance of agriculture and land stewardship.”

*Pictured left to right: Tommy Bass, Livestock Environment Associate Specialist in Animal and Range Sciences; Tracy Dougher, Associate Dean of the College of Agriculture; Eric Belasco, Associate Professor in Agricultural Economics and Economics; Carl Yeoman, Associate Professor in Animal and Range Sciences and Jarrett Payne, instructor in Animal and Range Sciences. Photo courtesy of Tracy Dougher.*



Jordan Hieber, PhD Candidate, speaking and competing at the 2018 Western Section ASAS meeting in Bend, OR in June.

Dr. Omolola Betiku, 2017 PhD graduate, will begin teaching in the Animal Science Department at Florida A&M next Spring as an Assistant Professor. Her courses will include Feeds & Feeding and Animal Nutrition.



Recently, the CEO of Heroes and Horses sent us a letter about the work **Dr. Shannon Moreaux** has done with this organization. They nominated him for MSU's Excellence in Outreach Award.



Above: Shannon removes a horseshoe from the forage furnace. He taught these veterans how to shoe horses. Below: Shannon (far left) on the trail with Heroes and Horses.

I'm Micah Fink, founder and CEO of a Gallatin Valley non-profit group called Heroes and Horses. Our work with veterans and horses has been featured in the WSJ, YETI films, Men's Journal, and many other national publications. We are a 40-day reintegration program that uses horses, mules, and wild mustangs with no days off. It's a stand-alone program staffed by 70% volunteers. We are a small organization that relies heavily on community support. One of our key volunteers has been Dr. Shannon Moreaux.

Over the past year during the Heroes and Horses season, 'Doc' spent the entire summer season living in a tent with me! It's tough living conditions, to say the least. Over the years, he has developed curriculum, and created and implemented new programming. He has taught everything from farrier courses, horsemanship, riding, and equine health and care, all the while braving tough living conditions and working with Veterans, who are themselves in the worst way. His leadership, sacrifice and total commitment to giving back as a volunteer is something I have honestly never seen before. All of his free time in the summer he spends working with us. This is not only at a personal cost but also a financial one as well. I can not say enough about the work he has done here. We have grown the program substantially under his leadership and guidance. As an Executive, I have the opportunity to work with many professionals from many walks of life. None stand out more than Shannon.

We decided to honor him at our end of the year event in 2018. I wish there was more we could do, but he would not accept it anyway. I believe recognizing him for his excellence in the community is something that should happen as he sets the example for what it means to give back. He is an educator, veteran, veterinarian, father, and friend and in my mind, there is none finer.

Very respectfully,

Micah Fink



[www.Heroesandhorses.org](http://www.Heroesandhorses.org)





Jeff Mosley, Extension Range Specialist, made a visit to Capitol Hill to discuss rangeland management issues in Montana and the West. His work details the effects of the over-grazing of bison and elk on the Northern Range in Yellowstone National Park. J Jeff met with Secretary of the Interior staff, Senate Energy and Natural Resources Committee staff, U.S. Forest Service officials, and the offices of Senator Steve Daines, Senator John Tester, and Congressman Greg Gianforte. Jeff was Past President of the Society for Range Management.



*Dr. Mosley, Lia Biondo, SRM's Washington, D.C. Coordinator and Jess Peterson, SRM Executive Vice President in front of the Capitol.*



*Jeff meeting with the Office of Senator Jon Tester.*



*Jeff meeting with Department of Interior.*

*photos courtesy of the Society for Range Management "SRM Capital Update"*

**ANIMAL & RANGE SCIENCES  
MONTANA STATE UNIVERSITY**



You can connect with the Animal & Range Sciences department via a variety of social media sites based on your interests or needs. They are also great ways to keep up to date with our activities and current news. We encourage you to check out the options at <http://animalrange.montana.edu/socialmedia.html> and interact with us by posting a question or comment. We'd love to hear from you!

## More successes in meat processing

As part of the meat processing class each year, the students develop a new product. They are charged with investigating the market and competitors as well as looking at what is necessary to take the product to full production including different types of packaging and equipment. This year the students drew for what species they would be using. In the draw were two beef, pork, lamb and a wild card. The wild card was allowed to choose any species they wanted to use as long as it could be obtained relatively easily. This year there were a collection of seniors ready to take on the world with their new products.



Devan Leo and Kaitlyn Doddridge developed a Fig and Feta Cheese Beef Smoked Sausage. The subtlety of the figs in this sausage made it very unique. The biggest challenge with all beef sausages is the ability to carry seasoning flavors. Beef fat does not carry the seasoning the same as pork and this can be a challenge. The ladies did an excellent job of addressing this challenge.

Mason Haidle and Carter Clinkenbeard developed a Maple, Brown Sugar Beef bacon. In a market that is inundated with pork bacon, this offering was a unique approach. Some challenges to this product are the actual selection of the meat source. Beef bacon usually is made from beef navels. This cut can be extremely tough so it is important that the process address tenderness challenges. They utilized tumbling to incorporate the seasonings and to help a little with tenderizing. The bigger challenge was to develop a cooking schedule that would help to soften collagen so that the product was not tough. They also found that the beef fat would not crisp like pork fat. This led them to suggest other uses as opposed to the typical breakfast slice.



Amanda Leckband and Hannah Allen, two of the Californian transplants, went for a taste of home. Both grew up in Southern California where they will tell you the Mexican food is more Authentic. They developed a pastor taco or what most would see as something similar to carne asada. They were working with pork deciding to use pork shoulder or the blade end of the loin. One of the biggest challenges the students felt they had was finding the “authentic” ingredients, especially the chilies. What resulted from the product development is an easy to prepare meal that can be used in a variety of ways.



The wild card group, Riley Foster and Tienna Canen decided to utilize pork. Their approach was to develop a ground pork jerky similar to a traditional Chinese product called Bak Kwa. This is a sweet product that is made in sheets and cut later. The students wanted a little more zing to the product and called their product flavor Sweet Sriracha. Machinability of this product was one of the major challenges. The formulation contained a lot of liquid that made the product soft so this had to be addressed to allow the product to be more easily handled at the plant level.

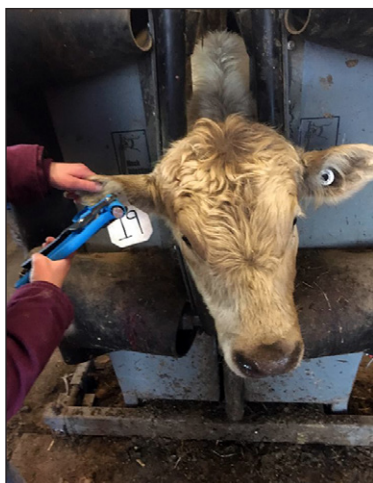


The final product was developed by Warren (Lane) Brush and Brooke McCleary. They had lamb. Lamb is usually one of the hardest to do product development with because the students are not as familiar with it as they are with beef and pork. Lane and Brooke decided to develop a Longaniza style sausage. Longaniza is a Spanish sausage similar to a chorizo and closely associated with the Portuguese linguica. These products are usually made from pork. The sausage is however, very different depending on country of origin. The challenge to making a sausage with lamb is to have enough fat to carry the flavor but to also limit a strong lamb flavor to make it more acceptable to more consumers. Lane and Brooke used 30% pork to incorporate fat and to aid in the carrying the flavor of the seasonings. The product is still 70%

lamb to make it meet the criteria to be called a lamb sausage.

*Story by Jane Ann Boles*

It's been another busy Steer-A-Year program. Steers were processed and started on the Growsafe system December 1, 2018. SAY would like to thank Elanco and Endovac Animal Health for donating vaccines. Also, thanks to CHS Feeds for donating our steer supplement. Steers were DNA tested and the results were sent to the donors. The MSU livestock judging class and team also evaluated and selected the best initial feeder steer. Thank you to our wonderful supporters! We are excited to see these steers grow.





The MSU Wool Harvesting School was held at Rockport Colony on December 17-18, 2018. A big thank to the Montana Wool Growers Association for their generous support. There were students from four colonies - Cascade, New Miami, Rockport and Seville. Over the two day program, roughly 30 students participated.





The Montana Wool Lab has been quite busy this year. Sample submissions have increased over 2017, with more submissions coming from out of state. The Montana Wool Lab team has continued to work hard on increasing the awareness of the lab's capabilities and have attended both the Montana Wool Grower's Association Conference in Billings, MT and the Trailing of the Sheep Festival in Hailey, ID.

The Wool Lab is currently involved in a few research projects including the USDA Fine Fiber Project in collaboration with the USSES Sheep Experiment Station and the NIRS Project in collaboration with Texas A&M. Both projects will provide useful information on differences in wool breed characteristics and a better understanding of using new tools for quantifying yield.

There are a few new faces on the Wool Lab team. The lab is currently being staffed by Liz Deurenmier, Trestin Benson and Ryan Knuth. Brent Roeder, Extension Sheep Specialist, joined the Wool Lab team in November and brings a wealth of knowledge in the sheep and wool industry.

## The Montana Wool Lab Team



Brent Roeder



Liz Deurenmier



Trestin Benson



Ryan Knuth



Liz Deurenmier (far right) at the Trailing of the Sheep Festival in Hailey, ID



Wool judging class at THE Montana Wool Grower's Association Conference in Billings, MT

## FALL 2018

### Graduate Students – PhD in Ecology and Environmental Sciences

Neto Garcia

### Graduate Students – MS in Animal and Range Sciences

Alyson Williams

### Undergraduate Students – B.S. in Animal Science

Warren “Lane” Brush  
Tienna Canen  
Kelsey Clancy  
Alexandra Coppage  
Kaitlyn Doddridge  
Riley Foster

Katherine Frye  
Christine Gluch  
Devan Leo  
Brooke McCleary  
Jessica Miller  
Kara Naugle

Kailyn Pohl  
Brady Richardson  
Taylre Sitz  
Rachel Wagenaar  
Drew Zipperian

### Undergraduate Students – B.S. in Natural Resources and Rangeland Ecology

Kegen Benson  
Dylan Craft  
Nicholas Lowing

### Undergraduate Students – B.S. in Sustainable Food & Bioenergy-Livestock Production

Hannah Allen



*Jordan Hieber, PhD Candidate, supporting the graduation of Neto Garcia at the Fall Graduation ceremonies. Kudos on the poster!*

*Photo by Adrian Sanchez-Gonzalez*





**Alyson Williams**, MS Candidate, placed second in the Applied Research Award at the 2018 Western Section ASAS meeting. Alyson was the only MS Graduate Student winning this award, the other two were PhD students.



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**Kegen Benson** was awarded the \$5,000 George Lea Founders Scholarship provided by the Public Lands Foundation. Benson, a Navy veteran, is in his senior year, majoring in Natural Resources and Rangeland Ecology with an option in Wildlife Habitat Ecology and Management. Benson also received an invitation to attend the Public Lands Foundation annual meeting in Billings, Montana and an opportunity to shadow a local manager of the Bureau of Land Management.

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The 2018 Montana Cattlewomen’s Memorial Scholarship has been awarded to **Kyler Maharg**. Kyler is pursuing a Bachelor of Science in Animal Science. He completed his first year with a 4.0-grade point average. Kyler grew up on his multi-generation family ranch near Helena, Montana.

Kyler was one of seven highly qualified applicants for the MCA scholarship. He said, “One of the biggest issues that affects the agricultural industry today is lack of education. Many people don’t know where their food comes from.” As a strong advocate for educating children about agriculture, Kyler has been instrumental with his family in bringing children to their ranch to show them and let them experience first hand “where their food comes from.” He plans to expand this program to all 3rd graders in the Helena School District and hopefully throughout the entire state of Montana.

The Montana Cattlewomen’s Scholarship is in the amount of \$1,000 and is funded through memorials. This scholarship was established in 1963 and has been awarded to a worthy recipient every year since its inception.

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**Joanna Borgogna**, Ph.D.-candidate in the Yeoman lab was awarded a 2018 Kopriva fellowship to support her research on the influence of Biogenic amines on gynecological health.

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**Herlin Kadriu**, an undergraduate scholar in the Yeoman lab was awarded an Undergraduate Scholars Program and Idea Network for Biomedical Research Excellence scholarship to support his research to identify and assess the toxicity of oxidative byproducts of biogenic amines to health-associated bacteria.

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**Randy Taylor** was the recipient of this year’s AG SC 342 Forage Legacy Scholarship. The scholarship is based on grades, participation, as well as their term project which consists of planning an entire forage management plan for either their own ranch, or one that is assigned to them if needed.

# Awards, Honors, and Grants

**Megan Milligan** was awarded the Don C. Quimby Graduate Wildlife Research Scholarship. The Don C. Quimby Graduate Wildlife Research Scholarship was established to honor Dr. Don C. Quimby, a biology teacher, student advisor and founder of the Wildlife Program with Montana State University's Biology Department. The 2018 award is \$1400 applied toward tuition and fees and/or research expenses.



*Dr. Don C. Quimby, Megan Milligan  
and Dr. Lance McNew*

## Grants:

**McNew, L.B.** † Estimating the occupancy and abundance of dusky grouse: developing protocols for unbiased population monitoring in Montana. Montana Fish, Wildlife, and Parks, \$253,512. July 2018–June 2022.

**Carl J. Yeoman** and **Craig Carr** were awarded \$71,913 by the Bair Ranch foundation to identify and cultivate methylcaconitine-degrading bacteria from wild ruminants for use to protect range cattle against larkspur poisoning

**Carl J. Yeoman** is part of a team led by Mary Miles (Health & Human Development) that was recently awarded \$100,000 to further their research to determine the specific components (metabolites) of Aronia berries and other foods that are absorbed with or without modification by the gut microbiota and lower gastrointestinal inflammation. Gastrointestinal inflammation being a major underlying factor in type 2 diabetes and atherosclerotic cardiovascular disease among others.

**Carl J. Yeoman** was awarded \$55,000 by the NIH through the Center for Translational Research to develop relationships with Alaska Native communities in the Yukon-Kuskokwim-Delta to apply his research on the microbiological and biochemical risk factors underlying gynecological and reproductive health to address disparities among this population





## **Publications:**

Milligan, M.C<sup>†</sup>, S.L. Wellst<sup>†</sup>, and L.B. McNew\*. 2018. A population viability analysis of sharp-tailed grouse to inform reintroductions. *Journal of Fish and Wildlife Management*.

Gregory, A.J., S.M. Wisely\*, L.B. McNew, and B.K. Sandercock. 2018. A landscape perspective on rates of multiple paternity and brood parasitism among greater prairie-chickens across Kansas. *Wilson Journal of Ornithology* 130:626–638.

Schroff, S.R.<sup>†</sup>, K.A. Cutting, C.A. Carr, M.R. Frisina, L.B. McNew, and B.F. Sowell\*. 2018. Characteristics of shrub morphology on nest site selection of greater sage-grouse in high-elevation sagebrush habitat. *Wilson Journal of Ornithology* 130:730–738.

Winder, V.L.\*<sup>†</sup>, L.B. McNew, J.C. Pitman, and B.K. Sandercock. 2018. Effects of rangeland management on survival of female greater prairie-chickens. *Journal of Wildlife Management* 82:113–122.

McNew, L.B. 2018. It depends: relationships between wildlife and livestock grazing management vary across space and time. *Proceedings of the Nebraska Grazing Conference, Kearny, NE*: pages 36–41.

McNew, L.B. 2018. Restoring sharp-tailed grouse to western Montana: MSU graduate students evaluate restoration potential and develop recovery recommendations. *Grouse News* 48:12-13.

Ishaq SL, Page CM, Yeoman CJ, Murphy TW, Van Emon ML, Stewart WC. 2019. Zinc-amino-acid supplementation alters yearling ram rumen bacterial communities but zinc sulfate supplementation does not. *Journal of Animal Sciences*. In Press

Lei B, Flores AR, Yeoman CJ, Liu M. 2019. Complete genome sequence of hypervirulent *Streptococcus pyogenes* emm3 strain 1838. *Microbiology Resource Announcements*. In press

Vlckova K, Pafco B, Petrzekova K, Modrý D, Todd A, Yeoman CJ, Torralba M, Wilson BA, Stumpf R, White BA, Nelson KE, Leigh S, Gomez A. 2018. Relationships between gastrointestinal parasite infections and the fecal microbiome in free-ranging Western lowland Gorillas. *Frontiers in Microbiology*. 9: 1202. DOI: 10.3389/fmicb.2018.01202

## **Presentations:**

Dr. Lance McNew was an invited speaker at the Nebraska Grazing Conference in Kearney August 6-8 and presented a talk titled: “It depends: relationships between wildlife and livestock grazing management vary across space and time.”

McNew, L.B. 2018. Wildlife Habitat Ecology Research in Montana’s Working Rangelands. Charlie M. Russell NWR working group, Malta, MT.

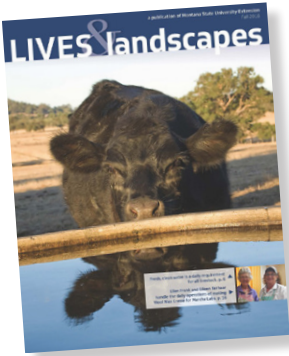
McNew, L.B., S.K. Vold, and M. Milligan. 2018. Livestock grazing and grassland wildlife associations in eastern Montana. 2018 Montana Range Tour, Sidney, MT.

Milligan, M. and L.B. McNew. 2018. Effects of livestock grazing on sharp-tailed grouse ecology in northern mixed grass prairies. 14th International Grouse Symposium, Logan, UT.

Ritter, T., and L.B. McNew. 2018. Habitat conditions associated with new settlement sites of beavers in southwest Montana. 14th Biennial Scientific Conference on the Greater Yellowstone Ecosystem, Jackson, WY.

Milligan, M.\*, L.B. McNew, and L. Berkeley. 2018. Effects of rangeland management on sharp-tailed grouse habitat selection in mixed-grass prairies. Annual Meeting of the Society for Range Management Meeting, Sparks, NV.

Vold, S.\*, L.B. McNew, and L. Berkeley. 2018. Effects of livestock grazing management on grassland bird ecology in northern mixed-grass prairie. Annual Meeting of the Society for Range Management Meeting, Sparks, NV.



**Megan Van Emon**, Extension Beef Cattle Specialist, recently published an article in the Fall 2018 publication of Montana State University Extension Lives & Landscapes. Megan's article titled "Water Quality for Livestock" can be found at <https://www.msuextension.org/magazine/articles/2413>.

"In summary, water quality is crucial to maintaining livestock production and health. Water quality differs throughout the year even from the same source and is greatly impacted by weather events such as drought or heavy rainfall. Information gained from periodic water tests for TDS, sulfates, nitrates, and bacteria can help livestock owners to be good livestock stewards."

In the Winter 2018 publication of Montana State University Extension Lives & Landscapes, **Emily Meccage**, Extension Forage Specialist, has an article titled, "Adjusting Feed Rations with Available Forage" and **Brent Roeder**, Extension Associate Sheep Specialist, wrote an article, "Wow, That's a Big Dog!" about livestock guardian dogs.



You can find this issue online at <https://issuu.com/msuextension/docs/winter2018?e=33838256%2F66383189>.



**Emily Meccage**, Extension Forage Specialist, recently answered the question "Are Organic or Nongenetically Modified Hays Better for Horses?" in the magazine The Horse. To find out her answer visit <https://thehorse.com/160147/are-organic-or-nongenetically-modified-hays-better-for-horses/>.

Hint: It could come down to personal preference.

**Lance McNew**, Assistant Professor of Wildlife Habitat Ecology, was interviewed for an article published for The Progressive Farmer titled, "Grazing is a Balancing Act".

The article can be viewed here: <https://www.dtnpf.com/agriculture/web/ag/news/business-inputs/article/2018/08/20/balancing-grazing-management>.

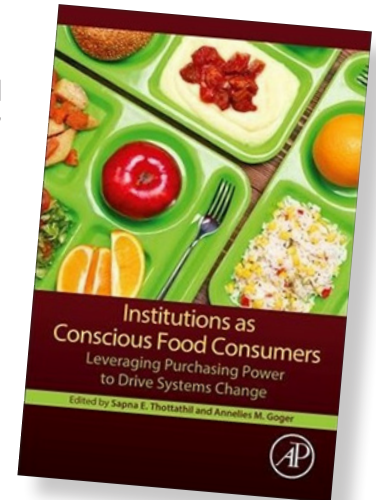




# Publications and Presentations

Congratulations to Tommy Bass, Livestock Environment Associate Specialist, for his contribution to the newly released book, *Institutions as Conscious Food Consumers: Leveraging Purchasing Power to Drive Systems Change*. Chapter 9 of this book titled “Montana’s Beef-to-School Project: Making Connections Enhance Local Agriculture” was co-written by Tommy.

Institutions like schools, hospitals, and universities are not well known for having quality, healthy food. In fact, institutional food often embodies many of the worst traits of our industrialized food system, with long supply chains that are rife with environmental and social problems and growing market concentration in many stages of food production and distribution. Recently, however, non-profit organizations, government agencies, university research institutes, and activists have partnered with institutions to experiment with a wide range of more ethical and sustainable models for food purchasing, also known as values-based procurement.



*Institutions as Conscious Food Consumers* brings together in-depth case studies from several of promising models of institutional food purchasing that aim to be more sustainable, healthy, equitable, and local. With chapters written by a diverse set of authors, including leaders in the food movement and policy researchers, this book:

- Documents growing interest among non-profit organizations and activists in institutional food interventions through case studies and first-hand experiences;
- Highlights emerging evidence about how these new procurement models affect agro-food supply chains; and
- Examines the role of policy and regional or geographic identity in promoting food systems change.

*Institutions as Conscious Food Consumers* makes the case that institutions can use their budgets to change the food system for the better, although significant challenges remain. It is a must read for food systems practitioners, food chain researchers, and food-service professionals interested in values-based procurement.



Research by **Dr. Hayes Goosey**, Assistant Research Professor, was highlighted in a recent issue of Sage Grouse Initiative. See full article at [http://www.sagegrouseinitiative.com/wp-content/uploads/2018/11/ScienceToSolutions\\_GrazedRangelandsProduceMoreBirdFood\\_Nov2018.pdf](http://www.sagegrouseinitiative.com/wp-content/uploads/2018/11/ScienceToSolutions_GrazedRangelandsProduceMoreBirdFood_Nov2018.pdf)

In Brief:

- Terrestrial arthropods (like insects) provide the protein-rich foods necessary for the survival of young shrub and grassland birds.
- A new study comparing arthropod communities in grazed, deferred, and idled pastures found that arthropods consumed by sage grouse chicks were 13% more prevalent in grazed versus idled rangelands.
- Long-term absence of grazing may alter the structure of arthropod communities, resulting in reduced food availability for growing young birds during late summer.

**Jeff Mosley** served as guest editor of the December 2018 issue of the journal *Rangelands*. The special issue addresses the effects of heavy grazing by bison and elk on the Northern Yellowstone Range, inside and outside Yellowstone National Park. Jeff coauthored 5 articles in the special issue. Read the full issue at: <https://www.sciencedirect.com/journal/rangelands/vol/40/issue/6>

MSU Alum (2018) **Chad Page** was selected for the 2018 Sheep Heritage Foundation's Memorial Scholarship. It should come as no surprise that Page picked up the award in his second attempt, as he studied under three previous winners while pursuing his master's degree in animal and range sciences at Montana State University: Megan Van Emon (2011), Tom Murphy (2013) and Whit Stewart (2014).

"I'm very honored to receive this scholarship," said Page, who is now working under Stewart at the University of Wyoming as he pursues his doctorate in animal science and ruminant nutrition. "I first heard about it in the ASI Weekly newsletter when I was still in Montana, and then I found out that three of my professors had won the scholarship in the past. I'm honored to join them on that list."

Page grew up with sheep and goats on a hobby farm in Arizona. He served on a two-year mission in Brazil with the Church of Jesus Christ of Latter Day Saints before attending Brigham Young University-Idaho and graduating with a bachelor's degree in animal health and veterinarian science.

"I have been fortunate in my career to work with some of the most passionate sheep scientists in the United States, both Dr. Thomas Murphy and Dr. Whitney Stewart," Page wrote in his application. "Working with these sheep specialists has provided plenty of opportunities to serve the sheep industry. I am an ultrasound technician for the National Sheep Improvement Program, managed the Montana centralized ram test, and have spoken at multiple sheep extension meetings about applicable research, including my own.



"The first project that I carried out in my master's program quantified trace mineral status in Montana ram lambs. Twenty-one sheep operations across the state participated in the study. The results from this study provided valuable information for ranchers and livestock nutrition companies. A new sheep mineral premix for the western half of Montana was developed based on our findings. I conducted a follow-up study investigating the effects zinc has on ram development. The findings from that study showed that dietary zinc concentrations above current recommendations increased average daily gain and wool growth in Targhee rams.

"I have authored two proceeding papers in the American Society of Animal Science western section, two extension papers and an article in the Montana Wool Growers magazine. I co-authored grant proposals that were funded by the National Sheep Industry Improvement Center and the Zinpro Corporation. I currently have a journal article discussing the Montana mineral survey accepted with revisions, and other projects from my master's soon to be published. I hope to continue to produce and teach valuable and applicable information for the sheep industry and its producers."

Page said he'd love to serve as an extension sheep specialist in the future, but would also be comfortable working in a nutrition role within the industry.



“The objectives of my current research are to evaluate the effects of supplemental zinc on zinc status, lamb growth performance, lamb survivability and prevalence of mastitis in ewes supplemented varying concentrations of zinc during gestation. I am currently conducting this research at the University of Wyoming, while similar aspects are being conducted with our collaborators at the U.S. Sheep Experiment Station and Montana State University. We have completed the first year of our study with preliminary data showing increased lamb survivability with increasing supplemental zinc to ewes in gestation.”

Stewart offered a glowing recommendation letter as part of Page’s application for the scholarship. “Chad is as comfortable speaking and working with sheep producers as he is in the laboratory or teaching in the classroom,” Stewart wrote. “I have no reservations sending him to the ranch to collect data or give a talk at a sheep seminar. Perhaps most unique to Chad is that he values producer experience and knowledge. He exemplifies the next generation of sheep specialists that I’m proud to train; hard working, independent thinking and committed.”

*Story featured in Sheep Industry News – September 2018*



Hi my name is **Jessica Roloff**, I graduated with my livestock management degree in 2014 from Montana State University. I’m from Bozeman Montana and was happy Montana State had such a great agriculture program. Everything I learned about cattle and agriculture was working as hands for different people and from my education at Montana State University. I’m currently the Feed Manager for Snake River Cattle Feeders, one of Agri Beef Company’s feedlots across the north west.

I started with the company in spring of 2015 as a manager in training at their largest yard in Moses lake Washington of about 65,000 hd. I had the opportunity to learn under the managers there and implement what I had learned in my college education. From riding, animal health and handling, math, anatomy, repro and nutrition it all has come into play with my duties day to day. I was promoted to the cattle manager at Snake River in American Falls Idaho in 2016 and then was moved into the feed manager position in 2017.

I call feed each day for about 14,500 hd, deciding how many lbs to put out based on bunk condition, cattle body language and among other things. I manage a 4 man crew and make sure day to day cattle are being fed. My education gave me the base knowledge for joining the

industry, if you’re willing to learn you can become quite the hand just by keeping your eyes and ears open. Taking in every word of advice, wanted or not, and figuring out the best way for yourself.

# Hello

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Welcome to **Amanda Reuland** who is our new Accounting Associate IV.

**Brent Roeder**, as mentioned in the newsletter, is the new Extension Sheep Specialist.

**Trestin Benson** has joined the Wool Lab as a Research Associate. She is pursuing her MS degree under Emily Meccage. She will work with **Liz Deurmeier**, who continues to work as a Wool Lab Research Associate.

Miles City will say hello to **Emily Meccage**, Forage Extension Specialist, as she relocates her office to Ft. Keogh. Emily will continue her duties with extension, undergraduate and graduate teaching, graduate education, research, and service. She will continue her collaborative efforts with faculty in the Department and College.

We are pleased to welcome **Carla Sanford** as the new Beef Extension Specialist. She is completing her PhD at the University of Florida and will begin here in May.

The College of Agriculture announced that **Dr. Sreekala Bajwa** is its next vice president and dean. Bajwa has been serving as chair of North Dakota State University's Department of Agricultural and Biosystems Engineering and professor of agricultural engineering since 2012. She will begin at MSU on January 14th.

# Goodbye

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**Dr. Jim Berardinelli** retired in August after 37 years. Congratulations to Jim!

**Tom Murphy** accepted a position with the USDA Agricultural Research Service as a sheep geneticist at the U.S. Meat Animal Research Center in Clay Center, Nebraska.

**Tyrell McClain** stepped down as Assistant Livestock Manager and moved to Havre to work at the Northern Agricultural Research Center. He is still pursuing his Animal & Range Sciences MS Graduate degree under Tim DelCurto.

**Dr. Charles Boyer**, The College of Agriculture vice president and dean, retired at the end of December! We wish him luck and appreciate all his support for our growing department.

Visit our website at [animalrange.montana.edu](http://animalrange.montana.edu)

Find us on Facebook at [facebook.com/MSU.Animal.Range.Sciences](https://facebook.com/MSU.Animal.Range.Sciences)

Email newsletter comments to [sharon.henderson@montana.edu](mailto:sharon.henderson@montana.edu)



*"Sheep Number Bed"*. Devon Ragen's 2-year old son, Jace, laying in a pile of wool at the Helle Rambouillet shearing this past Spring. Devon is a Research Associate in the department.



The mission of the Animal and Range Sciences Department is to create, evaluate and communicate science-based knowledge to enhance the management of Montana's livestock and rangeland resources in ways that are economically, socially and ecologically sustainable.

