Fort Keogh Researcher

USDA Agricultural Research Service
Livestock And Range Research Laboratory
In cooperation with
Montana State University
Montana Agricultural Experiment Station

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Introduction
Dr. Mark Petersen, Research Leader

Hello from Fort Keogh – We have had a very good year for, feed, forage and cattle production. These good growing conditions set us up to be productive in our research mission. In the last 2 years we have published over 30 refereed papers by our 7 scientists. The findings from those papers have been shared with stakeholders in a number of settings including scientific, organizational and individual stakeholders. For example, the Montana Stock Growers held their mid-year meeting in Miles City in June which included a lunch followed by a pasture and cattle research tour narrated by our scientists. In addition we were able to reinstitute our intern program this past summer and had 12 college students working alongside scientists and technicians. Our research program is going very well as we develop new practices and technologies for; range restoration in response to disturbance, precision supplementation, peak herd fertility and long lived productive range cow herds.

Our efforts will not only result in improvements in efficiency for production of range cows in North America but can also impact production systems in other semi-arid grazing environments. This is important since there are few research groups in the USA or globally that are dedicated to management of native grasslands for human food production. Recently two scientists participated in a conference entitled "Innovate 2014: Global Food Security" sponsored by the American Society of Animal Science. The over arching theme dealt with the role animal based foods will play in meeting the nutrition needs of the world's population by 2050.

Our research can be applied to large areas of land that are incapable of supporting the production of human food crops. The combination of terrain, soil type, and climate render the majority of land currently used for grazing unsuitable for cultivation for the production of vegetable-based foods for human consumption, yet forages can be sustainably converted by ruminant animals into meat and milk products. This information was followed by a discussion concerning the contribution ruminants play in green house gas production and the potential implications to global warming.

Of interest to this discussion are the findings of the U.S. Environmental Protection Agency (2012) showing meat-producing animal agriculture (i.e., beef, swine, sheep, goats, and poultry) contributing 2.1% of total national green house gas emissions. By comparison taking the projections of the 'Meatless Monday" movement, a one-day-per-week decrease in meat consumption could cut animal production by one-seventh, changing the projected national green house gas emissions by 0.29% of the total. A change that decreases green house gas emissions by less than one-third of one percent is likely to have only a very small environmental impact within the United States. Other topics presented and discussed included competition for feedstuffs between livestock and humans among others.

Inside this issue:

INTRODUCTION (CONTINUED)

I personally am proud of the work we do at Fort Keogh. Everyone here is dedicated to creating solutions for landscapes that function well and range cattle that are highly efficient and produce highly nutritious and wholesome food for people.

Finally we anticipate an advertisement for a Genetics Scientist to be released this month. We are looking forward to the search and adding a new scientist to our ranks. In March 2014, we hired a new Administrative Officer Amy Bontrager. She has hit the ground running and did a great job preparing budget projections for the new fiscal year and closing out the last fiscal year. We all look forward to working with her.

Finally I would like to thank the Young Farmers and Ranchers of the Montana Farm Bureau for their team work. Together we sponsor a 1 mile fun walk, 5k, 10k and ½ marathon over the Columbus Day weekend at the Fort. We had over 200 runners and walkers participate. The event is a fund raiser for the Montana Food Bank. We collected over $6,000 and donations of 225 pounds of food. You should join us next year!

Please visit us when you have a chance. Hope you have a good winter!

Mark Peterson

FIGHTING A PERNICIOUS WEED WITH FIRE BY DENNIS O'BRIEN, USDA

Carefully staged "prescribed fire" can reset a rangeland's biological clock, awaken dormant plants, and breathe new life and diversity into an ecosystem. When fire rolls over a rangeland, it gives perennial sod-forming grasses, which are good sources of forage for livestock, a better chance to take hold.

An Agricultural Research Service team in Miles City, Montana, is looking for ways to use fire to control a weed on the Northern Plains and on western rangelands. The weed is purple threeawn, and it is colonizing disturbed soils and overtaking rangelands used for grazing. When fully grown, the plant has sharp prongs that make it undesirable to cattle, and the cattle do not thrive if it becomes a staple of their diet.

The researchers—range ecologist Lance Vermeire, range technician Dustin Strong, and their colleagues—are in the ARS Range and Livestock Research Unit in Miles City.

Fire is commonly used on rangelands in the Southern Plains (Oklahoma, Texas, and Kansas), but it was not as readily adopted by settlers west and north of those areas. Because of that, less is known about its effectiveness as a management tool in the areas where purple threeawn is becoming more of a problem. The research is largely funded by the U.S. Bureau of Land Management, which manages much of the rangeland in the United States.

Effects of fire

To find out whether fire is useful in controlling threeawn, Vermeire, Strong, and their partners are probing a number of issues, including which season is best for using fire. The researchers want to determine whether fire not only reduces the abundance of purple threeawn, but also creates more balanced ecosystems where desirable grasses can flourish. Their intent is to give land managers a way to keep rangelands viable so that cattle grazing on them can stay healthy and well fed.

"We don't just want to discourage the bad weeds; we also want to promote the good grasses, such as western wheatgrass, needle and thread, and other native perennial grasses," Vermeire says.

This research plot in Miles City, Montana, is made up of about 75 percent purple threeawn plants. ARS scientists are looking at ways to use fire to control the weed, which is invading rangelands in the Northern Plains. Photo by Dustin Strong.

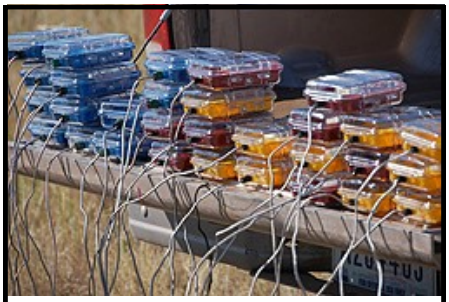
The researchers grew purple threeawn and two desirable grasses—western wheatgrass and blue grama—in a greenhouse to study the effects of fire under controlled conditions. Some purple threeawn was grown in isolation, and some was intermixed with the two grasses. They applied fire to some plants and let others grow unimpeded, and they clipped both the burned and control plants to specific heights to simulate cattle grazing. Combust-

ed materials, clipped material, and final biomass of all plants were measured to assess plant production levels.

Results showed that fire killed 36 percent of the purple threeawn and reduced its biomass by 61 percent, reductions the researchers say were significant. Though this study was done in a greenhouse, the researchers say the results indicate that fire treatments would likely have significant impacts for reducing purple threeawn on open rangelands. The study was published in *Rangeland Ecology and Management* in 2013.

The right timing

Another key question is when to use fire. Most prescribed fires are set in rangelands during spring or fall, but a plant's response to fire varies with its stage of development and activity level. Most native grasses in Montana are cool-season plants that have adapted to the natural cycle of frequent summer wildfires. They go dormant in the summer, making them less susceptible to summer fires. Purple threeawn, however, is a warm-season species that grows during the summer, which should make it more susceptible to summer fires.



Thermocouples (the silver wires) and data loggers are used in prescribed burns in research plots planted with purple threeawn. The loggers record plant temperatures every second the fire burns. Photo by Mark Jacobson, BLM.

In a study at two Montana field sites, plots were either burned during the summer or fall or were not burned at all, and each of those treatments had either no nitrogen or one of two levels of nitrogen added. Precipitation levels varied widely: Spring 2011 saw record rainfall, but spring 2012 was one of the driest on record.

The results showed that while fall fires reduced purple threeawn production, summer fires were much more effective, particularly after a wet spring. "Few rangeland treatments have shown such immediate effects with just a one-time application," Vermeire says. In comparison to the control plots, the weed's overall biomass was reduced 90 percent by the summer fire and 73 percent by the fall fire after the wet spring. By comparison, it was reduced 73 percent by the summer fire and 58 percent by the fall fire after the dry spring. Adding nitrogen to the soil had no effect on purple threeawn production at any of the sites nor on growth of the more desirable perennial grasses after the dry spring, but it doubled grass production after the wet spring.

The study was published in *Rangeland Ecology and Management* in 2013.

Heat dosage and duration

When conducting prescribed burns, land managers can control certain factors such as the temperature, duration, and the amount of heat applied. The duration of a fire, for instance, can be prolonged by allowing plant litter to accumulate or by burning in light winds or when the plant material is moist. "Dosage" could be defined by how hot and how long a fire burns, the researchers say.

The thermocouples run between the purple threeawn plants and the data loggers (seen here wrapped in wet burlap). Photo by Mark Jacobson, BLM.

In another study at the Montana sites, the researchers placed data loggers at the base of purple threeawn plants to record the temperatures during prescribed fires. The purpose was to assess the effects of temperature, heat duration, and heat dosage. The loggers recorded temperatures every second the fires burned.

The results, published in 2013 in *Fire Ecology,* showed that heat dosage and duration are more important than maximum temperature. The scientists conclude that summer fires, with their higher dosage and duration levels, provided more benefit than fall fires.

Vermeire said the results could also be attributed to purple threeawn's growth cycle. "Because purple threeawn grows and reproduces during the summer, setting it on fire in summer rather than fall is more likely to shut down that process," he says.

From the Agricultural Research Magazine http://www.ars.usda.gov/is/ar.

I am the new Extension Beef Cattle Specialist with Montana State University and I'm located here at Fort Keogh in Miles City. I began the position on August 1st.

I grew up on a small farm in Northeast Indiana. I attended Purdue University for my B.S. in Animal Science (2006) and M.S. in Ruminant Nutrition (2008). During my M.S., I had the opportunity to work in beef and sheep feedlot nutrition with Dr. Scott Lake. I attended North Dakota State University for my Ph.D. (2013) working with Drs. Chris Schauer and Kim Vonnahme. While in North Dakota, I conducted by research at the Hettinger Research Extension Center, where I resided for 2 years. My main research focus was the supplementation of metabolizable protein during late gestation to ewes and the effects the supplement had on the offspring. I also had the opportunity to conduct research in the effects of feeding dried distillers grains with solubles to rams on feedlot performance and spermatozoal concentrations, as well as calf backgrounding, low-stress weaning techniques, and cow-calf nutrition. I then moved to Ames, IA to pursue an opportunity as a Post-Doctoral Associate with Dr. Stephanie Hansen in beef feedlot nutrition and Dr. Dan Loy in beef extension.

In my spare time, I enjoy hunting, fishing, and golf. Golf and I have a love/hate relationship, but I just keep playing. I enjoy watching football, especially NDSU Bison, the herd is marching towards their 4th National Championship, and Purdue Boilermakers, BOILER UP! And now, I'm beginning to watch the Bobcats!

I have a wide array of research and extension interests, which include nutritional impacts on reproduction of both cows and bulls, mineral supplementation, heifer and bull development, and feedlot nutrition. I look forward to collaborating with the scientists here at Fort Keogh, as well as on campus and the Northern Agricultural Research Center in Havre. I'm also looking to collaborate with producers on research projects that will also be used as project demonstrations for extension. I'm looking forward to getting out in the state and meeting new people, learning new concepts, and developing new ideas to collect and provide information.

Some of the main questions/concerns I have discussed lately involve feeding sprouted grains, wet hay bales, and forage quality. As everyone knows, this summer and fall have been a wild ride when it comes to weather. We have had rain, hail, frost, cool temps, and hot temps, and all of these have differing effects on forage quality. If you have any questions, concerns, ideas, or just want to chat, please don't hesitate to call or email.

Megan Van Emon

Montana State University

Extension

Beef Cattle Specialist

Contact Information:

Megan Van Emon

243 Fort Keogh Road

Miles City, MT 59301

Email:

megan.vanemon@montana.edu

Office: 406-874-8286

Cell: 701-928-1096

October 12, 2014: Hoofin' It For Hunger Fun Run, 197 registered.

October 2, 2014: Prairie County Tour spent the day at Fort Keogh going over the current research and how it applies to them. There were about 20 participants.

September 23, 2014: The Rotary Club toured the Russian Olive Plots with Mark Petersen. Erin Espeland, Ecologist, and Robert Kilian, NRCS, gave a talk on the Russion Olive Research Project.

September 17, 2014: The Montana Stockgrowers Customer Focus Group for Fort Keogh met. Presentations from the scientists and feedback discussions were made. There were 12 focus group members present plus a MSU representative and an ARS representative.

September 11, 2014: Real Montana Seminar 6 – Livestock and Coal, Mark Petersen gave an overview of Fort Keogh and a tour of the station to a class of about 30 future leaders of Montana.

September 8 & 9, 2014: Mark Petersen and Andy Roberts attended the Simmental Association meetings in Bozeman.

September 6, 2014: Montana Hereford Association toured Fort Keogh and were given presentations by Lance Vermeire, Andy Roberts, Vicki Leesburg, and Tom Geary. There were 30 breeders on the tour.

August 13, 2014: Dr. Cindy Orser, Director, Montana University System Research Program, visited Fort Keogh for a tour and met with the Research Leader on exploring collaborative research.

July 21-24, 2014: Dr. Tom Geary attended the SSR meetings in Grand Rapids, Michigan, where he presented a paper titled, 'Systems Biology Approaches to Understanding Conceptus Elongation and Early Pregnancy Loss. He was also an author on a poster titled, 'Genome-wide Association Study and Endometrial Transcriptomics of Fertility-Classified Beef Heifers.'

July 18-23, 2014: Drs. Andy Roberts and Mark Petersen attended the American Society of Animal Science annual meetings in Kansas City, Missouri.

June 24-27, 2014: Drs. Andy Roberts and Mark Petersen attended the Western Section of Animal Science meetings in San Angelo, TX.

June 13, 2014: Fort Keogh hosted the Montana Stockgrowers for a lunch and tour as part of their summer meeting. The tour consisted of a stop out at the Cover Crop Study and talk by Dr. Richard Waterman, a talk about the Water Quality work by Dr. Mark Petersen, a stop by the pasture where the beef cow longevity and efficiency with limited feeding management takes place and a talk by Dr. Mark Petersen. The last stop was up at Upper Cottonwood with a talk on Fire Effects in the Northern Great Plains by Dr. Lance Vermeire. With three buses and several vehicles, over 200 people attended the talks and lunch.

June 10-11, 2014: Dr. Tom Geary attended the W112 meetings in Fairbanks, Alaska. He gave an update of his research and collaborated with other attending scientists.

May 21, 2014: Fort Keogh employees gave updates on their research to the Montana State University Extension agents. There were 10 in attendance.

April 30- May 2, 2014: Fort Keogh hosted the annual school tours. Area first graders were given tours emphasizing where their meat comes from and what a balanced diet is along with being able to pet and see farm animals. The fifth graders' tour consisted of 5 talks including: Opening – what is Fort Keogh, Genetics, Animal Nutrition, Range, and Physiology. Over 400 students came through the tours.

March 27-29, 2014: Dr. Tom Geary traveled to Fargo, ND, to North Dakota State University. He presented a talk to faculty, staff, and students (35) on the role of estrogen in pregnancy establishment.

February 20-22, 2014: Sue Bellows (Bio. Lab. Tech.) Facilitated a class about artificial insemination for the ag class from Miles Community College. The class consisted of classroom training and hands on training at the horse barn. There were 15 students that participated in the class.

February 17, 2014: Dr. Andy Roberts talked at the Ranchers Stewardship Alliance meeting – Hi-Line Ranchers Learn How to Beef Up Profitability. His talk was titled: Factors affecting cow herd efficiency. There were over 70 producers present for the one day workshop in Malta, MT.

February 6, 2014: Dustin Strong, Sue Bellows, Jennifer Muscha, Tom Geary, and Brad Eik judged at the Custer County Rural Schools Science Fair.

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If you would like a copy of any of these publications, they are available on our website at: http://www.ars.usda.gov/Research/docs.htm?docid=4834 or email us at Fort.Keogh@ars.usda.gov.

Brad Eik
Ranch Manager

Well here we are again, 2014 has been a great year for us at Fort Keogh and we hope you all are enjoying these good times also! With all the good snow and spring rain, grass and hay have been unbelievable here.

I will start off with some production items. We had 60 acres in hay barley that averaged just over 3 tons an acre which we did not even have to irrigate. We were unable to get our cover crop in the ground this fall so we held on to that seed for next year and are trying something we have never done before by putting in winter wheat in those acres. After combining the wheat, we will get back to the cover crop study next fall. Our alfalfa ran at 5 tons/ac on the crop we only cut twice, the 120 acres we cut three times were in the 6.5 ton/ac range. With the early freeze, we decided to not cut any more third cutting and just bring cows in to utilize it standing in the field. Our corn crop was terrifying this summer with the ice jam we had last winter. It came down the river and took our pump house and all the electrical boxes and wiring with it. Our new farm Supervisor, Cooper Merrill, got the crop planted right on time and was coming up very nice, however getting bids on the electrical and new pump house took far longer than expected and we did not have irrigation water until the third week of June and were about 5 days away from a total loss. We got the pipe out and the water on and saved every field so that was one hurdle crossed. Chopping however became yet another hurdle in that the last two years we have had our silage custom chopped and were on the list to have that done again. The chopper came the day after Labor Day like normal and decided we were a few days away from being ready, so he went in and started his own corn then the next week we got an early hard frost followed by very warm days which put us behind the 8 ball as they say. With the corn drying out very quickly, the custom chopper informed me he was still 10-12 days away from getting to us and by that time our silage would have been like packing feathers. I had to make some hasty decisions and we were lucky that John Deere in Billings had a new chopper on hand so I traded our old machine off on it and with great work from our AO and RL here, in two days we were chopping and had all the corn in the pit in just 7 days. It was a great feeling and we dodged an enormous bullet there. On our 110 acres, we averaged just over 27 tons/ac so it was an average crop for us but after all the obstacles faced, it's like having a pile of gold out there.

On the cattle side of things, it has also been a great year. With so much grass and a fairly mild summer along with switching mineral, the cows and calves have looked phenomenal. Our pregnancy rates are at an all time high for most herds. I will start with the Line 1 herd whose pregnancy rate a year ago was 78% on the cows and 50% on the heifers, this year was dramatically better with both the cows and heifers at 96% pregnant. Our Physiology cow herd (Hereford angus cross cows) has not been preg tested yet except for the bred heifers. They came in at 90% pregnant with 68% of those being caught with an A.I. protocol. Our CGC cows were at 94% and our registered Black Angus herd cows came in at 97% and heifers 93%. I do not have all the weaning data on the calves but I will share what I do have starting with the Physiology cows. The steers averaged 523 on 199 head on September 24th, very good for April and May born calves. The ladies came in a little lighter at 477 on 181 head on September 19th. The only others I have at this time are the bull calves for the CGC cows from 2 breeding pastures. Pasture 1 on Oct 9th bulls averaged 564 lbs and the calves from pasture 2 were 482 lbs. We are figuring the big difference was from pasture effect.

With that, as always, I hope this letter finds everyone well and still enjoying the high calf prices and nice weather. If there is anything I can do for anyone out there or questions you would like answered, my door is always open or give me a call at the station 406-874-8226!

USDA Agricultural Research Service

MONTANA STATE UNIVERSITY
Montana Agricultural Experiment Station

If you have email and would rather receive this newsletter as a .pdf file, send an email to: Fort.Keogh@ars.usda.gov

USDA-ARS-PA
Livestock and Range
Research Laboratory
243 Fort Keogh Road
Miles City, MT 59301-4016
http://www.ars.usda.gov/pa/ftkeogh
Phone: 406-874-8200
Fax: 406-874-8289
E-mail: fort.keogh@ars.usda.gov

Hoofin' it for Hunger Fun Run

It was a cool rainy morning for the "Hoofin' It for Hunger" Trail run ,Sunday, October 12, 2014, that was held at the **USDA -ARS Fort Keogh Livestock and Range Research Laboratory's** 56,000 acre research ranch facility west of Miles City, Montana in support of Feds Feed Families food drive. In a team effort with the American Farm Bureau Federation Young Farmers and Ranchers program, Fort Keogh hosts the run which includes a half marathon, 10K, 5K and a 1 mile fun run/ walk. This year there were 197+ registered runners, a few did not want to challenge the elements that day . Those that did were rewarded with the warm sun, fresh air and a great day as clouds broke. It was muddy in parts of the course but the runners didn't let that deter them! This event is held to benefit the Montana Food Bank Association. Over $6,000 will be donated from proceeds raised through 38 sponsors and registration fees. Participants of the 1 mile fun run/walk provided 225 pounds of food items in lieu of registration that was donated to the local Miles City Food Bank.

After finishing the half marathon, contestants raved about the beautiful countryside route they ran. It took them past livestock barns, crop fields, pastures, banks of the Yellowstone River, a wooded area, an old railroad bed, over an old railroad bridge to the prairie, then up a hill to a gravel pit that supplied base material for all railroad track beds in the area. In addition many of the runners with no food production knowledge, were fascinated with the location's history, agricultural research mission and the collaboration with farmers and ranchers to sponsor the food focused event. Hoofin' It for Hunger is purely a trail run, no pavement here. The mud made it a bit interesting but the smiles of the finishers completing the race made it worth all the effort to organize and will ensure another race will happen again next year!