Fort Keogh Researcher

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

November 2015

Introduction
Dr. Mark Petersen, Research Leader

Hello from Fort Keogh;

It is nice to be sitting down to write to you about the activities and accomplishments at Fort Keogh.

Every year is so interesting to see what Mother Nature gives us and what we need to do to adapt. If you looked up our precipitation for the year on the US Weather Service web page you would read we have received about three fourths of normal for this time of year. If you rode across our pastures you would think we have not received that much. Our pasture have not grown much grass this year since the timing of the little moisture we did receive did not coincide with the growth demands of the range vegetation. As a result we have reduced the number of cattle we will winter to more closely balance "mouths with grass" and then reevaluate before the cows go out to breeding pastures in the spring. If we receive inadequate spring rains, we will reduce the herds again. Most likely we will sell heifers to decrease herd size since they should have higher value as stocker/feeders than cows. The strong El Nino pattern that has formed keeps us alert.

The good thing about all of this is that we have to conduct our research in the same conditions that our stakeholders have to manage and produce. These types of conditions create opportunities for new discoveries that we never could have planned. Currently our range group is engaged in a long-term drought study that was implemented a couple of years ago and the dry weather helps that investigation.

The scientists at Fort Keogh have had a good year getting their research findings out to scientific and agricultural partners. Three of our scientists traveled internationally; Kurt Reinhart to South Africa, Andy Roberts and Tom Geary to Brazil. We also had scientists present invited papers to industry and scientific symposia. Our scientists and Ag operations employees shared in hosting a number of tours with various groups including the 1st and 5th graders of eastern Montana. In a unique event, we sponsored a 1 or 2 mile walk, 5 K, 10K and half marathon race with the Montana Farm Bureau Young Farmers & Ranchers as a fund raiser for the Montana Food Network. Through this cooperative endeavor we created an opportunity for 180 regional runners and provided $6000 to the Food Network.

This summer, we employed 12 student interns from high school, college and graduate school. In order to better accommodate the students at the Fort, we recently built a 6 bedroom bunk house. This facility has 2 showers and bathrooms, a

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communal galley kitchen and two lounging areas to gather or to conduct computer work. We are looking forward to our first boarders.

We have also had opportunities to enhance our scientific instrumentation in the last year. We added to our capacity to study bull fertility, improved measurement quality of hormones and have decreased the time needed to measure blood metabolites.

There has been some changes to personnel at the Fort. Janice Clendenen retired in the summer after 25 years. She worked with procurements on both sides of the transactions (with vendors and the Fort employees). We will miss Janice as she had a lot of knowledge and was dedicated to our smooth operations. She was replaced by Travis Helm, who started in November. He has very good experiences with the US Army and is a native to Miles City and Eastern Montana cattle production. We welcome Travis and look forward to getting to know and work with him. Finally, you have read about our efforts to hire a genetics scientist. We have hired a bright young scientist, Dr El Hamidi Hay, who is presently working in a Post Doctoral position at a sister laboratory in Beltsville, MD. He received a PhD at the University of Georgia. His background fills gaps we have to move the collaborative objectives we have with our beef cattle field studies to conduct genome wide association studies and genomic selection on traits of economic and biological interest.

I am personally proud of the work we do at Fort Keogh. Everyone associated with Fort Keogh 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.

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

Mark Peterson

Improved Methods for Restoring Disturbed Rangelands by Matt Rinella

Rangelands make up 40% of Earth's land surface, and in addition to directly supporting over 2 billion people by providing feed for livestock and other needs, rangelands provide critical wildlife habitat and a variety of recreation opportunities. Globally, energy extraction, overgrazing, catastrophic wildfire, and exotic weeds have reduced the ability of rangelands to provide for human needs, and this problem could worsen as a consequence of climate change and increasing pressures of a rapidly growing human population.

Over recent decades, rangeland managers throughout the World have increasingly recognized the need to restore desirable native vegetation to compromised rangelands, but efforts in this regard have proven highly failure-prone. For example, in the Western U.S., as many as 95% of seeding efforts fail to restore desired vegetation in some rangeland systems. A concrete example from close to home helps illustrate why failed seeding efforts have potential to be devastating. The Bakken energy boom of North Dakota and Montana has created a network of infrastructure so vast that it can be seen from outer space, and associated rangeland disturbance from temporary road construction, pipelines and well pads is extensive. If efforts to seed desirable vegetation on these rangelands fail, there will be sustained, widespread losses to livestock agriculture and wildlife.

Fort Keogh has a long history of researching ways to repair damaged rangelands. In the early days, this research focused on identifying appropriate grazing practices. Newer work has evaluated seeded forages, prescribed fire and targeted grazing as means to increase rangeland productivity and manage invasive weeds. Given Fort Keogh's history, it is well-positioned to develop seeding-based methods for restoring rangelands heavily disturbed by energy extraction and related activities.

Fort Keogh recently completed a study geared toward establishing diverse, native rangeland plant communities capable of supporting live-

stock agriculture on former coal mining lands. This large-scale study of long-term plant community development has provided information relevant to a variety of imperiled rangeland ecosystems, from the Bakken in North Dakota to cheatgrass-infested Great Basin areas of Utah and Idaho. Coal mine reclamation begins with the use of heavy equipment to reconstruct the original topography and redeposit topsoil, and this is followed by seeding. The researchers compiled records from over 300 areas on nine mines in Montana and Wyoming indicating which species were seeded along with seed rates and other factors such as year of seeding, precipitation and soil handling practices. In addition to compiling these records, the researchers measured vegetation occurring on the areas. Once the vegetation and reclamation history data were in hand, the researchers searched for patterns indicating management practices that tended to promote successful rangeland restoration.

An important finding from the studies pertained to the species of grasses sown. In particular, when western wheatgrass, thickspike wheatgrass, slender wheatgrass, and/or green needlegrass were included in the seed mix, weedy annual species, such as cheatgrass, Japanese brome and mustards, were kept in check. The chances these weedy annual species would dominate areas and lead to seeding failure were much lower when at least one of these competitive perennial grasses was included in the seed mix.

Another finding involved the exotic perennial crested wheatgrass. In areas where this grass grows, few other plant species occur, so crested wheatgrass prevents development of native rangeland plant communities with a high diversity of plant species.

USDA-ARS Rangeland Ecologist Matt Rinella assessing shrubs as part of research focused on restoring these important plants to degraded rangelands (Photo by Sue Bellows).

Improved Methods for Restoring Disturbed Rangelands (cont.)

Additionally, crested wheatgrass is considered to be a poor forage species compared to many of our native grasses. The study revealed that a certain soil handling practice can encourage crested wheatgrass invasion. Specifically, moving topsoil directly from areas about to be mined to areas being restored introduced crested wheatgrass seeds near the soil surface where they could readily germinate and grow. This is in contrast to topsoil being stored in large piles for long periods prior to being deposited–When this was done crested wheatgrass was much less of a problem because the seeds became buried deep in the soil.

Other key findings relate to increasing establishment of sagebrush and other desirable shrubs. Shrubs provide critical food and habitat for wildlife in the northern Great Plains and are a key source of livestock forage in some rangeland systems. Sowing high shrub seed rates did not greatly increase shrub abundances. Instead, reducing grass seed rates was the best way to encourage shrubs, because high grass seed rates led to intense grass competition that prevented shrubs from establishing. Grass competition was such a strong factor limiting shrubs that shrubs actually established better when sown in droughty years because dry conditions prevented grasses from rapidly growing and outcompeting shrubs. Shrubs also did better in rockier areas, again because rocky areas tend to have lower grass competition. Over the long run, healthy grass stands developed equally well when grasses were sown at low versus high rates, so lowering grass seed rates benefits shrubs, lowers seeding costs and does not pose increased risks of seeding failure.

In other studies, Fort Keogh is directly investigating ways to restore rangelands impacted by pipeline installations and oilfield development. One study is investigating cover crops as a way to reduce soil erosion and improve soil health. Cover crops may prove beneficial for livestock production by providing temporary forage during native species establishment and building soil in areas where topsoil is limited, such as the Bakken oilfield. In another study, Fort Keogh researchers found narrow water pipelines reseeded with perennial grasses and annual oats can be successfully reclaimed without restricting livestock access. It remains unclear whether wider energy pipelines (at least 100' across) can also be grazed without harming newly seeded perennial grasses, but a pipeline soon to be installed through Fort Keogh will provide an opportunity to test this.

When Congress transferred Fort Keogh to USDA for the purpose of agricultural research in 1924, they could not have known major future challenges to livestock agriculture would include exotic plants, pipelines and energy extraction. It is a testament to their foresight that our leaders saw the need to devote resources to future agricultural challenges, without the remotest idea what those challenges would be. This same vision will be needed to cope with climate change and population growth while sustainably managing rangeland resources to meet human needs.

New Hires

Travis Helm is our new Administrative Assistant coming to us from serving in the Army for the last 17 years, most recently in Germany. Travis is a Miles City native who graduated from Custer County High School.

After almost two years without a technician, Dr. Tom Geary is pleased to have Abby Zezeski on board as the new Biolological LabTechnician in his department. Abby has a masters degree in Animal Science from Virginia Tech.

Retirement

After 25 years of service to Fort Keogh, Janice Clendenen, Administrative Clerk, retired May 31, 2015. A party was held May 1 at the Range Rider's Museum. Janice has moved on to become a full-time grandma.

October 11, 2015: Hoofin' it for Hunger fundraiser was held at Fort Keogh with 180 runners from all over.

October 2, 2015: Vicki Leesburg hosted the Ag Class from Idaho State University. She gave them an overview of Fort Keogh and then took them out to look at the Line 1 animals. There were 35 students.

September 30, 2015: Prairie County Range Tour: Exploring Fort Keogh. Presentation on Water Quality—Mark Petersen; Range Livestock Management—Richard Waterman; Drought and Rangeland—Lance Vermeire; Range Tour—Jennifer Muscha; Horse Barn Tour—Tom Geary.

April 27—May 1, 2015: School tours were held for the area 1st and 5th graders. We had about 400 students this year learn about agriculture and where their food comes from.

April 16, 2015: Richard Waterman taught the Ag Careers Class 2:00 to 3:15 pm at CCDHS, 36 students. Title: Break even price on back grounding steers and how to read a feed tag.

April 3, 2015: Lance Vermeire gave a talk "Managing purple threeawn with fire and nitrogen" at Sidney, Montana, for the 2015 Brown Bagger series.

March 18-20, 2015: Tom Geary traveled to Brazil and made three presentations. "Improving AI Pregnancy Rates in Cattle" to 70 Veterinarians and Industry reps; "Reproductive Management for Optimal Oocyte Development to Enhance Fertility" to 850 Veterinarians, Industry Reps & Producers; and "Reproductive Management for Optimal Uterine Preparedness for Pregnancy" to 750 Veterinarians, Industry Reps, & Producers.

March 16-17, 2015: Matt Rinella was invited by Cordero Rojo, Caballo, Eagle Butte, Wyodak, Buckskine, and Rawhide mines to talk about results of mine reclamation research. Between 1 and 7 people attended each presentation.

March 10, 2015: Andy Roberts presented "Brazilian Beef Production Systems" and "Low Input cost vs Med/High Input Cost Heifer Development" at the Heart River Ranch and Open A Angus customer appreciation banquet, Belfield, ND (80 attendees).

March 5, 2015: Andy Roberts presented "Nutritional considerations for developing heifers on rangelands" to the Petroleum County Conservation District, NRCS livestock producer workshop, Winnett, MT (25 producers).

February 25, 2015: Andy Roberts gave a talk titled "Beef cattle research at Fort Keogh" to Miles Community College students, Fort Keogh, MT (2 Students).

February 20, 2014: Megan Van Emon gave a talk "Post-Calving Nutrition" at Sidney, Montana, for the NPARL 2015 Brown Baggers series.

February 11, 2015: Vicki Leesburg presented 'The impact of the Line 1 Herefords on the Global Population" and Andy Roberts presented "Lifetime production efficiency" at the Southeast Montana Cattle Producer's Tour held at Fort Keogh by the MSU Extension Service (45 attendees).

February 5, 2015: Tom Geary presented "Limitations to pregnancy success in beef cattle" at the South Dakota Veterinary Meetings, Deadwood, SD. (130 Veterinarians present).

February 5, 2015: Andy Roberts gave a talk titled "Beef production in Brazil" at the ABS customer appreciation dinner, Baker, MT (30 attendees).

January 31 – Feb 6, 2015: Jennifer Muscha and Mark Petersen attended the Society for Range Management annual meetings in Sacramento, CA. Jennifer presented a poster titled "Revegetation after Russian-Olive (Elaeagnus angustifolia L.) removal along the Yellowstone River in eastern Montana." Mark Petersen's poster was titled "Does type of winter heifer management influence distance traveled, time spent resting and average speed when grazing spring and summer native range?"

January 13, 2015: Andy Roberts gave a talk titled "Heifer Development Strategies" at the 2015 South West Beef Symposium. Amarillo, TX (154 attendees).

December 3, 2014: Tom Geary presented "Limitations to Pregnancy Success in Beef Cattle" at the 2014 Warnick Lecture, University of Florida, and Gainesville, Florida to UFL Faculty & Graduate Students (35 attendees).

November 18-19, 2014: Tom Geary presented "Reproduction and Pregnancy Establishment in Beef Cattle" to the High School Vocational Agriculture Class in Seeley Lake, MT. (25 participants).

November 30—December 12, 2015: Andy Roberts traveled to Brazil to discuss heifer development with producers and industry representatives.

November 4, 2014: Andy Roberts presented "Beef Cow Longevity and Efficiency with Limited Feeding Management" at the Missouri Forage and Grassland Council/GLCI 2014 Annual Conference. Lake Ozark, MO (~ 100 attendees).

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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

Greetings all from Fort Keogh!

I hope everyone has had a productive year in 2015 and have been enjoying this nice fall weather. We have had a pretty good year at the Fort and I would like to share with you some of our stats from the past 12-month period.

- Overall cattle bred up over 96% last year.
  - ◊ This year was closer to 88% and with the dry summer we have had, it could have been of much worse.
- Calf death loss this spring was just over 1% which is much improved from past years.
- Had a nice pen of Black Angus bulls downtown for the Beef Breeders show in February. This is the 4th year we have participated in the show.
- Bull sale buyer numbers were down this year.
  - ◊ Sold 24 mostly two-year-old Line 1 bulls which averaged $3,500/hd. Had 7 no sales that were sold private treaty for $2,500.
  - ◊ Sold 24 yearling Black Angus bulls private treaty for $3,000 a head.
  - ◊ Sold 10 yearling CGC bulls private treaty for $2,500 a head.
  - ◊ Sold 225 steers on Superior from the Phys herd that were on top of the market in the November sale. One load at 625 lbs and one load at 575 lbs.

Our ag operation made just under $1.6 million in fiscal year 2014 and over $1.3 million so far in fiscal year 2015!

- Crop yields in 2015 on 3 cuttings of alfalfa were 6.8 tons/ac, winter wheat, field W2 made 97 bushels/ac, fields 9 D & E had significant hail but still made 45 bu/ac. Silage production was down this year at around 22 tons/ac. We were not happy with the new variety that took the place of the corn we have planted out here for years and had great success with.
  - ◊ Have opted away from planting anymore new seeding straight alfalfa. We have decided to go to a Sainfoin, Orchard grass, and Meadow Brome mixture which is much better suited for range cows as it is more palatable and way less expensive fertilizer wise. It causes no bloat and cattle get more out of mix grass hay than straight alfalfa.
- New machinery- with good cattle prices it's given us a chance to update our infrastructure quite a bit with the following:
  - ◊ 2 brand new F350's with Krogman bale beds for feeding.
  - ◊ Last fall we bought a new 3 row corn chopper and head.
  - ◊ Bought a new 569 JD baler with netwrap.
  - ◊ This fall purchased a McCormick X6.430 tractor and loader.
  - ◊ Upgraded our pit loader to a 25 year newer model.
  - ◊ Got a brand new John Deere road grader.
- We combined our cow crew last fall into one,7-man cowboy crew with one supervisor. This has really made cattle working much more efficient and changed the "us and them" to "ours." The guys are really liking it and we get more done in a day. Efficiency has gone way up. We also were able to get them a new log cabin office building from Pink Hills Cabins.

As always, if there is anything we can help you producers with here at the Fort or if you ever have any questions, please don't hesitate to contact me directly at 406-853-2635. Thanks for reading and have a great fall and holiday season!!!

Ranch Manager
Brad A. Eik

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Hoofin' It for Hunger 2015

The 2015 Hoofin' It for Hunger Fun Run which includes a 1/2 marathon, 10K, 5K, and 1 & 2 Mile run was held October 11, 2015, at Fort Keogh. The race is sponsored by Fort Keogh Employees, Farm Bureau Young Farmers, and the Montana Food Bank. Due to wonderful sponsors, volunteers, and racers that came from all over, it was a very successful day!

After all was said and done, over $6,000 was raised for the Montana Food Bank and 300 pounds of food was donated by the 1 & 2 Mile runners for the local food bank! There were 170 runners in the 1/2 marathon, 10K and 5K. It was a very windy day but that did not deter the participants. Peter Taylor was the Fastest Farmer!