

Fort Keogh Researcher



In cooperation with



Introduction

Dr. Mark Petersen, Research Leader

Greetings from Fort Keogh. I hope this newsletter finds you coping with the drought and transitioning to a winter mind set. We have been very fortunate during this year's fire season. A number of our friends south of Miles City experienced multiple losses due to the wildfires. We had a small lightning caused fire that was put out by BLM smoke jumpers, camped at the Fair Grounds in Miles City. Everyone who works here was on alert after that. The rain we received in

October (nearly 1") was appreciated due to the reduction in wildfire potential. A small group of Fort Keogh scientists, Lance Vermeire, Andy Roberts, and I, were invited by the Montana Stockgrowers to observe and listen to the testimony of ranchers affected by the fires. In response to that tour, we have joined with the Northern Great Plains Section of the Society for Range Management to sponsor a day and a half conference entitled "Recovering from

Wildfire." We have a nice array of speakers; ranchers that experienced losses from this year's fire, ranchers who have experienced fire in the last 10 years, land management agency personnel to discuss decision processes and fire damage reduction practices, and researchers to present scientific data concerning what is known about fire aftermath and recovery. We hope you were able to attend December 5th and 6th at the Sleep Inn in Miles

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Hoofin' it for Hunger Fun Run

By Diona Austill, Program Support Assistant

The first annual Hoofin' It For Hunger 10K, 5K, and 1 mile run was held at the Fort Keogh Livestock and Range Research Laboratory on Sunday, October 14, 2012. Fort Keogh Employees, Farm Bureau Young Farmers and Ranchers, and the Montana Food Bank Network organized the event and raised over \$2600 for the Montana Food Bank Network which supplies food to all the food banks in Montana. Canned goods were also collected and taken to the local food bank. About 100 people participated in this first event, 24 of which ran the 10K

route which weaved around the river and through the farm fields. Prizes and awards were given to the top 2 places in each age category. It was a beautiful day

for a run in Montana! For pictures and information There is a Facebook page (www.facebook.com/hoofinitforhungermt).



Introduction (continued)

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City. In spite of the fires and dry weather we had a very busy research field season following protocols and collecting data. We did not have the normal number of students assisting in our research this summer due to budget reductions. Salaries for student interns are a discretionary portion of our budget that we did not want to reduce but really had no choice.

We had a number of our researchers in the beef cattle group participate in a scientific meetings this summer. Tom Geary, Andy Roberts and Travis Mulliniks (a PhD student here from New Mexico) all participated in invited symposium papers. There were also a number of abstracts reporting on-going studies presented at these meetings. We are also pleased that Tom Geary and colleagues were awarded a National Institutes of Health grant to investigate the causes of early pregnancy losses that occur within the first 27 days of conception. Matt Rinella in our Range group has been awarded grant funding from the Bureau of Mines to investigate the factors that lead to coal mine reclamation success to return the land to grazing. The findings of these studies should have broad application to many types of disturbances including drought.

This summer Rachel Endecott, MSU Beef Extension Specialist, relocated to the Bozeman Campus filling in behind John Patterson's retirement. This was a great loss to Fort Keogh and we are working with MSU to figure out how to replace this position.

We have nearly completed the process

of defining and gaining approval for our research goals for the next 5 years. The beef cattle research program plans are complete and the range ecology research plans will soon be approved. The process used to provide oversight for our planned research includes a critical review by a scientific panel for relevance to the ARS mission, appropriateness of the research for our location, and identification of important problems that will lead to impactful results. To facilitate identification of research problems we solicited input from our customer focus group in September of 2011, and then convened 2 conference calls with them to review objectives that were strongly influenced by their input. We then reviewed both of the projects at our September 2012 meeting. The overall goal of our continuing research effort is to reveal new knowledge leading to better understanding, development of new technologies and practices to enhance rangeland stability, and to promote efficiency of beef cattle production.

It seems there is always some sort of development on the Fort to report in every newsletter. This month we had a visit by a consultant affiliated with an engineering firm working with the Tongue River Railroad to identify and survey the route. In addition we had the scoping team from the Surface Transportation Board here to gather information. The railroad is proposed to come through our east country parallel to the Tongue River. The Surface Transportation Board is working on the Environment Impact Statement. We should know in a couple of years the route the railroad plans to take on the Fort.

We are changing how we sell excess

Line 1 cattle. In October we held, in our meeting room, an in-person and telephonic auction for Line 1 open cows. Over half of our buyers participated remotely and the rest were at the Fort. We will very likely sell our excess bulls in a special sale on a regular sale day (Tuesday at our local auction barn-Miles City Livestock Commission in cooperation with the online sale auctioneers Frontier Livestock). Buyers will have the opportunity to bid in person, on the phone or through the internet. The sale will most likely be 1 week later than our normal time in years past. The last bit of news is that we are waiting for approval to begin the search for a new Quantitative Geneticist. We will be advertising for an entry level or early career scientist.

This year our employee club teamed up to gather donations for Relay for Life to support cancer research. The club organized a luncheon here at the Fort that was a fun time and the food was delicious. Overall we were able to give the Cancer Society \$1,400. In another community event, we partnered with the Carter /Fallon County Farm Bureau to sponsor a Fun Run, 5K, and 10K runs as a fundraiser for the Montana Food Network. Our employees laid out a beautiful route that the runners raved about. It was also enjoyable to work with our Farm Bureau friends. The race was called "Hoofin' it for Hunger." Right now we are planning to hold it again next year so start training so you can join us.

In closing, we are working for you so please stop in and see us or contact us. We want to share with you our work and hear about the problems and ideas you are thinking about.

Fire Research

by Lance Vermeire,
Rangeland Ecologist



Fort Keogh is conducting a continuing and systematic assessment of fire effects in the Northern Great Plains. Efforts have included fire in all seasons of the year, but focused on summer fire because that is when most fires occur in our region. Precipitation is always the primary driver, so we have examined fire effects on the plant, soil and animal communities across a broad range of weather conditions.

Our work has clearly indicated the dominant perennial native grasses are resistant to summer fire. Even under extreme conditions of the second driest and the wettest springs on record, productivity has equaled or exceeded that of non-burned sites the first growing season after summer fire. Cool-season perennial grasses have increased 40-100% by the second post-fire season. Total productivity has been similar between burned and non-burned sites because gains in perennial grasses have been offset by reductions in annual grasses and forbs. The annual grasses

and forbs reduced by fire have typically been non-native weeds. Fire has also reduced prickly pear cactus and Wyoming big sagebrush is widely known to be fire-sensitive. Silver sagebrush and fringed sage, on the other hand, sprout and recover quickly following fire.

Post-fire grazing management has been a major focus because of the lack of data on the subject and the high costs associated with deferment or complete rest from grazing, which are often recommended after fire. We first examined grazing to different levels of utilization in June the first year after summer fire. Productivity was the same for non-burned sites that were not grazed and for burned sites that were not grazed or were grazed to 17, 34, or 50% removal of biomass. We also confirmed that animal weight gain decreases when grazing is deferred until August compared to starting in mid-May or late June. Deferment to late summer showed no benefits to the plant community in terms of productivity or spe-

cies composition, even at 60-76% utilization.

We also examined plant response to heat dosage to facilitate control of unwanted species with fire and predict fire effects on desirable species. Fuel load (amount of combustible material) is a primary predictor of heat released by fire. This work has included fire effects on grasshoppers, weed seeds, and mature plants. We selectively controlled pest grasshopper species in the field with fire and verified in laboratory experiments that the controlling factor was heat dosage and depth that grasshopper eggs were buried in the soil. White-whiskered grasshoppers, one of the top pests species were consistently reduced about 85% in the field and lab.

Concern about weed infestations following fire prompted us to test fire effects on weed seeds that were deposited on the soil surface. Fuel load explained 98% of the variation in heat

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dosage and emergence of the weeds decreased with increasing fuel load. Japanese brome, leafy spurge, spotted knapweed and Russian knapweed were reduced 79-88% by fire with as little as 890 lb/ac of fuel. Results indicate fire is unlikely to eradicate weeds, but may cause abrupt changes in seed availability and facilitate control with other methods. Similar research indicated fire reduced prickly pear cactus 42-57% with fuel loads common to the region and 83% of surviving plants experienced insect or browsing damage.

Native perennial grasses are considerably more resistant to fire. Testing fuel loads greater than 8000 lb/ac, well above those commonly encountered on rangeland, we observed limited mortality. Mortality was less than 1% for western wheatgrass and threadleaf sedge, 16% for blue grama, and 14% for needle-and-thread. Mortality increased with increasing fuel load and heat, but extreme levels (fuel loads > 7100 lb/ac) for each were required to reach 0.5 probabilities. Mortality from direct fire effects is not likely with fire conditions common to the tested species.

We are also examining fire seasonality and return interval effects on the plant community, nutrient cycling, and grass bud production. We look forward to sharing results of this work as well and as always, appreciate your input.

Lance Vermeire is a Rangeland Ecologist and has worked at Fort Keogh for the past 10 years. Research conducted by Dr. Vermeire has focused on the ecology of rangeland weeds, rangeland monitoring techniques, and the ecological effects of prescribed fire on soil, plants, and animals.

Early weaning could improve heifer and steer performance

By **Sandra Avant / USDA-ARS**

When environmental conditions such as drought jeopardize cattle production by reducing calf growth and weaning weights and decreasing cow body condition and body weight, early-weaning management strategies may offer some relief.

Calf weight is critical to the economic viability of a ranch, and reduced cow weight and body condition may negatively impact future production. Animal health and well-being may also be affected in stressful situations created by drought conditions. Agricultural Research Service (ARS) scientists at our Fort Keogh Livestock and Range Research Laboratory (LARRL) in Miles City, Mont., have found that early weaning of spring-born calves improves body weight gain and condition of the cow herd.

Animal scientist Richard Waterman and his colleagues at LARRL, along with researchers at Montana State University and the American Simmental Association in Bozeman, Mont., evaluated the early weaning of beef calves and the impact it has on cow, heifer (young female cow) and steer performance.

Scientists compared calves weaned at a traditional age of 215 days to calves weaned early at 80 days of age at two locations—LARRL and a commercial ranch at Judith Gap, Mont. Cows that had their calves removed at 80 days weighed more and were in better body condition going into winter, reducing the amount of harvested feedstuffs required to over winter these cows.

Under some circumstances, early weaning might also increase the likelihood of the cow becoming pregnant earlier in the breeding season, according to Waterman. Heifers that were early weaned reached a reproductive age sooner. Also, early weaning did not impair a heifer's opportunity to be retained in the herd as a replacement female.

An evaluation of steer calves for body weight gain, feedlot performance and carcass characteristics supported the concept that early-weaned steers reach maturity sooner during the finishing phase, according to Waterman.

However, the research also revealed that if early-weaned steers are not identified prior to entering the feed yard or finishing phase and subsequently harvested at a similar time as traditionally weaned calves of similar genetics and age, early-weaned steer carcasses may be too fat and receive less desirable U.S. Department of Agriculture (USDA) yield grades. Yet, if early-weaned steers are identified prior to entering the feed yard and harvested at an early age, market premiums can be earned for those carcasses.

ARS is the chief intramural scientific research agency of USDA. These research findings, which were published in *Livestock Science*, support the USDA priority of promoting international food security.

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Fort Keogh Outreach Activities

October 23, 2012 – Morgan Russell, NDSU Graduate Student of Lance Vermeire, Ecologist, spoke to the Ag class from MCC and provided them a tour of the facilities. Her talk was titled 'Fire Season and Fire Return Interval on Bud Banks in the Northern Great Plains.'

October 18, 2012 – Lindsey Cook, MAES State Admin. Assistant, Hosted the Leadership Miles City group for the day. The group learns about how the different businesses and government agencies in Miles City work.

September 27, 2012 - - Tom Geary attended the Genex Large Herd Summit and presented a talk on New developments in synchronization.

August 28-29, 2012 – Ash Creek Listening Tour – Lance Vermeire, Ecologist, Andy Roberts, Animal Physiologist, and Mark Petersen, Animal Nutritionist, toured the burned areas of Southeastern Montana with Watty Taylor from our Customer Focus Group to talk to area ranchers and find out their needs and challenges as they try to recuperate from their places being burned.

August 13-14, 2012 – Tom Geary attended the Society for the Study of Reproduction (SSR), Penn State, State College, PA.

July 15-19, 2012 - American Society of Animal Science Summer Meeting held in Phoenix, AZ. Presentations were made by: Whisper Kelly (Bio. Tech. Richard Waterman) Comparison of different supplemental cobalt forms on fiber digestion and cobalamin levels; Travis Mulliniks (NMSU PhD Student Mark Petersen) Pre-breeding β -hydroxybutyrate concentration influences conception date in young postpartum range beef cows;

Rachel Endecott (MSU Beef Cattle Extension Specialist) Enterprise level implications of heifer development; Tom Geary (Research Physiologist) Influence of follicle characteristics at ovulation on early embryo survival, and Influence of follicle characteristics at ovulation on early embryo survival; Crystal Roberts (MS student Tom Geary) Effects of preovulatory estradiol concentration on embryo survival and pregnancy establishment in beef cows; Mark Petersen (Ruminant Nutritionist) Comparison of chelated versus inorganic trace minerals on rate and efficiency of gain and pregnancy rates in beef heifers, and The effect of dietary levels of copper and zinc on rate and efficiency of growth by rainbow trout. Poster Presentations included: Travis Mulliniks - Assessment of serum IGF-1 and β -hydroxybutyrate concentrations on reproductive performance prior to calving and breeding in young beef cows grazing native range, and Metabolizable protein supply alters pregnancy and subsequent retention rate during heifer development while grazing dormant winter forage; Rachel Endecott - Postweaning feed restriction effects on steer feedlot performance and carcass characteristics.

June 26-28, 2012 - Matt Rinella, instructor at the North American Invasive Plant Ecology and Management Short Course (NAIPSC) in North Platte, NE.

June 28, 2012 – Froid Field Day – Mark Petersen gave a talk on the Russian Olive Removal Project.

June 21, 2012 – Ag Lenders Range School Tour – about 35 participants toured the Russian Olive Research Plots with Mark Petersen & Jennifer Muscha, toured the burn plots at Upper Cottonwood with Lance Vermeire, toured the individual barn and

GrowSafe pens and discussed the CGC project with Andy Roberts and Rachel Endecott.

June 18, 2012 – Prairie County Range Tour, Terry, Montana. In the afternoon, there was a tour of the Purple Three-Awn site hosted by Lance Vermeire, Ecologist, Dustin Strong, Nic Duffet and Morgan Russell (students), and Marnie Rout, Post-Doc.

June 11, 2012 – Jennifer Muscha attended the Montana Range Days in Dillon, Montana, and participated as an instructor.

June 8-9 – Andy Roberts gave a talk about the plans for the new animal project on the Ranch Tour at the Montana Stockgrowers annual summer meetings in Great Falls. Mark Petersen and Brad Eik also attended the two-day meeting.

May 23, 2012 – Fort Keogh on the Road – Choteau, MT, – Mark Petersen (Principles of Rangeland Supplementation, and Variability in Stock Water Quality and Winter Water Temperature Effects), Andy Roberts (Heifer Development and Lifetime Production Efficiency), and Travis Mulliniks (Reproductive Success from Nutritional Assessments of Range Cows). The Rangeland, Livestock, and Nutrition Seminar was hosted by the Teton County Conservation District.

April 30, 2012 - Dickinson State University came to Fort Keogh for a tour. There were 16 students from the Agriculture class.

April 24-26, 2012- Fort Keogh hosted their annual school tours for 1st and 5th graders. Around 400 students attended the tours along with teachers and parents.

Fort Keogh Current Publications

Anderson, J., Vermeire, L.T., Adler, P.B. 2011. Fourteen years of mapped, permanent quadrats in a northern mixed prairie, USA. *Ecology*. <http://dx.doi.org/10.1890/11-0193.1>.

Endecott, R.L., Funston, R.L., Mulliniks, J.T., Roberts, A.J. 2012. Implications of beef heifer development systems and lifetime productivity. *Journal of Animal Science* jas.2012-5704.

James, J.J., Rinella, M.J., Svejcar, A.J. 2012. Grass seedling demography and sage steppe restoration. *Rangeland Ecology and Management*. 65(4):409-417.

Mulliniks, J.T., Sawyer, J.E., Mathis, C.P., Cox, S.H., Petersen, M.K. 2012. Winter protein management during late gestation alters range cow and steer progeny performance. *Journal of Animal Science Online* doi: 10.2527/jas.2012-5535.

Mulliniks, J.T., Cox, S.H., Kemp, M.E., Endecott, R.L., Waterman, R.C., Van Leeuwen, D.M., Petersen, M.K. 2012. Relationship between body condition score at calving and reproductive performance in young postpartum cows grazing native range. *Journal of Animal Science* 90:2811-2817.

Reinhart, K.O., Wilson, G.W., Rinella, M.J. 2012. Predicting plant responses to mycorrhizal: integrating evolutionary history and plant traits. *Ecology Letters* 15:689-695.

Rinella, M.J., Mangold, J.M., Espeland, E.K., Sheley, R.L., Jacobs, J. 2012. Long-term population dynamics of seeded plants in invaded

grasslands. *Ecological Applications* 22(4):1320-1329.

Rinella, D.J., Wipfli, M.S., Sticker, G.A., Heintz, R.A., Rinella, M.J. 2012. Salmon returns and consumer fitness: growth and energy storage in stream-dwelling salmonids increases with spawning salmon abundance. *Canadian Journal of Fisheries and Aquatic Sciences* 69:73-84.

Rinella, M.J., Dean, R., Vavra, M., Parks, C.G. 2012. Vegetation responses to supplemental winter feeding of elk. *Western North American Naturalist* 72:78-83.

Roberts, A.J., Wallace, L.E., Harbac, M., Paterson, J.A. 2012. Retention and readability of radio frequency identification transponders in beef cows over a five year period. *Professional Animal Scientist* 28:221-226.

Waterman, R.C., Ujzadowski, V.L., Petersen, M.K. 2012. Effects of rumen-protected methionine on plasma amino acid concentrations during a period of weight loss for late gestating beef heifers. *Amino Acids* 43:2165-2177.

Waterman, R.C., Geary, T.W., Paterson, J.A., Lipsey, R.J. 2012. Early weaning in Northern Great Plains beef cattle production systems: I. Performance and reproductive response in range beef cows. *Livestock Science* 148:26-35.

Waterman, R.C., Geary, T.W., Paterson, J.A., Lipsey, R.J. 2012. Early weaning in Northern Great Plains beef cattle production systems: II. Development of re-

placement heifers weaned at 80 or 215 d of age. *Livestock Science* 148:36-45.

Waterman, R.C., Geary, T.W., Paterson, J.A., Lipsey, R.J., Shafer, W., Berger, L.L., Faulkner, D.B., Homm, J.W. 2012. Early weaning in Northern Great Plains beef cattle production systems: III. Steer weaning, finishing and carcass characteristics. *Livestock Science*. (online first) <http://dx.doi.org/10.1016/j.livsci.2012.06.024>.

Wesley, R.L., Cibils, A.F., Mulliniks, J.T., Pollak, E.R., Petersen, M.K., Fredrickson, E.L. 2012. An assessment of behavioral syndromes in rangeland-raised beef cattle. *Applied Animal Behaviour Science* 139(3-4):183-194.

Retirement



Kenny Strobel

After 40 years of service to the Fort Keogh Livestock and Range Research Station on the Montana Agricultural Research Station side, Kenny Strobel, Outside Maintenance Supervisor, decided to retire.

Kenny has a realm of historic knowledge about the research station and will be missed by everyone. He is off to play with the grandkids and do some traveling. He was our chief cook on barbecues and employees wonder what will happen to his famed apron.

Assistant's Corner

By Brad Eik



Greetings and Happy Holidays from the crews at Fort Keogh! Here is what we have been busy doing since our last newsletter. Breeding: One major change to our breeding program was moving the Line 1 herd to a different set of pastures we felt would be more conducive to breeding. We moved them to smaller pastures where they were all one-shot AI'd. Two clean-up bulls were placed in each pasture as opposed to single sire breeding herds used in the past. The physiology cattle also went through an AI protocol, the same one as last year. We moved the Line 1 and CGC first calvers out of the big herd and put them under our pivot to try to increase breed up by keeping fresh pasture in front of them to help with flush. All other cow herds were bull bred only.

Drought: It has been a trying summer for us just like for everyone else with the lack of rainfall. We were fortunate to have a lot of old grass to get the cows through but we have provided a 20% protein tub to herds that it wouldn't affect the research since post calving all summer. We were fortunate we have only had one fire and it only burned about 100 acres. We also developed some water this summer adding additional tanks and a new watering site in a pasture where we had a big number of cows. We have exhausted some of our winter feeding pastures trying to keep the cows happy. We will have to rely on hay and cake more than in years past. Another step we took to save some grass and get our cows in a little better condition going into winter was that we early weaned about 650 calves 2 months early and all other calves weaning dates were moved up at least 2 weeks if not a little more. We are in the process of putting a drought plan in place for next year should the drought continue. One option with a herd reduc-

tion of 30% on all herds and another with 50% reduction.

Crop Production: It has actually been a fantastic year for crop production considering the spring we had. It was very difficult to get the corn to emerge and in June, I never would of believed we would have yielded about 27 ton per acre on the silage. We had our corn silage custom chopped this year for the first time and it cost \$8.50/ton. With our 3 row chopper it usually takes around 14-16 days, depending on breakdowns to get our silage in the pit. This year in 2 days it was all in with 4 tractors packing. It was all they could do to keep up. Our farm manager reported this was the best hay production year since 1988, at 6.8 tons to the acre. Irrigation makes all the difference. We fought with some late season weed problems in the grain barley. A lot of the crop was cut for hay and we had to aerial spray the remainder. The combiner still had troubles and yield was well below average as he shelled a lot out before it got into the combine.

Fly Control Study: This is the second year of using 2 fly control methods; mineral with IGR and Bayer brand fly tags. We got the mineral cattle started with the IGR in April this year and that seemed to give better relief to the cows than our May start last year. We also used the copper colored Bayer tags in 2012 which seemed to give us some control but didn't seem to give us the length of control we got from the slate colored tags in the previous summer. On the whole, the flies were a much bigger problem this year. We are finding that both of these options reduced flies on our cows. However we appreciated the easy implementation of the mineral program when cattle weren't close to a working facility. Most importantly, we are doing something to give the cattle relief from the

flies rather than just letting them fight the flies.

Preg-checking: We haven't tested all herds yet but our breed up on the herds we have checked so far has been low this year. The Line 1's were around 12% better than last year but still not where we had hoped at around 80%. We again struggled getting our first calvers to rebreed. We don't have the other herd numbers yet but should before the next newsletter.

Cattle Sales: We've tried something new with a group of about 300 steer calves that have been on feed for around 60 days. We are going to try to market this set of steers through Superior Productions instead of taking them to the sale barn here in Miles City. We have been a little disappointed with the price we have gotten compared to similar calves on the same day at the sale barn. We want to see what will happen when we have a much larger pool of buyers.

This is kind of the quick and dirty of our year long operations at the Fort. If you ever have any further questions about things or if I can help you in any way please feel free to contact me anytime or stop in the office. I would be happy to have a conversation with you. Thanks for your time.

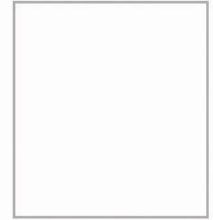
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Fort Keogh

Invites the community to our

Holiday Open House!

December 7, 2012, 2:30 to 4:30 pm

Join us for Cookies, Drinks
and Tours!

Tours will start each half hour until 4:00.

