
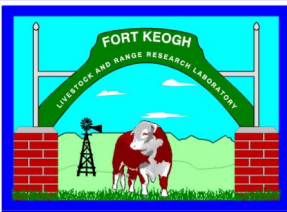



FORT KEOGH RESEARCHER

L I V E S T O C K A N D R A N G E R E S E A R C H L A B O R A T O R Y

In cooperation with



Introduction, by Mark Petersen, Research Leader



Hello from the Cowboys, Staff, Students and Scientists at Fort Keogh!

We have had an active six months since our last newsletter. First of all the weather has been favorable for growing both grass and calves. Not only were we above the 30-year summer precipitation average but the distribution was evenly spaced too. Fall has been very mild. We did not experience our first freeze until the end of October. Along with the good rain we had no wild fires.

With this weather came heavier calves and good sales. We are striving to add value to our cattle through better marketing strategies.

Other good news includes the modernization of our office wing which we moved into the second week of September. During construction we moved our non-scientific staff and some technicians into group offices which were very cozy for everyone but worth the inconvenience. During the

demolition, we were surprised to learn there had been no insulation in the walls or ceiling for the last 40 years. Not only did we improve the infrastructure and conditions of the office wing, but we improved functional spaces (conference room, spaces for visitors and students, moved Montana State University and USDA employees offices closer to improve coordination, employee lunch room, etc.). We were also fortunate to advance our telephone, computer, and communication technologies. We would like to invite you to stop by our headquarters on the afternoon of December 3rd for an Open House. We will have our office wing open for tours from 3:00 to 6:00 p.m. You will have an opportunity to look over the remodeling, munch on homemade cookies, and visit with your friends and employees at Fort Keogh. We hope to see you here on the 3rd.

As if the modernization project was not enough, the week after we moved into our offices, we hosted a four-day "On-site Expert Panel Review" of our programs and operations. The last time we con-

ducted a review was 2001. There have been many changes since 2001 (especially personnel). We prepared for the review for nearly a year. Our panel was made up of 7 researchers and 1 rancher. In addition, 13 members of our Fort Keogh Focus Group along with 5 Area Office leaders from Fort Collins and 2 National Program Leaders from Washington, DC, participated in the review. We are anticipating receiving the panel's assessment in a report soon. We plan to capitalize on the panel's insight to enhance the impact and relevance of Fort Keogh research.

Lance Vermeire and Richard Waterman completed a 4-year experiment this summer. Basically they evaluated the impact of managed patch fires in pastures that burned in different years on vegetation response, yearling gain, grazed diet quality, and grazing behavior. We

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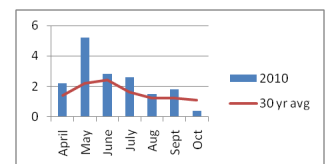


Figure 1. Monthly rainfall at Fort Keogh in summer 2010.

INTRODUCTION, CONTINUED

are looking forward to their conclusions and recommendations regarding the timing of fire on vegetation vitality and yearling utilization of pasture forage. In addition to the completion of this study, we had a number of students working here last summer. They ranged from high school students to PhD candidates. We

encourage young people and college students to look into a summer job or internship at Fort Keogh in 2011.

As you read through the Fort Keogh Researcher, you will find an interesting topical article written by Kurt Reinhart. Some of his research investigates the relationships among

soil microbes and native plants and is only one of a few researchers in the USA that conducts research in semi arid rangeland soil ecology. He has some very interesting ideas that in the future may provide new tools to improve native plant vigor. So please enjoy his article on page 2. Brad Eik, our operations man-

ager, has a column describing current herd management outcomes and direction. You will also find a list of Outreach Activities we participated in during the last six months and our most recent publications.

Hope you have a good winter.



GETTING THE DIRT ON DROUGHT

BY KURT REINHART, ECOLOGIST

Although our semiarid grasslands are resilient to periodic droughts, droughts affect forage production and quality. Production is sensitive to fluctuations in the timing and amounts of precipitation. Though precipitation is generally emphasized because it is easy to measure, our grasses really only care about plant available moisture. In other words, how does a rain event affect the moisture that their roots can access that will enable growth? A better understanding of how climate, soil properties, and plants interact to produce forage of varying quantities and qualities is important for the optimal management of animal production systems and the sustainable management of rangelands.

One important aspect of "plant available moisture" is soil health. Soils develop over long periods and depend on geology, climate, and life (mostly plants & microbes). Producers are unlikely to fundamentally change the basic soil structure of their rangelands be-

cause it is impractical to alter clay, silt, or sand content. Some practices specific to agriculture have noticeable effects on measures of soil health. For example, no-till farming helps conserve water and reduce erosion while accumulating soil organic carbon and building healthy soil microbial communities.

Soils in much of Montana, especially the eastern portion, are described as Entisols which basically means they are not well developed and have low levels of organic matter. In contrast, soils from much more productive grasslands in Kansas are well developed and have 3 to 4 times more organic matter. In natural systems like rangelands, soil organic matter is possibly the most important soil property affecting plant growth. In our part of the world, soil organic matter is low but still important because it affects our soil's capacity to take up (infiltration) and retain moisture. Water infiltration refers to the movement of water from the surface into the soil

and affects how much precipitation makes it into our soils versus ends up in our rivers. Basically, the presence of soil organic matter corresponds with efficient capture and storage of plant available moisture. Soil organic matter is also positively related to nutrient cycling and nutrient retention (i.e., less leaching) but that's another story.

A good way to envision healthy soils is to think about your kitchen sponge and the pore spaces that enable it to hold water. Next time you're out walking around on some rangelands take a closer look at the soil surface. You might be surprised by the abundance of insect (cricket, ant, etc.) and rodent burrows. Active burrows though probably don't contribute much to infiltration because the animals engineer them to limit water entry. Once they are abandoned, they are more likely to at least temporarily affect water infiltration.

Though these large openings in soil are important, the main passage of water

into the soil occurs through numerous small pore spaces. Remember your kitchen sponge. The holes in your sponge represent a wide range of sizes with most being very small. The same is true of your rangeland soils. The main engineers producing these smaller openings are plant roots, soil invertebrates (insects, etc.), and soil microbes, especially soil fungi. Earthworms are very important to soil health and water infiltration in gardens and wetter portions of the country but are not affecting our semiarid rangelands. Prolific small pore spaces are important because they enable most infiltration of water.

In semiarid grasslands, most of a plant's "production" is actually below-ground in the form of root growth. This and limited incorporation of leaf litter into the soil (remember no earthworms to churn the leaf litter into the soil) make roots a primary source of organic matter into our soils. Roots (alive or dead) also act as conduits enabling

water to infiltrate into the soil. Roots are constantly undergoing turnover as they grow, die, decompose, and/or are consumed by animals (e.g., nematodes). This turnover is a critical process occurring beneath our feet that helps add organic matter to the soil, produce small scale channels and air spaces, and build healthy soils.

Another important characteristic of soil that helps maintain small channels is known as water stable soil aggregates (defined as many soil particles held together in a single mass that is stable to the action of water). Though small in size (less than 1/8 of an inch), they contribute to soil structure and nutrient cycling. Think of what happens when your sponge gets really dry. It shrinks and the pore sizes become really small limiting how quickly it will take up water the next time you need to use it. Water stable soil aggregates maintain the soil's pore structure during wet and dry cycles. They improve soil properties (aeration, water infiltration, and water holding capacity) that benefit plant growth. Scientists recently discovered a major factor contributing to how water stable aggregates are built.

In 1996, ARS scientist, Sara F. Wright, discovered a new soil protein referred to as glomalin. Glomalin is important because it appears to act as the glue holding parti-

cles of an aggregate together. Like any good glue, it is relatively strong and persistent when compared to other organic matter in the soil. This protein stabilizes the aggregates and helps them resist falling apart. This protein was only recently discovered because its physical properties make it difficult to separate from other organic matter. Since it is very durable, it accumulates in the soil and some estimate it makes up approximately 30% of organic carbon in soil. Because it has been found in nearly all soils, it is possibly the most abundant protein on our planet. Pretty amazing! Since living things produce proteins, you're probably wondering what produced all this protein and how can management be optimized to produce more glomalin and build healthier soils?

Glomalin appears to be produced primarily by prolific soil fungi that are associated with roots called mycorrhizae (meaning fungus root). Mycorrhizae benefit plants directly and often enable them to function with greater tolerance to drought. Mycorrhizae form microscopic thread-like structures that extend from inside plant roots into the soil space. If you could line up all these small threads from just a teaspoon of soil you would have yards and yards of microscopic thread. Since they are much smaller than roots, they can more effectively forage for limiting resources. Mycorrhizae can-

not live independently of plants but this doesn't mean they are parasites. They barter with plants and exchange limiting nutrients (phosphorus and nitrogen), water, or combinations of these with the plant for sugar. Though small in size, these soil fungi are important to rangelands because they help build healthy soils and enhance forage production by enhancing uptake of limiting nutrients and tolerance to drought.

Overall, maintaining healthy rangelands that are tolerant of drought involves the interaction between climate, soil, and diverse forms of life. There is some encouraging evidence that moderate levels of grazing can result in increased water stable soil aggregates and increased water infiltration rates. However, we currently know very little about how to optimize these beneficial effects because we know very little about how different grazing management practices affect soil organic matter and related soil properties. NRCS is using the Rangeland Health Indicators system to evaluate Range Health which includes a Soil Stability Test of surface soils used primarily to evaluate erosion potential of soils. This simplified test provides some indirect information on soil organic carbon and water stable soil aggregates though more measures are needed.

NEW TECHNICIANS

In the second half of 2010 we added two new Biological Science Technicians to our beef cattle research personnel. We are very fortunate to employ two highly qualified and respected individuals. They have both started fast and are already contributing.

Stacie A Kageyama, Biological Science Technician (Animal Genomics) started working with Lee Alexander supporting research in the area of beef cattle genomics and genetics.

Crystal Roberts, Biological Science Lab Technician (Beef Cattle) started working with Tom Geary supporting research in the area of reproductive physiology and fertility.



Stacie Kageyama
Biological Lab Tech



Crystal Roberts
Biological Lab Tech

To compare Montana's Entisols to other soils and learn how soils develop, visit the Smithsonian Museum of Natural History website-
http://forces.si.edu/soils/04_00_00.html

To learn more about Glomalin visit this ARS website-
<http://www.ars.usda.gov/Research/docs.htm?docid=15971>

AWARDS

Dr. Michael D. MacNeil was presented with a **Notable Technology Development Award** from the FLC for "A New Paradigm to Predict Genetic Merit of Angus Cattle for Characteristics Indicative of Carcass Value." The Federal Laboratory Consortium Regions established Technology Transfer Awards honoring "outstanding achievement" in the technology transfer arena. These annual awards recognize exemplary work by federal laboratories, private businesses, and state and local government.

Dr. Michael D. MacNeil received a Distinguished Alumnus Outstanding Professional Achievement Award from the South Dakota State University Alumni Association.

MacNeil, a research geneticist with the USDA Agricultural Research Service, is considered by some of his peers as one of the leading beef geneticists in the world.

His theories on genetics and economic benefit have become standards in the industry. The key word there is "become."

"The beef cattle industry was very slow to recognize the critical importance of melding economics with genetics for decision-making purposes." according to Wade Shafer, director of performance programs at the American Simmental Association. That didn't stop it from being a high priority for MacNeil since the beginning of his career.

That career began as a research assistant in 1976 at Montana State, and later that same year, at SDSU. He was there through 1980.

Dr. MacNeil's genetic parameter research allowed combined analysis of ultrasound and harvest data providing Angus breeders and commercial cattle producers with a single set of carcass trait EPDs. This approach resulted in a truer picture of differences in genetic merit than had ever been available for Angus cattle. The impact of this research is far reaching as commercial producers select Angus bulls using EPDs to influence the carcass merit of their beef cattle produced.



Dr. Michael D. MacNeil

Shafer said in the early years, MacNeil "was very much a lone ranger. However, since the industry has begun to accept the concept (of using genetics in decision-making), Dr. MacNeil's technology has seen widespread usage and acclaim."

Industry's embrace of MacNeil's technology can be seen in the awards he has received.

Since 1989, MacNeil has been at the Fort Keogh Livestock and Range Research Laboratory at Miles City, MT. In 2002, the Federal Laboratory Consortium honored it as the outstanding lab in the midcontinent region.

In 2004, he was part of the team that won the Golden Hereford Breeder award from the American Hereford Association. (Write-up from Award Brochure)

FORT KEOGH
OUTREACH ACTIVITIES

Rachel Endecott organized an in-service training update for around 25 county agricultural agents in **Bozeman, MT**, April 2010.

Rachel Endecott presented "Improving the Efficiency of Beef Cattle Reproduction" to 15 producers in **Sheridan, MT**, at the monthly Rancher Roundtable sponsored by Madison-Jefferson County Extension, April 2010.

Rachel Endecott gave a 3-minute Extension radio program about grass tetany in cattle. The program aired on KIKC (**Forsyth**) and KYUS/KMTA (**Miles City**) with a coverage area serving over 50,000 people, April 2010.

Rachel Endecott gave a program about beef cattle production to 90 2nd and 3rd graders and their teachers at Ag Day, co-sponsored by the Madison Valley Cattle Women and the Madison Conservation District in **Ennis, MT**, April 2010.

Kurt Reinhart spoke about his career as an Ecologist and working as a scientist with the USDA-ARS to graduate students and post-docs at the Industry Roundtable meeting at the University of Alabama, **Birmingham**, April 2010.

School tours were held on May 3-6, 2010, at **Fort Keogh**. More than 400 students from the area attended.

Mark Petersen and Andy Roberts attended the Livestock and Rangeland

Workshop, Livestock and Rangeland Resources – An Ideal Combination, sponsored by the Petroleum County Conservation District and Grazinglands Conservation Initiative (GLCI) and NRCS, in **Winnett, MT**, on May 5, 2010. Mark Petersen's talk title was "Effects of Local Water Quality on Livestock and Their Production" and Andy Roberts' talk was "Beef Cow Efficiency and Heifer Development with Limited Feed and Winter Supplementation."

Rachel Endecott organized two carcass grading trainings for 25 county agents, youth, and 4-H leaders in **Sidney** and **Big Timber, MT**. The workshops were team-taught by Rachel and Jane Ann Boles, MSU Meat Scientist. June 2010.

Rachel Endecott gave a talk about agri-security at Makoshika State Park in **Glendive, MT**. June 2010.

Rachel Endecott organized and coordinated an Ag Lenders Range School, which was hosted by the Terland family near **Reed Point, MT**. Around 35 agriculture lenders, appraisers, and real estate agents attended and learned about range management and agriculture issues. June 2010.

Rachel Endecott served on a USDA-NIFA grant review panel in **Washington, DC**. June 2010.

Jennifer Muscha, Kurt Reinhart, Mark Petersen, and Lance Vermeire as-

FORT KEOGH OUTREACH ACTIVITIES (CONT.)

sisted with Montana Range Days which was held in Miles City for the second year in a row. Tours of **Fort Keogh** were included. There were over 200 participants. June 2010.

Mike MacNeil gave two talks at the Beef Improvement Federation Meeting in **Columbus, OH**, June 2010, titled: "Toward implementing prototype EPD for feed intake;" and "Evolution of National Cattle Evaluation for Carcass Traits in Angus."

Rachel Endecott gave a 3-minute Extension radio program about pinkeye in cattle. The program aired on KIKC (**Forsyth**) and KYUS/KMTA (**Miles City**) with a coverage area serving over 50,000 people. July 2010.

Richard Waterman gave a talk titled "Metabolic Signals of the Beef Cow in Negative Energy Balance," and Mark Petersen gave a talk titled, "Challenges to Predicting Productivity of Grazing Ruminants - Where to now?" at the 4th Grazing Livestock Nutrition Conference in **Estes Park, CO**, July 9-10, 2010.

Rachel Endecott judged the graduate student competition papers at the Western Section, American Society of Animal Science meeting in **Denver, CO**, as a member of the Western Section Graduate Student Competition Committee. July 2010.

Several scientists and graduate students attended the Western Sec-

tion American Society of Animal Science meetings in **Denver, CO**, July 11-15, 2010, which were being held in conjunction with the ASAS, ADSA, PSA, CSAS, and AMPA. The following papers were presented: Mike MacNeil presented "Factors Affecting Spermatozoa Morphology In Beef Bulls" for Crystal Roberts, Graduate Student of Tom Geary and Mike MacNeil; Andy Roberts presented "Level of maternal winter supplement and feed restriction during postweaning development influences circulating concentrations of IGF-1 in heifers during the peripartum and rebreeding period;" and Lindsey Voigt, Montana State University graduate student of Rachel Endecott presented, "In situ digestibility of grass hay after heifer diets were abruptly switched from 35 or 70% concentrate to 100% forage." Mike MacNeil gave a talk at the Western Section ASAS Awards Ceremony as the recipient of the Distinguished Scientist Award 2009.

Andy Roberts was invited to give a talk entitled "Improving beef cattle producer profitability: Critical control points in reproduction," at the American Simmental Association sponsored meeting for Beef Cattle Extension Specialists, July 23, 2010, in **Billings, MT**.

Tom Geary attended the 43rd Annual Meeting of the Society for the Study of Reproduction, "The Intersection Between Genetics, Genomics, and Repro-

ductive Biology," July 30—August 3, 2010, in **Milwaukee, Wisconsin**, and presented a poster titled: "Establishment of a phenotypical model of adverse outcomes associated with assisted reproductive technologies."

Mike MacNeil attended the 9th World Congress on Genetics Applied to Livestock Production in **Leipzig, Germany**, on July 31-August 7, 2010. He presented "Genetic Correlations Between Carcass Traits and Molecular Breeding Values in Angus Cattle."

Rachel Endecott judged 4-H beef project interviews in **Miles City, MT**, at the Custer County 4-H Interview Judging Day, August 2010.

Tom Geary attended the 8th International Ruminant Reproduction Symposium in **Anchorage, Alaska**, September 3-8, 2010. Tom chaired a session and presented 3 posters with graduate students titled, "Contributions of follicle size to establishment and maintenance of pregnancy in suckled beef cows using reciprocal embryo transfer," Jackie Atkins, University of Missouri Graduate Student of Tom Geary; "Factors affecting preovulatory concentrations of estradiol and its role in establishment and maintenance of pregnancy in suckled beef cows using reciprocal embryo transfer," Emma Jinks, University of Missouri graduate student of Tom Geary; and "Circulating concentrations of pregnancy as-

sociated glycoproteins (PAGs) are associated with embryo/fetal survival but not ovulatory follicle size in suckled beef cows," Ky Pohler, University of Missouri graduate student of Tom Geary.

Andy Roberts was invited to be a speaker at the Forage Beef and Soil Health Workshop at the **Dickinson Research Extension Center's ranch** on the supplementation/cow longevity study. September 15, 2010.

Rachel Endecott gave a program about Youth Livestock Quality Assurance at the State 4-H Leaders Forum in **Deer Lodge, MT**, (September 2010) and at MSU Extension's Annual Conference in **Bozeman, MT**, (October 2010).

Tom Geary was invited to talk to 47 Genex Representatives (Semen collection company) at the Wingate Inn in **Billings, MT**, October 14, 2010. His presentation was titled "Reproduction and Synchronization Techniques." These representatives were from across the United States and Canada.

Rachel Endecott gave a 3-minute extension radio program about value-added cattle marketing. The program aired on KIKC (**Forsyth**) and KYUS/KMTA (**Miles City**) with a coverage area serving over 50,000 people. November 2010.

Rachel Endecott gave a program about preparing for winter feeding in **Broadus, MT**, November 2010.

RECENT PUBLICATIONS:

- Callaway, R.M., Bedmar, E.J., Silvan, C.G., **Reinhart, K.O.**, and Kilronomos, J. 2010. Effects of soil biota from different ranges on *Robinia pseudoacacia* invasion: acquiring mutualists and escaping pathogens. *Ecology* (accepted 9/22/2010).
- Harrelson, F.W., Ivey, S.L., Cox, S.H., Dunlap li, R.L., Mulliniks, J.T., Carter, B.H., Loest, C.A., and **Petersen, M.K.** 2010. Effect of supplemental protein source during the winter on pre- and postpartum glucose metabolism. *Western Section of Animal Science Proceedings* 61:262-265.
- James, J.J., Drenovsky, R.E., Monaco, T.A., and **Rinella, M.J.** 2010. Managing soil nitrogen to restore annual grass infested plant communities: An effective strategy or incomplete framework? *Ecological Applications* (accepted 5/24/2010).
- Liu, G.E., Hou, Y, Zhu, B., Cardone, M.F., Jiang, L., Cellamare, A., Mitra, A., **Alexander, L.J.**, Coutinho, L.L., Dell'Aquila, M.E., Gasbarre, L.C., Lacalandra, G., Li, R.W., Matukumalli, L.K., Nonneman, D., de A. Regitano, L.C., Smith, T.P.L., Song, J., Sonstegard, T.S., Van Tassell, C.P., Ventura, M., Eichler, E.E., McDaneld, T.G., and Keele, J.W. 2010. Analysis of copy number variations among diverse cattle breeds. *Genome Research* 20:693-703.
- MacNeil, M.D.**, Nkrumah, J.D., Woodward, B.W., and Northcutt, S. 2010. Genetic evaluation of Angus cattle for carcass marbling using ultrasound and genomic indicators. *Journal of Animal Science* 88:517-522.
- Mulliniks, J.T., **Muscha, J.M.**, Lodge-Ivey, S.L., and **Petersen, M.K.** 2010. Predicted mineral intake utilizing both water and forage analysis varies by source and location of livestock water in Eastern Montana. *Western Section of Animal Science Proceedings* 61:182-185.
- Nichols, B.M., McDonald, T.J., Harbac, M.M., **Roberts, A.J.**, Paterson, J.A. 2010. Effects of gestational dietary metabolizable protein level and dry matter intake on subsequent production traits in primiparous heifers. *Western Section of Animal Science Proceedings* 61:35-39.
- Perry, G.A., Dalton, J.C., and **Geary, T.W.** 2010. Management factors influencing fertility in synchronized and natural breeding programs. *Proceedings of the National Cattlemen's Beef Association Applied Reproductive Strategies in Beef Cattle Workshop*, San Antonio, TX. p. 147-172.
- Petersen, M.K.** and **Muscha, J.M.** 2010. Fort Keogh Livestock and Range Research Laboratory's Historic Role in the Settlement of the West and Present Contributions to Range Ecology and Livestock Research. *Rangelands* (accepted 8/23/2010).
- Petersen, M.K.**, Mulliniks, J.T., **Roberts, A.J.**, and **Waterman, R.C.** 2010. Challenges to Predicting Productivity of Grazing Ruminants. Where to now? *Proceedings 4th Grazing Livestock Nutrition Conference* 180-188.
- Progar, R.A., **Rinella, M.J.**, Fekedulegn, D., and Butler, L. 2010. Nuclear polyhedrosis virus as a biological control agent for *Malacosoma Americanum* (Lepidoptera: Lasiocampidae). *Journal of Applied Entomology* (accepted 9/19/2010)
- Progar, R.A., Markin, G., Milan, J., Barbouletos, T., and **Rinella, M.J.** 2010. Short-term population dynamics and impacts of the red-headed leafy spurge stem borer (*Oberea erythrocephala* (Schrank.) Coleoptera: Cerambycidae) on leafy spurge (*Euphorbia esula*). *Journal of Invasive Plant Science and Management* (accepted 9/19/2010).
- Reinhart, K.O.** 2010. The role of facilitative interactions in tree invasions. *New Phytologist* 187:559-562.
- Reinhart, K.O.** and **Rinella, M.** Comparing susceptibility of eastern and western U.S. grasslands to competition and allelopathy from spotted knapweed (*Centaurea stoebe* L. subsp. *Micranthosae* (Gugler) Hayek). *Plant Ecology* (accepted 11/10/2010).
- Reinhart, K.O.**, Royo, A.A., **Kageyama, S.A.**, and Clay, K. 2010. Canopy gaps decrease microbial densities and disease risk for a shade-intolerant tree species. *Acta Oecologica* (accepted 7/28/2010).
- Rinella, M.J.** and James, J.J. 2010. Invasive plant researchers should calculate effect sizes, not P-values. *Journal of Invasive Plant Science and Management* 3:106-112.
- Rinella, M.J.**, Haferkamp, M.R., Masters, R.A., **Muscha, J.M.**, **Bellows, S.E.**, and **Vermeire, L.T.** 2010. Growth regulator herbicides prevent invasive annual grass seed production. *Journal of Invasive Plant Science and Management* 3:12-16.
- Rinella, M.J.**, Masters, R.A., and **Bellows, S.E.** 2010. Growth regulator herbicides prevent invasive annual grass seed production under field conditions. *Rangeland Ecology and Management* 63:487-490.
- Rinella, M.J.**, Vavra, M., Naylor, B.J., and Boyd, J.M. 2010. Estimating influence of stocking regimes on livestock grazing distributions. *Ecological Modeling* (accepted 9/23/2010).
- Roberts, A.J.**, **Waterman, R.C.**, **Geary, T.W.**, **Alexander, L.J.**, and **MacNeil, M.D.** 2010. Level of maternal winter supplement and feed restriction during postweaning development influence circulating concentrations of IGF-I in heifers during the peripartum and rebreeding period. *Western Section of Animal Science Proceedings* 61:194-196.
- Roberts, C.A.**, **Geary, T.W.**, **MacNeil, M.D.**, **Waterman, R.C.**, **Roberts, A.J.**, and **Alexander, L.J.** 2010. Factors affecting spermatozoa morphology in beef bulls. *Western Section of Animal Science Proceedings* 61:122-125.
- Sanchez, P.H., Tracey, L.N., Browne-Silva, J., **Petersen, M.K.**, and Lodge-Ivey, S.L. 2010. Propionibacterium acidipropionici p169 and glucogenic precursors to improve rumen parameters associated with low quality forage. *Western Section of Animal Science Proceedings* 61:67-71.

Underwood, K.R., Tong, J.F., Price, P.L., **Roberts, A.J.**, Grings, E.E., Hess, B.W., Means, W.J., and Du, M. 2010. Nutrition during mid to late gestation affects growth, adipose tissue deposition, and tenderness in cross-bred beef steers. *Meat Science* 86:588-593.

Waterman, R.C. and Butler, W.R. 2010. Metabolic signals of the beef cow in negative energy balance. *Proceedings 3rd Grazing Livestock Nutrition Conference*, Wilmington, OH.

Waterman, R.C. and **Vermeire, L.T.** 2010. Grazing deferment effects on forage diet quality and ewe performance following summer rangeland fire. *Rangeland Ecology and Management* (accepted 9/18/2010).

Vermeire, L.T., Crowder, J.L., and Wester, D.B. 2010. Plant community and soil environment response to summer fire in the Northern Great Plains. *Rangeland Ecology and Management* (accepted 9/26/2010).

Vermeire, L.T., **Rinella, M.J.**, and **Muscha, J.M.** 2009. Managing annual bromes in the Northern Great Plains. *Symposium Proceedings Range Beef Cow Symposium*, Casper, WY.

Voigt, L.A., **Endecott, R.L.**, Paterson, J.A., and **Waterman, R.C.** 2010. In situ digestibility of grass hay after heifer diets were abruptly switched from 35 or 70% concentrate to 100% forage. *Meeting Proceedings. Western Section of American Society of Animal Science*. 61:266-270.

Please check our website <http://www.ars.usda.gov/npa/ftkeogh> or email sue.miles@ars.usda.gov for these and other publications.



ASSISTANT'S CORNER BY BRAD EIK

Hello all, I hope everyone is having a good fall and getting all that last minute work done before winter rears its ugly head. I would just like to give you a little update on the outside operations at the Fort. It has been a busy summer and fall between rotating cattle through pastures and getting our crops in the bins.

We have nearly all the calves weaned and in the feedlot except the late calving herd which is one of our season-of-calving herds that calve from the end of May through June and they will come in next week. Our weaning weights have been up this year due to the phenomenal moisture and grass year we have had. To date we have weaned 1035 calves (bulls, steers, and heifers) for an overall average of 477 pounds being weaned before October 15.

We had an excellent first cutting of hay which we did not have to irrigate at all. Due to the grasshoppers, our second cutting started out looking good but the yield was not what we had hoped for, and our third cutting was about the same as the second. We did have a couple fields that were not worth cutting a third time, however they are serving as excellent fall grazing for one of our herds giving the usual fall pasture a very nice break

to recover. Our feed barley was looking like we were in for high yields this year until the grasshoppers got a hold of it, but we yielded around 82 bushels/acre. We had a great corn silage year averaging 32 tons an acre. Our grain corn is in the bin. I will fill you in on the yield in the next news letter as well as the protein and actual production of the hay.

A new project included finishing 72 steers using our new GrowSafe system which we are trying to get marketed to a packer that will give us individual carcass data. Along with this trial, we have also become certified through AginfoLink to age and source our cattle. Hopefully this will have a positive effect on our selling price. We are going to start aging and sourcing more groups of cattle

in the near future to see if this proves to be a worthwhile marketing strategy for us and for you.

I would also like to introduce two new members of our MSU staff. Lindsey Voigt has taken over as Administrative Associate for Sandi Lockie whom retired this past summer, and Brian Lester, the newest member of the Farm and Feedlot crew.

That's about it from here. I hope everyone is enjoying the good calf market and we will catch you next time. Don't forget to worm your working horses going into these winter months. It sure makes a difference.

Brad Eik



Lindsey Voigt
Administrative
Associate



Brian Lester
Farm/Feedlot Crew



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We're on the web!

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If you have email and would rather receive this newsletter as a .pdf file, send an email to diona.austill@ars.usda.gov to be added to the list.

Fort Keogh Open House

Friday, December 3, 2010

3:00—6:00 p.m.

Come see our remodel!

Tours will start at 3:15 p.m. and run every half hour.