



# Fort Keogh Researcher

## Introduction

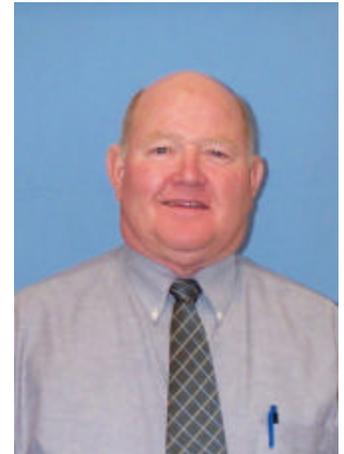
Goodness, how time flies! This was brought to my attention recently after deciding it was about time to develop another Fort Keogh Researcher newsletter. When I mentioned this to Diona, my secretary, she said she was wondering about that too as it seemed to her it had been quite awhile since we published our last newsletter. I said I didn't think it was very long ago at which time she pulled out a copy of our last newsletter as published in December 2005! I think time flies when you are having fun, at least I hope that is the way it is.

### Personnel

Much has happened at Fort Keogh over the past 11 months. We have had four employees move on to bigger and better things, at least that is our hope. **Michelle Griffin** moved to Helena to be closer to family. She was a molecular genetics technician at Fort Keogh. **Dr. Robyn Sapp**, statistician, resigned her post-doc position to

accept a position in St. Louis with the Monsanto Company. **Lance Geirke** resigned his position as a member of our genetics' cowboy crew and moved to a ranch near Otter, and **Dr. Marshall Haferkamp** retired after a long and distinguished career at Fort Keogh, the ARS laboratory in Burns, OR, and Texas A&M University. We are in the process of filling this vacancy. This is often a relatively long process, but we are hopeful to have someone on board by early next spring.

In conjunction with these changes, we have been fortunate to hire **Heidi Stroh** to replace Michelle. In addition, **Dr. Rachel Endecott** has joined our staff as a Montana State University Extension Beef Cattle Specialist. This position was formerly filled by Dr. Rick Funston, but it has been open ever since Dr.



Rod Heitschmidt  
Research Leader



Funston moved to the University of Nebraska four years ago. We are excited to have this position filled again as we believe it is of great value to eastern Montana agriculture.

### Field Days – A New Approach

#### Inside this issue:

Introduction	1
Retirement	2
Research Update—After Fire Man-	3
Recent Publications	5
Travels	6
New Extension Beef/Cattle Special-	7
Awards	7



In cooperation

with



## Introduction, continued

In my 16+ years as Research Leader and Superintendent at Fort Keogh, I have seen both fully successful and some not-so-successful outreach activities. I have learned that no one knows with much certainty what level of success we can expect from any given activity, and it is this uncertainty that has led Fort Keogh to completely re-think its outreach program. Specifically, we continue to wonder how we can best serve our customers. Certainly, having Dr. Endecott and Larry Brence officed with us at Fort Keogh is a big advantage and something we are grateful for, but even they have a difficult time accurately predicting technology transfer meetings' participation/attendance levels. Thus in many instances, we and our sponsoring partners ex-

pend valuable resources on less than fully successful events.

To eliminate this waste, Fort Keogh is no longer planning to host **public field days**. However, we would like to host some **private field days!** Private field days are field days requested by any group willing to travel to Fort Keogh in some organized fashion. The advantages to hosting private field days are many with the four largest being: 1) we can customize the field day to the desires of the participants (range vs. animal research, field tours vs. conference room lectures and discussions, a mix of range and animal research with field tours and conference room discussions, etc.); 2) we can focus our resources on produc-

ing a very high quality meeting with little or no wasting of either time or money; 3) we can fully accommodate participants' time schedule; and 4) we will know what to expect in terms of number of participants, desired length of tours, etc. We have found this to be a very effective and rewarding activity so please, let us know how we might tailor a private field day for your group!



## Dr. Marshall Haferkamp Retires

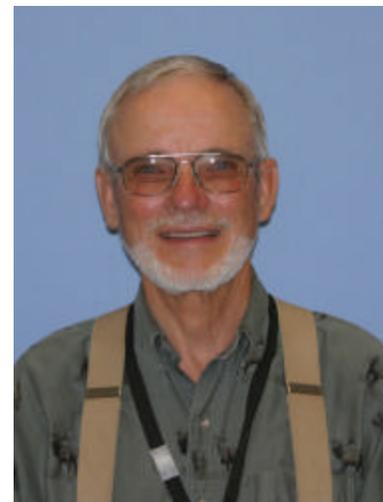
Dr. Marshall Haferkamp, Rangeland Scientist, with USDA-ARS, Fort Keogh Livestock and Range Research Laboratory, retired on July 31, 2006, after working more than 30 years in the field of rangeland management.

He received his BS and MS degrees in Range Management from Colorado State University. After 2 years as an assistant in Animal Science at South Dakota State University, he entered graduate school at the University of Arizona and received his Ph.D. in Range Management in 1975.

His professional research career, from 1975 to 2006, spanned several ecoregions with stints in the Range Science Department at Texas A&M (1975-1981), Eastern Oregon Agricultural Research Center, Oregon Agricultural Experiment Station, Burns, Oregon (1981-1984), USDA-ARS, Burns, Oregon (1984-1988), and USDA-ARS, Miles City, Montana (1988-

2006). His research program emphasized studying the soil-plant-environment-herbivore interaction on native rangelands and seeded pastures in several ecoregions. He is recognized nationally and internationally for his work in rangeland restoration and with the invading annual grass, Japanese brome. He also actively investigated the impact of environment and grazing on carbon sequestration in the Northern Great Plains. Dr. Haferkamp served as associate editor for the Journal of Range Management and the e-journal Forage and Grazinglands. He served on several committees for the Society for Range Management at the international and section levels. He received an Outstanding Achievement award (1999) from the Northern Great Plains Section, Society for Range Management, and a Fellow (2000) and Sustained Lifetime Achievement (2004) awards from the Society for Range Management.

He and his wife, Gwen, plan to re-



main in the Miles City area, staying active in the sheep business and pursuing their hobbies that include photography, bird watching, fishing, hunting, and bicycling.

We wish Marshall the very best in his future interests.

## Summer Fire and Post-Fire Grazing Management

Lance Vermeire  
Rangeland Ecologist

Fire is a natural, but more often than not, unplanned event in the Northern Plains. About 75% of wildfires in the region occur in July and August when fuel loads are near their annual peak and the weather is generally hot and dry. The effects of summer fire are not well known since prescribed fires are typically conducted in spring and fall, and studies of wildfires lack replication and specific knowledge of the sites before fire. In a region where livestock grazing dominates rangeland use, a primary concern revolves around the fact that little is known of plant response to summer fire or how that response may be affected by grazing after fire.

Land management agencies typically advise 1 or 2 years of complete rest from grazing following fire. In the absence of data, this may be the ecologically safest option because it is doubtful any harm will come to the plant community from a short period of rest. However, 1 or 2 years of complete rest could add significant economic risk from sudden and often extensive losses in grazing opportunities. Stocking rate has been shown to be the most significant factor affecting plant response to grazing. Therefore, a potential alternative to complete rest is conservative forage use. To address these concerns we designed experiments to determine summer fire and post-fire grazing effects on grassland sites at Fort Keogh.

Four 2-acre plots were burned in August of 2003 and 4 were burned in August 2004 and compared against 8 non-burned plots to determine summer fire effects. Neither burned nor non-burned sites were grazed. To compare the effects of post-fire grazing, 32 sites burned in August 2003 or August 2004 were not grazed the following growing season or grazed by sheep during June and July to achieve 17, 34, or 50% use by forage

weight. The prescribed utilization treatments were achieved by using proportionately fixed densities of sheep (3, 6, and 9 sheep in 2004 and 6, 12, and 18 sheep in 2005) for each treatment and monitoring differences between grazed and caged areas in each plot.

In each experiment, standing crop and species composition were measured in July prior to treatment, one year after fire (immediately after grazing), and 2 years after fire to determine pre-existing differences among plots, immediate treatment effects, and recovery. In the fire experiment, plots were not grazed for the study period. In the grazing experiment, plots were grazed during the first post-fire growing season then released from grazing the next year to assess carryover effects.

We hypothesized that dominant perennial grasses and overall productivity would be resistant to summer fire because the region developed with a history of fire and cool-season perennial grass activity is generally low in summer. For the grazing experiment, our hypotheses were that standing

crop would decrease with increasing utilization during the year plots were grazed and utilization would have no effect on production the year after grazing.

Spring precipitation is a strong determining factor for forage production in the Northern Plains and our experiments were conducted under extreme conditions. April-May precipitation was 38% of the long-term average in 2004 and 145% of average in 2005. So, one set of plots was burned in a near-average year and followed by severe drought. The other set of plots was burned during severe drought and followed by a very wet year.

Fire reduced fringed sage 73% the first year following fire. However, fringed sage has well-protected buds in its root crown and standing crop of the sprouting species was similar between burned and non-burned sites by the second year. Fire failed to kill significant numbers of prickly pear cactus, but reduced the number of pads 56%. Prickly pear cactus is generally considered to be sensitive to fire if sufficient fuel is available.





Our results reflect drought-induced reductions in standing crop and the tendency for prickly pear to occur near claypans, both of which reduce the plant's exposure to fire. Forbs were a minor component and were similar between burned and non-burned sites.

Grass standing crop was reduced 57% during the drought year, but recovered fully by the second year. Grass standing crop was unaffected when fire was followed by a wet year. Current-year grass biomass was similar between burned and non-burned sites throughout the study, indicating standing crop differences during drought were completely attributable to old dead material from previous years' growth in non-burned sites and not a reduction in productivity. Sedges, and warm-season grass (primarily blue grama) were similar between burned and non-burned sites. Needle-and-thread standing crop was reduced 47% by fire then recovered fully by the second year. The initial reduction was expected as others have shown needle-and-thread to be sensitive to fire. However, fire had to increase tillering or seedling recruitment to have produced the rapid recovery. Western wheatgrass more than doubled on burned sites after two years. Other cool-season perennial grasses (primarily Sandberg bluegrass and junegrass) increased 60% with fire across years. Annual grass (predominantly Japanese brome) standing crop was reduced 72% by the

second year post-fire. Annuals were initially a minor component due to drought, so fire effects were masked until conditions improved in the latter part of the study.

Short-term effects of post-fire grazing were limited. Total grass standing crop decreased with increasing utilization to the prescribed levels (17, 34, and 50%) of forage removal during the year plots were grazed. Individual grass components were not selected strongly enough by sheep to show the same direct relationship, with the exception of warm-season grasses. Because of the timing of grazing, warm-

season grasses provided some of the most recently grown forage and appear to have been selectively used by sheep. Warm-season grass standing crop decreased with increasing utilization, regardless of time since fire. Total grass standing crop was similar across treatments the growing season after grazing.

### Conclusions

Fire-induced changes in the plant community exceeded those caused by grazing. Summer fire shifted composition toward the described historic community, with western wheatgrass as the dominant species, greater abundance of other cool-season perennials, and less annual grass. Grazing effects were limited and short-lived. Effects of greater utilization or changes in seasonal use are not known. However, grazing at up to 50% use during June and July the first growing season after summer fire was not detrimental to dominant perennial species. The difficulty with post-fire grazing management may be more managerial than biological. Although our research indicates these grasslands can tolerate light to moderate grazing following summer fire, the removal of standing dead material reduces the amount of available forage during the period between the fire and the following growing season. Therefore, accurate stocking decisions are weather-dependent and difficult to make until May or June.



## Recent Publications

Cronin, M.D., **MacNeil, M.D.**, and Patton, J.C. 2006. Mitochondrial DNA and microsatellite DNA variation in domestic reindeer (*Rangifer tarandus tarandus*) and relationships with wild caribou (*R.t. granti*, *R.t. groenlandicus*, *R.t. caribou*). *Journal of Heredity* doi:10.1093/jhered/es1012.

Cronin, M.W., **MacNeil, M.D.** and Patton, J.C. 2005. Variation in mitochondrial DNA and microsatellite DNA in caribou (*Rangifer tarandus*) in North America. *Journal of Mammalogy* 86:495-505.

**Geary, T.W.**, **Grings, E.E.**, **MacNeil, M.D.**, De Avila, D.M., Reeves, J.J. 2006. Use of recombinant gonadotropin releasing hormone antigens for immunosterilization of beef heifers. *Journal of Animal Science* 84:343-350.

**Grings, E.E.** 2006. The Language of Rangeland Science. *Rangelands* 28(2):36-37.

**Grings, E.E.**, Blummel, M., Sudekum, K.H. 2005. Methodological considerations in using gas production techniques for estimating ruminal microbial efficiencies for silage-based diets. *Animal Feed Science And Technology* 123-124:527-545.

**Grings, E.E.**, W.A. Phillips, R.E. Short, H. Mayeux, and **R.K. Heitschmidt**. 2006. Postweaning performance of steers from varying calving and weaning strategies in Montana. *Professional Animal Scientist* 22:386-391.

**Heitschmidt, R.K.** and **L.T. Vermeire**. 2006. Can abundant summer precipitation counter losses in herbage production caused by spring drought? *Rangeland Ecology and Management* 59:392-399.

Kealey, C.G., **MacNeil, M.D.**, Tess, M.W., **Geary, T.W.**, Bellows, R.A. 2006. Genetic Parameter estimates for scrotal circumference and semen characteristics of yearling Line 1 Hereford bulls. *Journal of Animal Science* 84:283-290.

Lamb, G.C., Larson, J.E., **Geary, T.W.**, Stevenson, J.S., Johnson, S.K., Day, M.L., Kesler, D.J., Dejarnette, J.M., Landblom, D.G., Ansotegui, R.P. 2006. Synchronization of estrus and artificial insemination in replacement beef heifers using gonadotropin-releasing hormone, prostaglandin F2a, and

progesterone. *Journal of Animal Science* 84:3000-3009.

Larson, J.E., Lamb, G.C., Stevenson, J.S., Johnson, S.K., Day, M.L., **Geary, T.W.**, Kesler, D.J., Dejarnette, J.M., Schrick, F.N., Arseneau, J.D. 2006. Synchronization of estrus in suckled beef cows before detected estrus and (or) timed artificial insemination using gonadotropin-releasing hormone (GNRH), prostaglandin F2a (PG), and progesterone (CIDR). *Journal of Animal Science* 84:332-342.

**MacNeil, M.D.**, and **T.B. Mott**. 2006. Genetic analysis of gain from birth to weaning, milk production, and udder conformation in Line 1 Hereford cattle. *Journal of Animal Science* 84:1639-1645.

**MacNeil, M.D.**, **T.W. Geary**, G.A. Perry, **A.J. Roberts**, and **L.J. Alexander**. 2006. Genetic partitioning of variation in ovulatory follicle size and probability of pregnancy in beef cattle. *Journal of Animal Science* 84:1646-1650.

Phillips, W.A., **Grings, E.E.**, R.E. Short, **R.K. Heitschmidt**, S.W. Coleman, and H. Mayeux. 2006. Effects of calving season on stocker and feedlot performance. *Professional Animal Scientist* 22:392-400.

**Rinella, M.J.** and R.L. Sheley. 2005. Models that predict invasive weed and grass dynamics: 1. Model development. *Weed Science* 53:586-593.

**Rinella, M.J.** and R.L. Sheley. 2005. Models that predict invasive weed and grass dynamics: 2. Accuracy evaluation. *Weed Science* 53:605-614.

**Rinella, M.J.** and R.L. Sheley. 2006. Using light attenuation to estimate leafy spurge impacts on forage production. *Rangeland Ecology & Management* 59:431-437.

**Roberts, A.J.**, Al-Hassan, M.J., Fricke, P.M., Echternkamp, S.E. 2006. Large variation in steroid concentrations and insulin-like growth factor binding proteins exists among individual small antral follicles collected from within cows at various stages of estrous cycle. *Journal of Animal Science* 84:2714-2724.

Tauk, S.A., Berardinelli, J.G., **Geary, T.W.**, and Johnson, N.J. 2006. Resumption of postpartum luteal function of primiparous, suckled beef cows exposed continuously to bull urine. *Journal of Animal Science* 84:2708-2713.

**Vermeire, L.T.**, Wester, D.B., Mitchell, R., Fuhlendorf, S.D. 2005. Fire and grazing effects on wind erosion, soil water content, and soil temperature. *Journal of Environmental Quality* 34:1559-1565.

Walker, R.S., R.M. Enns, **T.W. Geary**, N.W. Wamsley, R.G. Mortimer, B.A. Lashell, and D.D. Zelesky. 2005. Evaluation gonadotropin-releasing hormone at fixed-time ai in beef heifers synchronized using a modified co-synch plus CIDR protocol. *Professional Animal Scientist* 21:449-454.

**Waterman, R.C.**, J.E. Sawyer, C.P. Mathis, D.E. Hawkins, G.B. Donart, and M.K. Peterson. 2006. Effects of supplements that contain increasing amounts of metabolizable protein with or without Calcium propionate salt on postpartum interval and nutrient partitioning in young beef cows. *Journal of Animal Science* 84:433-436.

Wu, X.L., **MacNeil, M.D.**, De, S., Xiao, Q.J., Michal, J.J., Gaskins, C.T., Reeves, J.J., Busboom, J.R., Wright Jr., R.W., and Jiang, Z. 2005. Evaluation of candidate gene effects for beef backfat via bayesian model selections. *Genetica* 125:103-113.



## South Africa

For the past three years, Mike MacNeil has been engaged in collaborative research with scientists from the South African Research Council (ARC) at Irene. This collaboration resulted from an initiative of the ARS Office of International Programs to identify ARS scientists with research interests that are complimentary to those of the ARC. In this collaboration, the research Mike has done at Fort Keogh in developing indexes that aid in selection for improved profit potential is being extended to South African production systems. The first joint study has been to identify EPD profiles of bulls that when bred to indigenous cows will produce more desirable for an emerging domestic feedlot industry. Ephraim Matjuda, an ARC scientist and University of Limpopo graduate student, is following up on this work with a study to develop selection criteria for improving the profit potential of the indigenous cattle. Mike is Ephraim's PhD dissertation advisor in this study. Mike is also working with a second student, Oliva Ma-



Ephraim Matjuda evaluates Nguni cattle on a farm in Limpopo Province.

pholi, who will be coming to Fort Keogh early next year to work in the genetics laboratory on experiments leading toward a Master's degree from the University of the Free State. These efforts contribute to the development of scientific expertise in South Africa to support domestic agriculture with the long-term goal of

alleviating poverty. In addition, this research provides the opportunity to test the robustness of technology developed and used at Fort Keogh in substantially different production systems.

## China

In September of this year, Elaine Grings traveled to China as the guest of China Agricultural University. The primary purpose of the trip was to continue cooperative work with Dr. Zhang in the Department of Grassland Science on methodologies to assess diet composition in grazing livestock. This project arises out of a Protocol for Cooperation in Agriculture Science and Technology that was developed by USDA and China's Ministry of Science and Technology. Dr. Zhang spent two months in the autumn of 2005 as a visiting scientist at Fort Keogh. While here, he assisted our laboratory with setting up some marker techniques for monitoring the plant species composition of the diets of grazing cattle. Elaine then traveled to Beijing to spend two weeks in Dr. Zhang's laboratory at the University, which is located in the northern part of China's capital city. Dr. Zhang has several graduate students working on tech-



Dr. Zhang looking at forage species in the nursery plots at a field station in Heibei Province, P.R. China .

niques to measure compounds in forage plants that uniquely identify species in plant mixtures. Understanding which plant species are being eaten by cattle should provide

us with better estimates of intake and diet quality for grazing cattle, with the ultimate goal of improving our grazing and nutritional management practices.

## New Extension Beef/Cattle Specialist

Rachel Endecott started as the MSU Extension Beef Cattle Specialist on November 1, 2006. Her office is at Fort Keogh. Rachel grew up on a cow/calf operation near McAllister, MT, and received her BS in Animal Science from Montana State University and her MS and PhD in range beef cattle nutrition from New Mexico State University. Her extension and research objectives include investi-

gating management strategies to lower unit costs of production to enhance sustainability of range beef cattle production. If you have questions or concerns or would just like to visit with Rachel, don't hesitate to contact her. Office (406) 874-8286; Cell (406) 853-3956.



Rachel Endecott

## Scientist Inducted into the American Hereford Association Hall of Merit

Mike MacNeil, native of New York State, graduated from Cornell University with a bachelor's degree from the College of Agriculture in 1974. He then went to work for Dutchman Hereford Co. in Lauxmont, Pa., until returning to school at Montana State University, where he received a master's degree in animal science in 1978. He then moved to South Dakota State University (SDSU) to begin work on his doctorate's degree. In 1980, Mike left SDSU to join the University of Nebraska staff at the U.S. Meat Animal Research Center (MARC), Clay Center, Neb., as the experiment station statistician.

Mike was awarded his doctorate's degree from SDSU in 1982 for his work on genetic antagonisms between sex-limited traits. In 1983, he joined the U.S. Department of Agriculture (USDA) Agricultural Research Service at Clay Center. In 1989, Mike transferred from MARC to Ft. Keogh Livestock and Range Research Laboratory in Miles City, Mont. Here he assumed responsibility for the Line 1 Hereford program.

Aspects of Mike's research that have directly benefited the AHA include: 1) comprehensively and objectively characterizing Line 1 Hereford cattle; 2) facilitating dominate use of Line 1 Hereford cattle in bovine genomics; 3) developing profit indexes for the AHA; 4) estimating the economic value of heterosis; 5) developing guidelines for implementing cross-

breeding systems; 6) identifying genetic antagonisms for carcass and maternal traits; 7) evaluating importance of cow families in performance of Hereford cattle; 8) identifying and evaluating new phenotypes for estimation of EPDs (including calving date, metabolizable energy intake of cows and ovulatory follicle size); 9) identifying quantitative trait loci for phenotypes of economic relevance to the beef industry and especially to Hereford breeders; 10) experimentally evaluating the genetic antagonism between birth weight and subsequent growth in Line 1 Hereford cattle; and 11) characterizing consequences of selection to reduce birth weight and increase yearling weight in increasing calving ease, production efficiency and carcass value.

"Dr. MacNeil has been a good friend and inspiration to me as well as many other livestock producers across America," says Mark Cooper, Cooper Hereford Ranch, Willow Creek, Mont. "He has been a very influential voice for the American producer and is much deserving of this prestigious award."

John Hough, vice president of Benyshek and Hough Consulting Services, adds, "Mike is one of only a few researchers who truly understands both research theory and its application in the livestock industry."

Mike has authored, co-authored or edited more than 260 scientific and technical publications. These publica-



Pictured are Betty and Mike MacNeil, Miles City, Mont. Mike is a 2006 Hereford Hall of Merit inductee.

tions are frequently cited, and resulting technologies have been adopted by government agencies, livestock producers and beef cattle breed associations.

Mike somehow still has time to be active in his church and in the American Society of Animal Science, as well as other professional and civic organizations. He and his wife, Betty, make their home outside Miles City and are the parents of two children, Megan and Brendan. (Taken from news release by Hereford World Magazine).



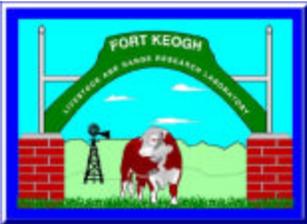
LIVESTOCK AND RANGE RESEARCH  
LABORATORY

243 Fort Keogh Road  
Miles City, MT 59301-4016

Phone: 406-874-8200  
Fax: 406-874-8289

We're on the web!

[www.ars.usda.gov/npa/ftkeogh](http://www.ars.usda.gov/npa/ftkeogh)



**Come visit us on the web!**

**[www.ars.usda.gov/npa/ftkeogh](http://www.ars.usda.gov/npa/ftkeogh)**

