Fort Keogh Researcher

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In cooperation with

MONTANA STATE UNIVERSITY
MONTANA AGRICULTURAL EXPERIMENT STATION

MONTANA STATE UNIVERSITY EXTENSION

INSIDE THIS ISSUE:

Introduction, by Mark Petersen, Research Leader

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

Since the last newsletter we have been productive on a number of fronts. In the research arena we have made a big leap forward by identifying genotypes of cows from the composite herd (CGCs) that are the focus of an ongoing investigation (in its tenth year) studying cow longevity. I am looking forward to first interpretations of these results. This work and other studies hopefully will lead to the development of genetic markers for use as selection tools. As we advance forward we will need to collaborate with scientists at other laboratories to efficiently add depth to our capabilities to build capacity for evaluation of genetic relationships associated with important economic traits of range cattle.

In our rangeland research group, Matt Rinella has completed a study that shows the time frame needed to evaluate noxious weed management experiments should not be less than 4 years but should be in excess of 10 years. He took a retrospective look and re-evaluated past studies (conducted throughout Montana) and found the original conclusions of some studies were reversed after 10 or more years had passed. In a parallel effort, Matt (and collaborator Erin Espeland from USDA-ARS Sidney) has received a $170,000 grant to re-evaluate "restored" sites that had been degraded due to mining. The results from studying restoration of mining lands are expected to give insight into the restoration of degraded rangelands used for grazing.

Winter was a test for us. After a nice fall it got cold, snowed and stayed cold. Usually we can graze January maybe February but not this year. Some of our cows were thinner than they had been in the past prior to calving. We have plans to increase hay production this year to make up for the greater quantities of hay we fed. Brad Eik our Ranch Manager has an article at the end of the newsletter that will get you up-to-date on the cattle operations.

We have been devoting a lot of our time to planning and evaluating how to improve the way we conduct research and operations. In September, we conducted an Expert Panel Review and received a thorough report from the panel in January. The scientists met on three occasions over a month's period to discuss how we could adopt their recommendations. We have written a draft plan to improve and use their suggestions. Our response will be in a final form soon. This has been a revealing process that has already made us better.

We are 1.5 years away from terminating our present 5 year research plan. To prepare for that event, we have participated in 2 National Workshops with the purpose of developing the next 5 year plans starting in 2013 for both rangeland and beef cattle oriented research. The opportunity to use our panel insight while developing future research objective has been beneficial. We have been working towards one big problem that can be attacked by a combined effort of the range and livestock scientists simultaneously.

We are always striving to meet our stakeholders and customers when it is convenient for them. We hosted an Open House and Tour Friday Night during the Christmas Stroll organized by businesses in Miles City. The Open House was a good opportunity for us to show the results of the recent remodeling of our facilities and office space and share our accomplishments. We followed up the open house

Introduction (continued)

with our Fort Keogh Christmas Party that night.

In January we were invited to travel to Roundup and take "Fort Keogh on the Road." Six scientists presented both current science and management information along with original research to a group of 30 participants. The audience was engaged and asked a lot of questions which sparked discussion. (The organizing committee had provided some great flat iron steaks for lunch too.) In the first week of February, Fort Keogh with National Programs Office, Clay Center, NE, Temple TX, and other ARS units shared a booth in the trade show at the annual meeting of the National Cattlemen's Beef Association. That was a good opportunity to meet new people from around the country and see many of our Montana friends and Focus Group Members. Also in February, the Society for Range Management met in Billings. The meeting was sponsored by the Great Plains Section of which we are affiliated. Jen Muscha was on the planning committee and we appreciate all of the time and effort she gave to make that meeting a success with over 1,600 people attending. Hopefully in the near future you will be hearing from us as we try some electronic media to enhance sharing our story about innovative rangeland agriculture. Also SAVE THE DATE, June 21-23 we will be hosting the Western Section of the American Society of Animal Science Annual Scientific meetings. Tuesday June 21st will be an outside Beef Symposium utilizing retired and current Fort Keogh scientists to present research oriented material. The technical session will be held in classrooms at Miles Community College on the 22nd and 23rd of June. We are very appreciative of the partnership with the College. We expect approximately 180 participants. The last time these meeting were held in Miles City was 1931.

We are fortunate to have Dr. Matt Cronin from the University of Alaska as a visiting scientist for 12 months. He has come to Fort Keogh to collaborate with our genetic/genomics group. He has written an interesting article you will find on page 2.

Please stop by the Fort and say hi. We would like to find out what is going on at your place.

New Employee

Dustin Strong, Range Technician

Dustin Strong (Range Technician) is working with Dr. Lance Vermeire supporting research in the area of range ecology. Dustin grew up in northwest North Dakota where his love for the outdoors and passion for rangelands began. He attended North Dakota State University, where he received a Bachelor's of Science in Natural Resource Management in May of 2010. Dustin is currently pursuing a Master's of Science in Range Science at NDSU, working with Dr. Vermeire and Dr. Amy Ganguli (Assistant Professor). Dustin's research is focused on the development of vegetation management strategies aimed at reducing purple three-awn abundance on Eastern Montana rangelands as well as quantifying fire behavior. Dustin is pleased to begin his professional career at Fort Keogh and he and his family are looking forward to calling Miles City home.

Research In Common

By Visiting Scientist Matt Cronin

Dr. Matt Cronin

WHY WOULD A SCIENTIST FROM ALASKA WORKING ON POLAR BEARS WANT TO WORK AT FORT KEOGH WITH CATTLE? RESEARCHERS?

Matthew Cronin, Research Associate Professor of Animal Genetics, University of Alaska Fairbanks, School of Natural Resources and Agricultural Sciences,

I've had the pleasure of working with researchers at Fort Keogh for several years and am now here as a visiting researcher. It is very exciting for me to be in such a productive and diverse research facility. Most of my past work has been with fish and wildlife populations, including polar bears, grizzly bears, caribou, salmon, and whales. Working in Alaska for the last 22 years, it is refreshing and exciting to be back in Montana. I did graduate work at Montana State University in the 1980's and being at Fort Keogh feels like being home.

Why would a scientist from Alaska working on polar bears want to work at Fort Keogh with cattle researchers? It's because of the quality of the science done here. Working in genetics, it became clear to me that the long term and rigorous genetic experiments done on the Line 1 Herefords and other cattle at Fort Keogh provide insights about relationships between lines and breeds, and performance traits that are applicable to wild populations. The same processes of breeding and selection occur in wild and domestic animals, but the controlled breeding and selection in the domestic cattle allow detailed scientific assessment of the factors responsible for variation in traits. Although we don't have the same experimental control of wild populations, they do breed and experience selection, and the advanced understanding of the processes in domestic animals helps us understand wild populations. Likewise, my perspectives from wild populations and diverse species may provide insights useful to cattle researchers regarding patterns of genetic variation and adaptation in nature.

My previous work with the Fort Keogh genetics researchers Mike MacNeil and Lee Alexander included assessing the extent of genetic differences between cattle breeds and a feral cattle herd on Chirikof Island, Alaska. We found this feral herd was genetically different from several cattle breeds. It has been isolated for decades on the small, uninhabited Chirikof Island, southwest of Kodiak Island. Local legend has it that the cattle are descended from Russian cattle, brought there in the early 1800's before the U.S. acquired Alaska from Russia. There are also documented introductions of western breeds in the 1900's so the herd's ancestry is mixed. The USDA Agricultural Research Service, National Animal Germplasm Program is interested in getting semen, embryos, or animals from this herd as a potential valuable genetic source. Because the cattle have been living unmanaged for many years, they may have experienced selection pressures different from those of domestic herds. However, Chirikof Island is very difficult (and dangerous) to get to, being surrounded by the rough and cold North Pacific Ocean waters. We are investigating the potential to access the island and collect animals or semen.

We also compared herds of wild caribou, and their closely related cousins, reindeer. Caribou and reindeer are the same species (*Rangifer tarandus*) and domestic reindeer were brought from Siberia to western Alaska in the 1890's. They increased to more than 600,000 animals in the 1930's, but have declined significantly since then. Several herds, with a total of about 10,000 to 20,000 animals are still herded in a semi-domestic fashion on the Seward Peninsula and a few other small herds around the state. We found that after more than 100 years, the Alaskan reindeer are still genetically similar to Siberian reindeer, and there has been limited genetic interchange between the reindeer and wild caribou. This is despite the overlap of the

Polar bear female and young. Susanne Miller/USFS

Research In Common (Continued)

Reindeer, (*Rangifer tarandus*), photo by Matt Cronin

caribou and reindeer ranges. In fact, the reindeer herds have declined in number as large numbers of reindeer have run off with wild caribou herds over the last several years.

My current genetics work includes comparison of the plains bison and wood bison subspecies. Plains bison are the common type that occurred in the Great Plains, including Montana. Wood bison occur in northwest Canada and live in more forested habitats. Wood bison are being proposed for introduction to Alaska, but because wood bison are on the endangered species list, the State of Alaska and landowners are opposed to it. It is interesting that plains bison were transplanted to Alaska more than 80 years ago, and the herds have done well. In addition, the size and appearance (phenotypes) of wood bison and plains bison overlap, and there are no fixed genetic differences between wood bison and plains bison. The combined data suggest that wood bison and plains bison are not legitimate subspecies. Fort Keogh researchers are helping to further assess this relationship with genetic markers developed in cattle. Cattle and bison are closely related enough so the same genetic markers work in both. This has important implications for wild population management and can help avoid problems with possible endangered species issues. Some groups want to make plains bison an endangered species also, and our work can bring good science to the table on this issue.

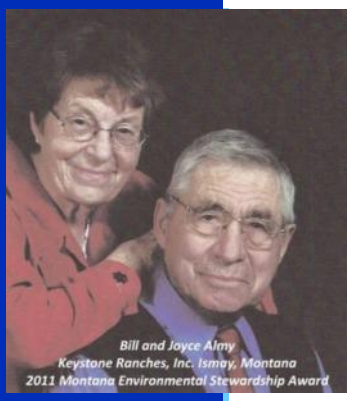
I have a large project on the genetics of polar bears and grizzly bears (also called brown bears). I am using modern genomics, as has been recently applied to cattle, to better define the differences between polar bears and the closely related grizzly. These species are so closely related, they share many of the same genes, although they are clearly separate species. The polar bear is clearly adapted to arctic marine life, with the familiar white fur, living on the sea ice, hunting marine mammals, and not hibernating (except pregnant females). Grizzly bears live on land, eat plants and animals, and both sexes hibernate. Understanding the species' genetic relationships will be useful in assessing the nature and extent of polar bears survival during previous warming periods in the Arctic. Polar bears have been listed as an endangered species because of predictions of loss of sea ice due to global warming. However, this is premature because the species is currently abundant and the endangered status is entirely dependent on model predictions. My work will show the time polar bears have existed as a species, and their exposure to previous warming periods with potentially ice-free conditions in the Arctic, through which they survived. It will bring better scientific rigor to the endangered species issues. The expertise of the Fort Keogh genetics researchers who work in cattle genomics is helping understand the application of modern genomics to this new species.

Caraibou, (Rangifer tarandus), photo by USFWS

Many of the issues on which I've worked have included endangered species considerations. Environmentalists have commonly made claims about genetic variation to justify declarations that populations of grizzly bears, wolves, sage grouse and other species are endangered. This is often using limited interpretation of the science and can have serious impacts on the resource industries and agriculture. For example, it was claimed that the wolf population in Yellowstone National Park would be endangered by inbreeding in the future because of lack of interbreeding with other groups. This is an unwarranted speculation that does not properly reflect the available science. I hope my work will provide good science and proper interpretation to limit the negative impacts of endangered species, so industry and landowners can continue to use and manage their land.

I am glad to be working in Miles City, and thank Research Leader, Mark Petersen, and the great staff at Fort Keogh for making my stay pleasant and productive.

Environmental Stewardship Award



BILL & JOYCE ALMY KEYSTONE RANCHES

Bill Almy, long time member of the Fort Keogh Customer Focus Group, and his wife, Joyce, of the Keystone Ranches, were the winners of the Montana Stockgrowers Association's **2011 Montana Environmental Stewardship Award.**

"Over the past 50 years, the Almys have made the best use of available resources. In partnership with various groups and agencies, they have implemented water and grazing management innovations on Keystone Ranches that have raised the carrying capacity of the land by almost 50 percent, cut their debt-to-asset ratio from 55 percent to under 15 percent, improved wildlife habitat, maintained long-term relationships with employees, and supported their eastern Montana community.

The Montana Stockgrowers Association (MSGA) recently nominated Keystone Ranches, Inc. and the Bill Almy family of Ismay, Mont. for the 2011 regional and national Environmental Stewardship Award sponsored by Dow AgroSciences, USDA-Natural Resources Conservation Service, the National Cattlemen's Beef Association, and the National Cattlemen's Foundation."

To read the full article go to http://www.mtbeef. org/content/images/ 2011AlmyESAPApp.pdf

Animal Science Award

DR. MICHAEL D. MACNEIL

Dr. Mike MacNeil was awarded the **Rockefeller Prentice Award in Breeding and Genetics** from the American Society of Animal Science. This is the highest honor that is awarded to an Animal Breeder/Geneticist. He will be recognized at the Animal Science Meeting in New Orleans in July.

College & High School

Our summer crew is starting soon. We have several high school and college students working in various facets of our operations. On the farm/feedlot crew we will have Clint LaRowe and Cooper Merrill both from Miles City returning for another season. Bryce Robinson and Ethan Murnin will be returning to work with Kenny on the maintenance crew.

Dr. Mike MacNeil will have Katie Reeder, University of Georgia, as a student intern to assist with various aspects of on going genetics and physiology experiments.

Bruce Moffat an Oregon State University student will be working on a plant restoration project with Dr. Matt Rinella.

Bernadette Garber and Kylee Jeffers will be on the summer range crew.

MSU Student, Drew Gaskill of Volborg, will be working with Drs. Tom Geary and Andy Roberts on identifying the role of estradiol in early pregnancy, a bull fertility study, and assessing the contribution of semen fertility on pregnancy failure,

Graduate Students:

Travis Mullinicks, New Mexico State University PhD student, is working with Drs. Mark Petersen and Andy Roberts on a project involving factors effecting beef cow efficiency.

Megan Minten, Texas A&M University, is working on her PhD with Dr. Tom Geary. She will be going to Washington State University to finish her PhD in the fall. Her PhD project is titled: Identification of Beef Heifers with Superior Capacity for Fertility.

Morgan Russell, North Dakota State University PhD student, will work with Dr. Lance Vermeire examining grass bud bank response to fire, drought and grazing to improve understanding of plant community changes following disturbance.

Nick Dufek, North Dakota State University Masters student, will work with Dr. Lance Vermeire examining fire and soil fertility effects on purple three-awn dominated plant communities and their interactions with grazing.

Fort Keogh Outreach Activities

November 5-6, 2010. Mark Petersen and Rachel Endecott attended the Montana State University Ag Appreciation Weekend at the MSU College of Agriculture.

December 18, 2010. At the winter meetings of the Montana Stockgrowers Association, Tom Geary and Andy Roberts presented talks at the Cattlemen's College. 100+ were in attendance.

January 7-14, 2011. Rachel Endecott gave a presentation about preparing for calving season at Cow Capital Beef Day in Miles City, MT and during the Southeastern Montana Winter Series (Jordan, Circle, Broadus, Ekalaka, Baker, Wibaux, Terry, and Forsyth) for 215 total attendees.

January 11-14, 2011. Richard Waterman was invited to be a keynote speaker at the 2011 Beef Days in six locations in South Dakota: Martin, Hot Springs, St. Onge, Wall, Union Center, and Buffalo. There were 75 participants at one site and anywhere from 15-30 at the others.

January 18 and 27, 2011. Rachel Endecott presented talks about cow body condition impacts on nutrition and reproduction at the Madison Winter Grazing Seminar in Ennis, MT (60 attendees) and at Herdsmanship Schools in Helmville and Hall, MT (19 attendees).

January 20, 2011. Rachel Endecott gave a hands-on workshop with a total of 130 K-4 graders at Ennis Elementary School about Montana agriculture products.

January 24, 2011. Andy Roberts, Mike MacNeil, Mark Petersen, Richard Waterman, Matt Rinella and Rachel Endecott presented at a "Fort Keogh on the Road" program to around 30 producers in Roundup, MT.

January 26, 2011. Rachel Endecott and Matt Rinella presented talks at a local Extension program in Fort Benton, MT for 10 producers.

February 6-9, 2011. Billings, MT, Society of Range Management 63rd Annual Meetings, Billings, MT. Mark Petersen, Ruminant Nutritionist, presented "Range Cattle Winter Water Consumption in Eastern Montana" and Chaired the session *Inventory, Monitoring, and Assessment*.

Kurt Reinhart, Ecologist, presented 2 posters, "Effects of Prescribed Burning and Litter Type on Litter Decomposition and Nutrient Release in Mixed-Grass Prairie in Eastern Montana," and "Understanding Priority Effects May Help Improve Restoration Outcomes and Establishment of Artemisia tridentata spp. Wyomingensis," and moderated the session, *Fire Ecology and Management*.

Lance Vermeire, Ecologist, presented 2 posters, "Fire, Herbicide and Disking Effects on Diversifying Crested Wheatgrass Stands in the Northern Great Plains" and "Fire and Post-fire Soil Erosion."

Jennifer Muscha, Support Rangeland Scientist, Co-Chaired the Logistics Committee for the meeting and is the Secretary/Treasurer for the NGP Section.

April 13, 2011. Fort Keogh hosted a group of producers from Argentina. An overview of the research was given by Dr. Mark Petersen, Dr. Tom Geary talked about the reproduction program and Dr. Andy Roberts gave a tour of the calving facilities and discussed the CGC project.

Recent Publications:

Funston, R., Martin, J., Larson, D., Roberts, A.J. 2010. Developing High Quality Replacement Heifers. Proceedings MN Beef Cow-Calf Days 2010 pages 1-8.

Geary, T. W., Ansotegui, R.P. , MacNeil, M.D., Roberts, A.J., Waterman, R.C. 2010. Effects of flunixin meglumine on pregnancy establishment in beef cattle. Journal of Animal Science 88:943-949.

Geary, T.W., Abreu, F.M. 2011. Factors affecting fertilization and pregnancy establishment in beef cows. Proceedings of the XV Course on New Approaches to Production and Reproduction in Cattle. Pp. 272-287. Uberlandia, Brazil.

Geary, T.W., Roberts, A.J. 2011. Improving Reproductive Performance: Long and Short Term. Proceedings of the XV Course on New Approaches to Production and Reproduction in Cattle. Pp. 370-385. Uberlandia, Brazil.

Harhay, G.P., Smith, T.P.L., Alexander, L.J., Haudenschild, C.D., Keele, J.W., Matukumalli, L.K., Schroeder, S.G., Van Tassell, C.P., Gresham, C.R., Bridges, S.M., Burgess, S.C., Sonstegard, T.S. 2010. An atlas of bovine gene expression reveals novel distinctive tissue characteristics and evidence for improving genome annotation. Genome Biology [online serial]. 11:R102.

Reinhart, K.O., Rinella, M.J. 2011. Comparing susceptibility of eastern and western US grasslands to competition and allelopathy from spotted knapweed [Centaurea stoebe L. subsp. micranthos (Gugler) Hayek]. Plant Ecology 212:821–828.

Reinhart, K.O., Royo, A.A., Kageyama, S.A., Clay, K. 2010. Canopy gaps decrease microbial densities and disease risk for a shade-intolerant tree species. Acta Oecologia 36(6):530-536.

Reinhart, K.O., Van Der Putten, W.H., Tytgat, T., Clay, K. 2011. Variation in specificity of soil-borne pathogens from a plant's native range versus its non-native range. International Journal of Ecology online doi:10.1155/2011/737298.

Rinella, M.J., Vavra, M., Naylor, B.J., Boyd, J.M. 2011. Estimating influence of stocking regimes on livestock grazing distributions. Ecological Modeling 222:619-625.

Roberts, A.J., Mclean, D.J. 2011. Differential gene expression in anterior pituitary glands from anestrous and cycling postpartum beef cows. Journal of Animal Science 89:1035-1041.

Vermeire, L.T., Crowder, J.L., Wester, D.B. 2011. Plant Community and Soil Environment Response to Summer Fire in the Northern Great Plains. Rangeland Ecology and Management 64:37-46.

Waterman, R.C., Richardson, K.D., Lodge-Ivey, S.L. 2011. Effects of Euphorbia esula L. (leafy spurge) on cattle and sheep *in vitro* fermentation and gas production. J. Science Food Agriculture DOI 10.1002/jsfa.4419

Waterman, R.C., Vermeire, L.T. 2011. Grazing Deferment Effects On Forage Diet Quality And Ewe Performance Following Summer Rangeland Fire. Rangeland Ecology and Management 64:18-27.

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

BRAD EIK
ASSISTANT TO THE SUPERINTENDENT

Greetings from the Fort Keogh cow crews and outside operations! We, like everyone else, are anxiously awaiting spring to get here and stay. For the first time in several years we had to purchase hay to get through the feeding season and are enjoying the green grass that is starting to pop up everywhere. Just a little update on things going on outside. We have been calving since February and are wrapping up in both the Genetics and Physiology cow herds with the exception of the Season of Calving (SOC) late herd which will get started end of May/first part of June. Calving has gone pretty well for us this year even with the cold wet spring. We have branded around 900 calves thus far and still have around 600 to go once everything is calved out. We switched up our vaccination program this spring continuing with the Clostrishield 7 way but switching to a modified live vaccine Pyramid 5 in place of the Virashield 6 which is a killed vaccine that we have used for several years here. We feel the calves will have a much better reaction to this sort of vaccine helping them fight dangerous pathogens more effectively.

We are getting ready to undergo semen testing of our composite CGC yearling bulls which are part of an ongoing fertility study. There are 214 head to be tested over a span of 5 days. We have also been selling a number of yearling bulls private treaty so if you're in need of some good growth bulls, come take a look at these composites and see what their genetics can do to help improve your herd vigor and add extra pounds to your calves in the fall. It is also the season to start our timed AI for the SOC early cows of around 80 head, and in a couple weeks the entire Physiology cow herd will be timed artificially inseminated (AI) which consists of 500 head of cows and heifers. We have worked all of our open yearling heifers with prebreeding shots including Pyramid 5 and Tri-Vib 5L which all first year breeding females receive two rounds. The older cows all get one dose of those vaccines each year.

We had another great Line 1 Hereford production sale this year in March and thank everyone for their attendance and purchases. We averaged $5,100 on 5 head of three-year-old bulls, $3,272.92 on 24 head of two-year-old bulls for an overall bull average of $3,587.93. On 18 females we averaged $1,288.24. We were very pleased with the attendance and sale results and look forward to another great year next year.

Fort Keogh donated a steer to Miles City Community College for the **Steers for Pioneers** program which we were very excited to be a part of such a good cause and hope to participate for years to come.

One more quick piece of information in closing. We are planning an informal study on fly control this summer treating herds with different techniques (fly tags and mineral with IGR) to control fly populations. We will be testing a couple different fly tag brands to see if one is more effective than the other and hopefully have some cost analysis to report this fall for your use.

We hope your spring has been good and that the grass is getting green in your neck of the woods. If we can do anything to help your operation or for any information about things going on out here, please feel free to call me or stop in and say hello.

Thanks!

Brad Eik
Ranch Manager
406-874-8226

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Strategies Developed for More Efficient Beef Cattle Production

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