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USDA Agricultural Research Service

MONTANA STATE UNIVERSITY College of AGRICULTURE & MONTANA AGRICULTURAL EXPERIMENT STATION

USDA ARS LIVESTOCK AND RANGE RESEARCH LABORATORY

Fort Keogh Researcher

Introduction

Dr. Mark Petersen, Research Leader

Hello from Fort Keogh;

It is nice to be sitting down to write to you about the events and accomplishments at Fort Keogh. Every year it is so interesting to see what Mother Nature gives us and what we need to do to adapt. This year was one of those years that you plan for but really hope does not happen. If you looked up our precipitation for the year on the US Weather Service web page, you would read we have received 5.9 inches by the 10th of November but nearly half of that (2.5 inches) fell in the last 2 months. It was a trying year for our ranges. The NOAA outlook for the next 5 months is showing chances for above normal precipitation due to the La Nina pattern that has formed. It would be very good if the forecast were accurate because we could use a wet spring. We have joined the Montana Mesonet network and they are installing real time weather stations across Montana. Our station, located in the Upper Cottonwood pasture on the north end of the Fort, was installed this summer and shows real time weather data - precipitation, temperature, soil moisture, etc. If you are interested in checking it out go to http://climate.umt.edu/mesonet/Stations/details.php?ID=ftkeoghn. It has a cellular link so you can access it on your computer or smart phone and it is updated every 30 minutes. We plan to add two more south of the installed unit and should be accessible from the internet.

The good thing about all of this is that we have to conduct our research in the same conditions that everybody else in the Northern Great Plains has to manage and produce. These types of conditions create opportunities for new insights that we could never have designed. Currently our range group is engaged in a long-term drought study that was implemented in 2013 and the dry weather certainly helps a drought study!

We have been busy with some big initiatives recently. We successfully submitted and received approval for our new Beef Cattle Research Project for the next 5 years. Input we received from various stakeholders asked us to move the research deeper into factors that influence a cows lifetime productivity, physiological mechanisms promoting fertility, identifying genetic associations with important phenotypes in Fort Keogh cattle, improving the precision and scope of breeding soundness exams for bulls, managing stock water quality and developing flexible schemes for variability in range forage production. The rangeland ecology research group has started to draft their new five-year proposal. Highlights of some of the ideas for that project include an emphasis on restoration from mining, weed eradication, invasive tree removal and drought.

As a part of our new research plans, the ARS has started a new platform for configuring cross-location research. This platform is called the Grand Challenge. The Fort Keogh Beef Cattle research scientists are engaged in a large study with scientists at Clay Center Nebraska, El Reno Oklahoma, Cheyenne Wyoming, Woodard Oklahoma and Grand

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Forks, North Dakota to investigate the interactions of genetics with environment by management and product from calf growth to harvest. The laboratory at Clay Center Nebraska will develop calves from five breeds and they will be grown after weaning to harvest in Nebraska, Oklahoma, and Montana using the typical resources common to that region. The cattle will have been ranked by various production measures including growth rate, measures of efficiency, meat quality, and healthfulness for human diets. Since cattle move all over the continent from growing to finishing, this study will allow us a first look at how genetic by environment by management impacts the final product. We will keep you updated as this effort progresses.

The Bunkhouse features a central shared kitchen and dining area and two lounge rooms, each furnished with leather couches, flat screen TV and coffee table. The six individual rooms are capable of housing a total of ten occupants. Two separate showers, lavatories and laundry rooms add to the comfort.

The last major initiative we had to steer around was Fort Keogh's proposed closure in the President's budget. As of the time this column was written the indicators were positive as the House and Senate Agricultural Appropriations Budget included funding for the Fort along with 17 other projected laboratory closings. We are waiting on the final budget bill to be approved which includes our funding. The number of individuals, organizations, and leaders who spoke about the important role they believe our research outcomes play humbles us.

This summer we fully utilized our new bunkhouse. We had six students from MSU Bozeman, Columbia Missouri, and Las Cruces New Mexico (Argentina). Having the bunkhouse for students is a nice addition to the experience we can create for future Animal and Range Scientists. I am personally proud of the work we do at Fort Keogh. Everyone associated with Fort Keogh is dedicated to creating solutions for landscapes that function well and range cattle that are highly efficient and produce highly nutritious and wholesome food for people. Please plan to visit us when you have a chance. Hope you have a great winter with the right amount of snow and you can enjoy the Holidays.

Mark Peterson

From Left to Right. Lauren, Marina, Abby, Katy and Tom.

Dr. Tom Geary and his Lab. Tech Abby Zeseski, pose with their summer hires after a successful work season.

From Left to Right. Amanda, Gavin and Kailey.

Local summer hires take a break from their work to show how much they enjoy assessing rangeland health.

Genetic by Environment Interaction Effects on Beef Cattle

Dr. El Hamidi Hay, Geneticist

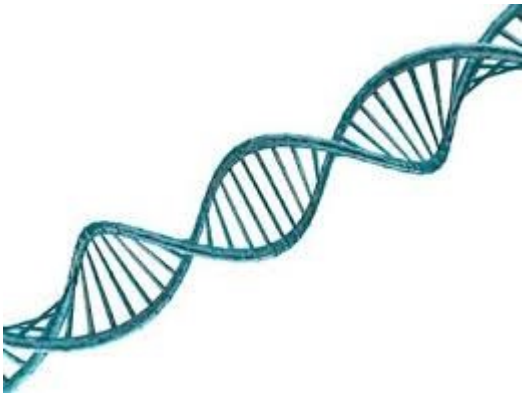
Economically important traits are often under the control of genetics, the environment, management and their interaction. In addition, cattle are required to perform in a wide variety of environmental conditions such as weather, topography, exposure to disease, and amount and quality of feed. Geneticists have long recognized the need to incorporate genetic by environment interaction in the evaluation and selection of beef cattle. However, this is not routinely included in the estimation of expected progeny differences (EPD) due to two major reasons. First, phenotypes are collected from a small number of environments, and second, only a few animals have progeny in various environments.

Fort Keogh has a long history of studying genetics by environment (GxE) interaction and its effects on beef cattle. In the early days, two closed Hereford cattle lines were developed at two USDA agricultural research stations, one in Montana and the other in Florida. Few animals were exchanged between the two locations. Therefore, both Montana Line 1 Herford cattle and Florida-line cattle were evaluated at both locations. The weaning weights of these animals were evaluated and showed that the Montana Line 1 Hereford in Montana were 22 pounds heavier on average at weaning than the Florida Hereford line. On the other hand, in Florida, the Montana Line 1 Hereford averaged 19 pounds lighter than the Florida Hereford. Due to the difference in the climate between Montana and Florida, the two Hereford lines behaved as different breeds. This is a clear example of the effect of the environment on the performance of beef cattle.

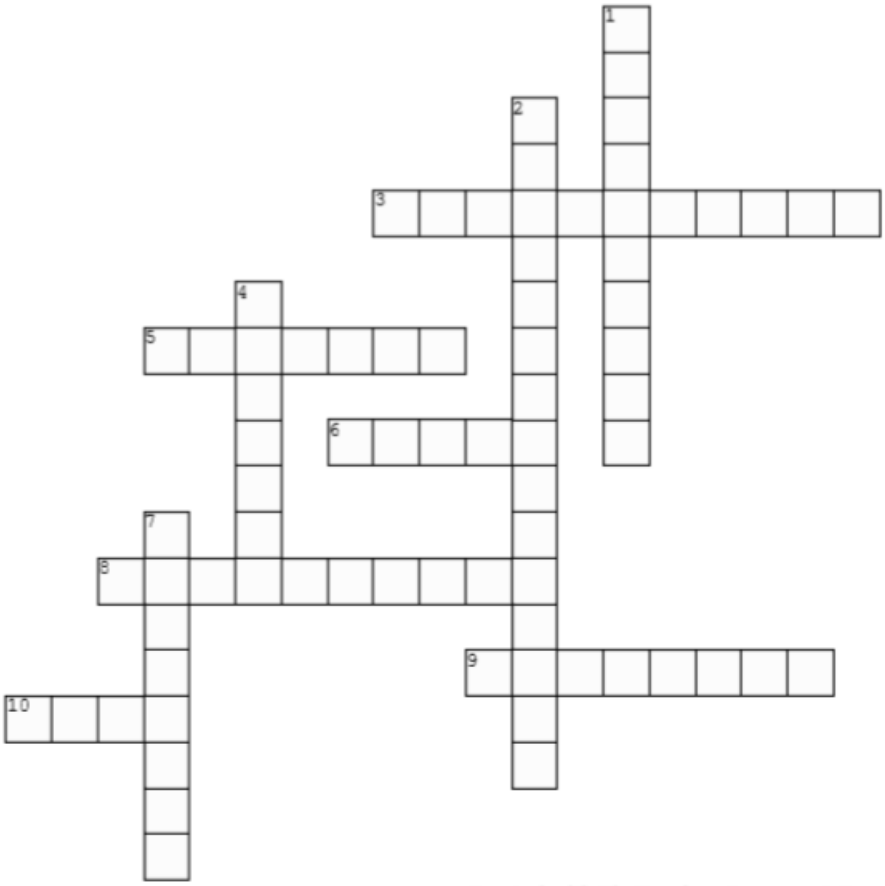
Recently, in collaboration with Dr. Andy Roberts from Fort Keogh, a study on genetic by prenatal and post weaning nutritional environment interaction has been carried out using a composite beef cattle breed (50% Red Angus, 25% Charolais, 25% Tarentaise). Four nutritional environments were created based on two levels of winter supplement provided to dams grazing winter range during gestation and two levels of input to offspring during post-weaning development. The traits evaluated consisted of average daily gain during the 140-d post wean trial (ADG), yearling weight and ultrasound measurement of fat depth over the rib (FAT) and intramuscular fat (IMF). The results of the study showed a significant effect of genetic by environment interaction on the traits studied causing a change and re-ranking of EPDs across different environments. Another important finding is that the effect of genetic by environmental interaction was more noticeable in the lowly heritable traits.

Currently, with the advent of DNA information, we are working on incorporating this important information to better evaluate and understand the effects of genetic by environment interaction. Given Fort Keogh's location and resources, it is well-positioned to carry out this type of research and disseminating the findings to scientific and agricultural partners.

Composite Genetic Cattle (CGC) in the feedlot.



A Line 1 bull on summer rangeland pasture.



Created with TheTeachersCorner.net Crossword Puzzle Generator

Across

3. a symbiotic association between a fungus and the roots of a vascular host plant
5. Prescribed in Ponderosa Pines.
6. The 'first' stomach of a cow
8. Location of the USDA ARS Headquarters
9. The study of genes, genetic variation, and heredity in living organisms
10. Cattle used for consumption

Down

1. One of MSU's Ag programs
2. Private lands hunting program
4. A dry spell
7. Line 1 breed

Block Management

Fort Keogh has been allowing hunters to try their skills in tracking and harvesting a variety of animals through the Montana Fish, Wildlife and Parks Block Management Program since it's introduction. This year 166 individuals have registered for hunting, some traveling from as far as Georgia. Hunters must first visit the front lobby of Fort Keogh to get permission to hunt, then they must visit the MT FWP office to register for a specific area and timeframe to conduct their hunting. Both of these stops must be conducted during normal duty hours. While the procedure to get access may seem lengthy, it can result in very satisfying efforts. As long as the hunters retain their access pass from Fort Keogh, they only need to visit our office one time. They do need to contact FWP every time they intend to hunt, to be assigned an area. This ensures that everyone can enjoy a safe hunting experience and not be hindered by other hunters unintentionally scaring prey away.

Hunting is a special privilege that we want to continue to provide to members of the community and travelers alike. Often, people think they have a right to be on Fort Keogh land, mistaking it for public land. The land operated by the USDA ARS is owned by the federal government, but it is not for public access. The land is "set aside" with the specific purpose to conduct experiments on the relationships between cattle and rangeland environments in an attempt to find better ways to manage both. In addition to supporting a local culture and tradition, hunting also allows Fort Keogh to manage the populations of wildlife. If left unchecked, the large game animals could easily disrupt the studies conducted here. We hope all hunters have had an exceptional experience while visiting the Livestock and Range Research Laboratory that we are proud to call Fort Keogh.

Ryan Thom shared proof of his success from hunting on Fort Keogh through the Block Management Program.

Hail

Scott Crevier came to the Cowboy crew at Fort Keogh in March 2017. He came to Fort Keogh from the Beaverslide Ranch south of Miles City. Scott has an extensive amount of experience in ranch and cattle operations.

Beau Huft began his employment in May 2017. He also joined the Cowboy crew here at Fort Keogh. He worked for several years at Harding Land and Livestock and Wyoming ranches prior to coming to Fort Keogh.

Farewell

Mike Woods, the Ranch Foreman, retired after 24 Years of quality work at Fort Keogh. He looks forward to spending his time hunting and fishing as well as spending lots of time with his family.

Cooper Merrill, the Farm Foreman, has decided to further his education and has returned to MSU Northern to receive a diesel mechanic degree to go along with his welding degree. He continues his MAES employment at the Northern Agricultural Research Center in Havre, MT.

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http://www.ars.usda.gov/pa/ftkeogh or email us at fort.keogh@ars.usda.gov .

Assistant's Corner

Hello everyone and welcome. I can't believe we are here again already, seems like we just did this and a year has already passed. Well, here are the highlights for the ag operation at the Fort for the year.

Annual Bull Sale

To support the new sale barn, we moved our 82nd sale back over there this year. All 29 Line 1 bulls sold, and we realized an average price of $3,800/hd with our top bull bringing $9,000. Zero no sales and prices that were up from a year ago made us feel pretty good about sale day as a whole. It was reassuring to hear numerous comments from long time buyers that the bulls have never looked better.

Cattle Production

We had great weather for calving season, still we had a few losses mostly weird things with the heifers. Lots of backwards calves and feet back. We were able to save most of them. Mortality rate was around 3%, which includes pasture loss to date as well. That number is up from a year ago but still considerably better than most of the past years.

Overall breeding was up this year on the heifers at 87% on 365 hd.

- L1 & Angus heifers moved from a 60-day to 45-day breeding season. L1's were as high as they have ever been at 94% with the registered Angus at 86%.
- Phys heifers had a lower than normal AI rate at 50% but still finished the 30 days season at 93% bred.
- CGC's were the group that dropped the average this year and it was really only half of them. We had them split and the one pasture was much rougher and it had a big effect on pregnancy rates at 54% while the other pasture was very close to 90% for an overall rate of 72% pregnant in 40 days.

Breeding on the cows was also better than expected.

- It has been a weird year for AI and Embryo transfer with the Phys older cow herd coming in at around 48%. Our normal AI rate is over 70% on these cows, we haven't performed the second preg check on them to know the whole season numbers yet. None of the other older cows have been checked yet either so I don't have that data yet.
- CGC older cows bred up at a great 96%.
- L1 breed up was much better than average at 85%.
- Registered Angus was lower than I would like to see at 84% but they are still in the adjustment phase of system here.
- Phys cows which are always high were at 97%.

We sold one heavy load of Phys steers in 2016 on Northern 105 hd at 585 lbs averaged $847/hd.

We topped the Superior Market again last December with 2 very good loads of black and black baldy steer calves from our Phys cows heavy group (90hd) at 560 lbs and the lights (110hd) at 460. Averaged real close to $1100/hd which in last year's dropping market was pretty favorable for lighter steers. The research changed in this herd for 2016 and 80 of these steers were left as bulls for a development study so we will only have one load to sell and I opted to sell them through Northern Ag early this year and they will sell this coming Monday for December delivery.

We donated another steer to MSU's Steer-A-Year program and will again this fall.

Sale prices have been down in FY 2016 but the Ag operation was still able to scrape together $1.3 million which is a very good year still. Hoping to get the cash flow steady in the coming year.

It's been dry but we had a good enough spring the grass is in pretty good shape out here and the cows are in real good condition.

Crop Production

Three pretty good cuttings of alfalfa produced anywhere from 5.8 to 6.4 tons. We irrigated things up for a 4th cutting but it will leave some nice grazing this fall.

Two cuttings on the Sainfoin/Meadow Brome/Orchard grass made right at 4.5 tons. Some of that wasn't irrigated on the 2nd cutting so I'm very happy with those yields. Now that the stand is established I anticipate closer to 6 tons next year on 2 cuttings.

Forty five acres of hay barley yielded 292 bales for 3.6 tons/ac.

One hundred forty acres of silage corn averaged right at 30 tons/ac on this gumbo. We were ecstatic, this might be the best corn crop we have had in my 7 years here.

We seeded down 155 ac of winter forage triticale for hay production this fall.

The farm plan, as a whole, was put together very well by Cooper Merrill and he stuck to his guns all season and had a great production year. I'm very proud of this young man. We also added a farm technician, Hayden Davis, that graduated from University of Georgia with a farm management degree to help fill the farm crew and he was a great addition.

Machinery

We were fortunate enough to get a brand-new, self-propelled, John Deere swather purchased for this coming year which will speed up our cutting time greatly.

We also upgraded wheel rakes from a 12-wheel to a 14-wheel rake.

Our old leaking grain bins were removed in 2016 and the concrete pad in 2017. This marks completion of the first stage of our feed mill renovation.

We put in three new stainless-steel hopper bottom bins with 4800 bu capacity each are standing on a new pad.

Two brand new overhead 30-ton cake bins were installed to keep the loose cake out of the old cake shed.

We took one of our really, good low mileage trucks from GSA excess and put a brand new heavy-duty Knight manure spreader on it with a silage kit. This gives us the freedom to do a good job spreading our own manure and gives us another truck for silage chopping with the long trips down to the end of the old highway.

We got a couple side-by-sides; one for the farm crew and one for the reluctant at first cowboy crew. They now admit it is nice for fencing and tagging up calves. lol

With that, I will close and say thanks for reading and attending the meeting and I hope everyone has a great fall and as always please give me a call if there is anything I can do to help you out there. (406-853-2635.)

Brad A. Eik

Ranch Manager

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Fort Keogh's Mission

To develop ecologically and economically sustainable range animal management systems that meet consumers' needs. Agriculture is the business of capturing solar energy and transferring it to humankind for their use (i.e., food and fiber), and grazing of rangelands is one of the most sustainable forms of agriculture known. Research focus is on developing profitable management tactics that enhance the efficiency whereby solar energy is captured by the forage resource and subsequently harvested and assimilated by grazing animals into highly desirable agricultural products.

Hoofin' it for Hunger 2017

This year marked the 5th year that the Montana Farm Bureau Young Farmers & Ranchers and Fort Keogh hosted the annual trail run to fight hunger in Montana. The race, which offers competitive events in the 5 km, 10 km and 1/2 marathon distances, raises money and food donations in support of the Montana Food Bank Network. The planning committee, which consists of volunteers from Montana Farm Bureau, Fort Keogh and the community, work hard to make the entire event more appealing to the public while striving to cut costs in order to maximize the donation. This year saw a total of 126 participants and generated $7000 dollars that was donated to the Montana Food Bank. Additionally, 121 lbs of food was collected during the race and donated locally to the Custer County Food Bank.

In addition to supporting the primary cause, the committee is also soliciting feedback from the participants in order to make a better event. In the past, it was noted that the distances were a little off. This year, the half marathon course was modified. This resulted in a closer to accurate 13.1 km distance that runners can compare their times to other half marathons that they have completed. The course is already challenging enough with a 270 foot gain in elevation midway, it doesn't need to be any longer than necessary.

A non-competitive Virtual run was also added in 2016. This option allows runners the ability to earn the t-shirt reward, the motivation to stay active and the goodwill of supporting a worthy cause, without the need to travel long distances. 31 runners chose to participate by being a Virtual Runner.

This year we tried some new marketing as well. Using social media, we participated in a few Facebook Live sessions to talk about the race, the location and address questions or concerns from the web. We also gave a shout out to our sponsors. Without them, we would not be successful. Like **Hoofin it for Hunger** on Facebook to receive up to date information and fun posts.

For information about next year's race, please visit

https://runsignup.com/race/mt/milescity/hoffinitforhunger or contact the race director at sueanns@mfbf.org.

Breathtaking views, as runners follow the trail along the Yellowstone River.