

Central Grasslands Forum



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From the Ground Up: Learning About Soil Health

Fara Brummer, Area Extension Specialist/Livestock Systems, CGREC

With the recent interest in cover crops and soil health in the northern Great Plains, we have a lot to learn about the underground action that is going on in the soil. Field-based evidence is strong in showing an increase in soil health with cover crop diversity and mixed species. Research becomes challenging because soil health is a dynamic process that changes through time and is specific to the crop in the field.

Soil is the foundation for plant life, which is the foundation of our livestock operations. Livestock can thrive on crop residue or planted crops if the nutrient levels in the plant are sufficient. Soil health is important in creating healthy plants, with the potential cost savings of reduced inputs.

At the Central Grasslands Research Extension Center, NDSU graduate student Erin Gaugler is studying the effects of an annual cover crop mix on soil health and livestock performance. Gaugler's adviser is Kevin Sedivec, NDSU range management specialist, with Bryan Neville, director of the CGREC, serving as co-adviser.

Gaugler's study focuses on monitoring soil structure and function, along with the effects of utilizing cover crop forage to extend the fall grazing season for beef cattle. A one-crop system (annual forage cover crop mix) and a dual-crop system (cereal hay crop/annual forage cover crop mix) are being tested in a split-plot design with three replicates. The annual forage cover crop used with both cropping systems are the same mixture of species.

Various soil parameters are being analyzed. They are: bulk density (dry weight of soil per unit volume of soil, which includes the solids and the pore space in soil); aggregate structure (structural particles in a soil that influence its function); macronutrients such as nitrogen, phosphorus and potassium; alkalinity; hydraulic conductivity; total soil organic carbon; and microbial biomass.

In October, mid-gestation beef heifers will be turned out for grazing and Gaugler will be documenting livestock gains. Her project will shed light on soil health and cattle performance under an annual cover crop regime in the Missouri Coteau region of the northern Great Plains.

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Erin Gaugler with plot drill at her field trials at CGREC.

Photo by Fara Brummer

Managing Cattle with Different Genetic Potential

Bryan Neville, Director and Animal Scientist, CGREC

Dani Black, Graduate Student, NDSU Department of Animal Sciences



Producers now have the ability to know more about their cattle than ever before with advances in genetic testing. We believe that having more information about the cattle we manage will help us better manage those animals destined for feedlots. In a recent study conducted jointly with the NDSU Animal Sciences Department and Central Grasslands REC, steers of varying genetic potential were used to explore how implant strategy and genetic potential for marbling and growth interact.

Steers were analyzed for genetic merit using a commercially available test and sorted into treatment groups based on the results of the genetic test that evaluated steers for growth and marbling potential. Of the steers tested, the top-rated 36 steers and bottom-rated 36 steers were used for this study.

Within each genetic merit group (high vs. low), half of each group was allocated to an aggressive implant program or a moderate implant program. Steers were ultrasounded to determine marbling score periodically during the study. All

steers were fed a common diet individually for 140 days prior to being harvested.

In terms of growth performance, we found the average daily gain of steers was not impacted by genetic potential; however, as expected, the aggressive implant strategy did improve growth by nearly 0.25 pounds/day.

Steers with high genetic potential for marbling had greater marbling scores than those steers with low genetic potential for marbling. This finding also was confirmed by the final carcass data.

One of the more interesting and seemingly profitable findings was that 22 percent more of the steers with high genetic potential for marbling qualified for Certified Programs at slaughter, compared with steers with low genetic potential for marbling. In fact, 66 percent of steers with high genetic potential for marbling that were implanted with a moderate implant program qualified for Certified Programs. In contrast, the percentage of cattle qualifying for Certified Programs with low genetic potential for marbling was not impacted by implant strategy.

This study was conducted with limited numbers of animals, but based on the preliminary results, producers feeding cattle with lower genetic potential would not sacrifice quality for increased weight gain when a more aggressive implant strategy is used. However, a more moderate implant strategy may help maximize returns for high-genetic potential calves. Testing this hypothesis on larger numbers of cattle is warranted.

What is the *Central Grasslands Forum*?

According to *Merriam Webster Online*, “central” is defined as being “situated near the center,” “grasslands” is “land covered with grasses and other soft plants” and “forum” is “a medium (as a newspaper or online service) of open discussion or expression.” When you put these words together, you have the recipe for our newsletter: an open forum for discussing the northern Great Plains grasslands that are central to our research projects.

Our goal is to bring you high-quality information on cattle production and grazing management of prairie grassland systems. We welcome your thoughts and comments. They are very important to us and will help us focus on issues that are most meaningful to cattle producers, grazing managers and those interested in sustainable grassland systems.

If you would like to be added to our mailing list (print or electronic), please contact us.

Using Early Intensive Grazing to Manage Kentucky Bluegrass

Bob Patton, Range Scientist, CGREC

A grazing project was started at CGREC in 2011 on pastures that are heavily dominated by Kentucky bluegrass. This perennial cool-season grass begins spring growth earlier than our native species. The forage quality of Kentucky bluegrass is high in the spring, but decreases through the season, resulting in reduced overall forage quality during the summer. This can reduce cattle performance.

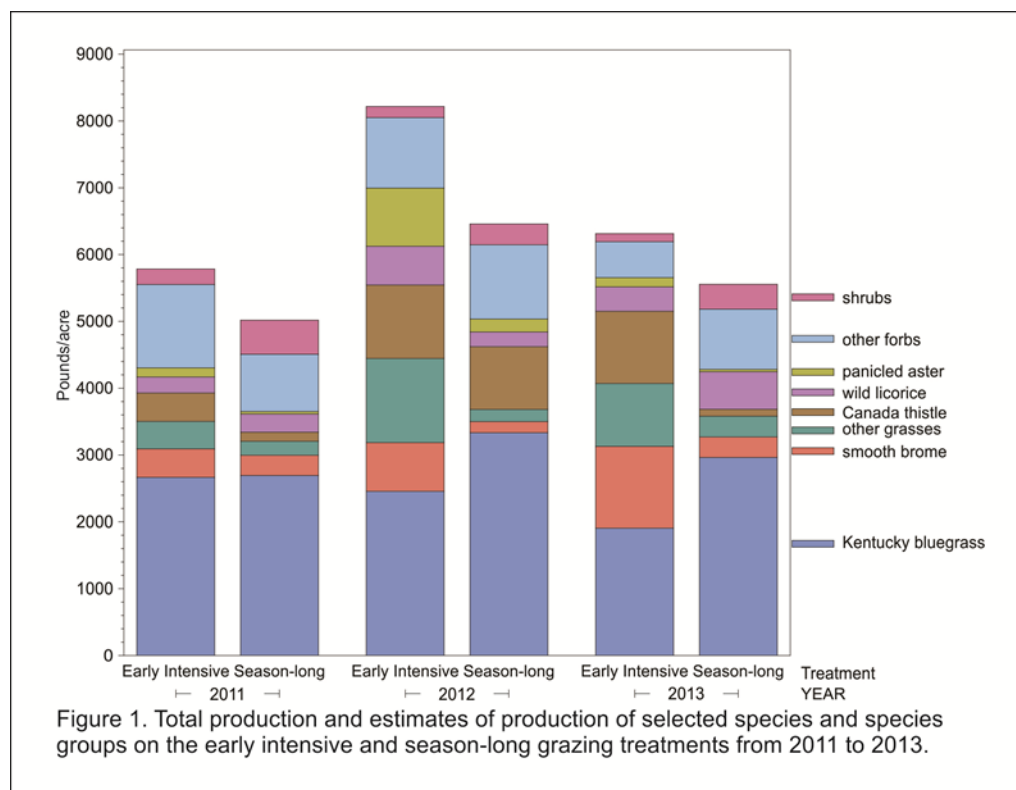
In this study, we are focusing on the pasture system. The objective is to determine if stocking pastures early at a high stock density and removing the cattle before they begin grazing the native vegetation can reduce the proportion of Kentucky bluegrass in the community. This may benefit the native species and improve forage quality.

To answer these questions, an early intensive treatment and a season-long treatment are being compared. Three 40-acre pastures are used for each treatment. Livestock are not rotated among pastures, and each pasture receives the same treatment each year. Over twice as many cattle are placed on the early intensive pastures as on the season-

long pastures for about one-third the time. Cattle are stocked in each pasture as early as possible after Kentucky bluegrass greens up (as early as mid-April). Cattle are removed from the early intensive pastures when 30 percent of the native species receives some grazing, or about five weeks. On the season-long pastures, the objective is to graze at a moderate stocking rate, somewhere between 0.96 and 1.85 AUM/acre for three or four months.

We have found that forage production was not significantly different between the early intensive and the season-long grazing treatments in 2011, 2012 or 2013 (Figure 1). Kentucky bluegrass aerial cover and frequency of occurrence has declined on the early intensive treatment during the period, while its aerial cover increased on the season-long treatment in 2012 and 2013.

We will continue to study changes in the vegetation during the next several years. In addition, cattle gains are now monitored to compare the treatments.



Impacts of Beef Cattle Management During Breeding

Danielle Black, Graduate Student, NDSU Dept. of Animal Sciences

Carl Dahlen, Extension Beef Cattle Specialist, NDSU Dept. of Animal Sciences

Implementation of an estrous synchronization and fixed-time artificial insemination (AI) protocol for breeding cattle requires them to be handled at least three times within an eight- to 10-day period. If mature cows are managed in an extensive grazing system, significant time and labor is required to gather and sort pairs at each working event. Our question is: Would removing cows and heifers from summer pastures to a drylot for the AI process impact their calf performance?



With this in mind, we are comparing two groups of cattle at the CGREC. One group contains cow-calf pairs that were removed from their summer pasture for the duration of the AI process and were managed in drylots with a diet of last year's hay. The other group of cow-calf pairs continued to graze in the pasture and were gathered and worked in the drylot at each step of the AI process, then returned to pasture after each step was complete.

During the course of this study, we monitored body weights of the cows and calves and conception rates of the cows, and collected blood samples for evaluation of non-esterified fatty acids (NEFA) concentrations. Comparing NEFA concentrations before and after the process can give us an indication if the animals were supplied enough energy through their diet. NEFA concentrations increase in the blood when the body begins using fat reserves for energy.

From this year's data, cows and calves managed in the drylot had reduced weight gain during the 10-day synchronization window, compared with cows managed in summer pastures. Calf weights on day 35 after breeding still were reduced in the calves that were managed in the drylot, compared with those managed on pasture.

With regards to conception rates, no differences were detected so far between cows managed in a drylot and cows managed on pastures.

Cows will be ultrasounded again in the fall to determine final pregnancy rates, and the weaning weights of their calves measured to determine if weight differences still exist between the two groups. More results of our research project will be shared with producers after weaning in the fall.



Annual Cover Crop Options

Guojie Wang, Forage Agronomist, CGREC

Matthew Danzl, Forage Agronomy Research Specialist, CGREC

Cover crops are growing in popularity among farmers and ranchers in North Dakota due to their fast establishment and contributions to soil health and biodiversity. Cover crops may be grazed in late fall to early winter to extend the grazing season, thereby reducing livestock feeding costs. They also can be baled or used as silage, or as a green manure soil amendment.

A set of research projects at the Central Grasslands Research Extension Center (CGREC) studies cover crop options that can be integrated into a farm and ranch system.

Full-season cover crops can be used as one component in a cropping system as a rotational crop or a forage base for livestock production. We are evaluating four groups of annual forage species: brassicas (turnip, radish, rape, kale, swede and cabbage), small grains (wheat, barley, oat, triticale and rye), legumes (clover, peas, beans, vetch and lentil) and warm-season grasses (millet, proso, sorghum, sudangrass and sorghum-sudangrass hybrids). These crops are seeded in spring (mid-May to mid-June).

Late-season cover crops can be seeded in prevented-planting areas caused by wet and cold soils. Late-season planted cover crops are not only beneficial to soil health, but also can boost forage production and late-season grazing. The above-mentioned annual forage species are planted in summer (mid-July to mid-August) and their growth extends into the late fall.

Double crops, or two crops in the same season, are difficult in North Dakota due to the short growing season and limited soil water. However, evaluating double-cropping systems with modifications is worthwhile.



The first crop can be harvested for forage earlier than for grain. This conserves soil moisture for the following crop, which in our case was a cover crop mix. For example: A spring cereal species, such as spring triticale, is seeded in mid-May and then harvested as forage in early July. An annual cover crop can be seeded into the stubble in mid-July, with growth and production potentially extending into the late fall.

At the CGREC, a monoculture of each species has been planted to study species' adaptation, performance and forage quality. Based on their agronomic performance under each management scenario, we will be able to propose a cover crop mixture or several mixtures that could meet a producer's goals for nutrient and soil health management through time.

Another option utilizes a **two-year rotation** with three different crops: a winter cereal followed by a forage mix, with forage soybean planted the following year. Winter cereals can be seeded in early September. Following harvest for hay or grain, cover crops can be seeded into the stubble.

At the CGREC, winter wheat, triticale and rye were planted to test their winter hardiness. The forage mix that followed included a warm-season grass (foxtail millet), two cool-season grasses (oat and annual ryegrass), three legumes (lentil, crimson clover and sunn hemp) and one brassica (turnip). Forage soybean was selected for seeding the following year because it is a broadleaf crop that contributes nitrogen to the soil.

Cover crops can be used in many combinations within cropping systems. The above options can be integrated into cropping systems with livestock producers in mind. Through these projects, we will gain an understanding about the benefits of cover crops to agriculture in North Dakota.

Pasja Turnip Potential as a Cover Crop or Forage

Fara Brummer, Area Extension Specialist/Livestock Systems, CGREC

Pasja (pronounced *pas-jah*) turnip is a brassica hybrid that has garnered interest in recent years due to its potential use as a fall cover crop for soil health application, as well as foraging benefits that can extend the livestock grazing season.

Pasja was developed in New Zealand by crossing a forage turnip with a forage rapeseed. Producing a high amount of leafy biomass, Pasja turnip has a root that is longer and more tapered than other turnips. The narrower root can penetrate soils and assist in infiltration. It is also a drought-resistant plant.

Pasja can be planted in late spring or early summer as a full-season crop, or in August for extended grazing season benefits. Most producers in North Dakota are utilizing Pasja turnip as part of a cover crop mixture that is seeded in August into fallow (prevented-planting acres) or into harvested cereal grain stubble. In Nebraska and elsewhere, producers are flying on mixes containing Pasja turnip into their corn fields so that grazing options are available after corn is harvested.

Fertilization of Pasja turnip is important. Nitrogen requirements are from 50 to 100 pounds/acre, with available phosphate at 60 pounds/acre, for establishment and production success. Pasja should be seeded as part of a cover crop mix where legumes can provide nitrogen benefits to the developing plant.

Here at the Central Grasslands REC, plot trials with Pasja turnip have shown a yield of up to 15 tons/acre (as-fed). However, due to its high water content, actual dry-matter yields are approximately 1.5 tons/acre for a full-season crop planted in late May.

Pasja turnip contains a high level of energy and digestibility that should be balanced with other forage or cereal grain species to slow the passage of nutrients in the grazing ruminant. Also, like any brassica species, Pasja can be high in glucosinolates, which are compounds that can cause thyroid problems in grazing cattle. These compounds will be lower in late fall as leaves turn yellow or after a hard frost. However, take care to graze cattle with Pasja turnip as part of a mix where other species are also available.

Forage quality information from the Central Grasslands REC has shown Pasja turnip to be high in crude protein as well as digestible energy. During three years, the turnip averaged a crude protein value of 15

percent pre-freeze and post-freeze, while dry-matter digestibility was 88 percent pre-freeze and 85 percent post-freeze.

The current price of Pasja turnip seed is about \$3.25/pound. While higher than other cover crop species, the usual seeding rate in a mix is only about 1 to 2 pounds/acre. With the high grazing values and the price of cows today, Pasja has the potential to become a part of a cover crop mixture with beneficial grazing application.



Pasja turnip grown at the CGREC. Picture taken on August 19th of this year.

Meat and Vegetables on the Grill

From the kitchen (and grill) of Sandi Dewald

6 fairly large potatoes, sliced
3 cups (about) long string beans (uncut)
1 medium onion, sliced

1 pound of pork sausage or hamburger (uncooked)
1 stick (1/2 cup) margarine
Salt, pepper and garlic to taste

Preheat grill. Spray a large piece of heavy-duty aluminum foil or a large disposable aluminum pan with cooking spray and place on hot grill.

Melt margarine evenly across foil/pan. Quickly add the vegetables because the margarine will brown very easily. Crumble the meat over the top of vegetables. Turn grill to medium or lower and let cook about 20 to 30 minutes, depending on the temperature of the grill. Stir very carefully because the foil tears easily. The food is ready when vegetables are tender and meat is done.

County Corner: Changing of the Seasons

Crystal Schaunaman, McIntosh County Extension Agent



While leaves changing colors usually indicates the “changing of the seasons,” the recent much-needed rain has kept things green. In this article, I am referring to the changing of my summer activities into the patterns of fall tasks that lie before me and probably some of you as well.

The fair season is over! This greatly affects what I do at work and at home. I have been organizing a livestock show at a fair every summer for 10 years. For the past five years, that has been in Wishek. Along with my county fair, I also have been 4-H beef superintendent at the State Fair for 10 years.

This year marks a new season in my life because this was the last year of my state beef show responsibilities. The reason for this is that my oldest daughter will be a 4-H member (not a Cloverbud) and now can show in 4-H at the State Fair. I am excited to be at the State Fair in the capacity of “mother” instead of “Extension agent.”

This summer was our family’s test run as we traveled to five open livestock shows in North and South Dakota with our two show heifers. I will continue running the Tri-County Fair livestock shows in Wishek, which had a record number of livestock this year!

The fall season includes preparations to get cows and calves home. We have talked about early weaning. However, this year, with our plentiful grass and our creep feeding program, we will have to wait and see.

Talk of early snow and bitter cold for North Dakota has got many thinking about getting hay in and tested through forage sampling. If you don’t know the value in forage sampling, talk to your Extension agent or feed salesman/nutritionist. I learned the value of sampling firsthand one summer when I took hay samples from all over the county

on similar hay fields. When comparing results, crude protein and TDN (total dietary nutrients) were all over the board!

I have heard all too often to “just use the averages” when building a ration, but without actually taking a forage sample, I don’t put much stock in this approach and neither will a good nutritionist. Nothing helps your bottom line and your cow herd better than having a properly balanced ration to get them safely through the winter.

With summer to fall maintenance, from buildings to feedlots, soon the yard will be filled with the lovely smell of freshly turned manure. As we put away summer haying equipment, we turn our attention to maintenance on the mixer wagon and tractors to make sure they are ready to endure the everyday visits to the feed bunk.

This is also a good time to evaluate pasture conditions and note any changes in grazing times or cattle use from 2014 that you might consider changing next year. Because pasture is not getting any easier to find, maximizing grass usage is important. If you haven’t considered cross-fencing, I would highly recommend attending a grazing tour/workshop. Several good ones were in our area this summer. I am happy to get you connected with resources that can help you think about grazing plans for next year.

At work, the fair stuff is all put away, so I will start preparing to deliver agricultural programs to producers during the winter. As with other Extension agents, I welcome your ideas.

I hope you and your family are enjoying the changing of the seasons!

(Submitted photo)

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Photos by Rick Bohn and Bryan Neville, CGREC