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Cover Crop Tour Highlights Grazing and Soil Health Benefits Fara Brummer, Extension Area Livestock Systems Specialist, NDSU



Grazing and soil health benefits were highlighted during a cover crop tour held Aug. 19 at the Central Grasslands Research Extension Center.

Area Extension specialist Fara Brummer led the tour, and Marisol Berti, a professor in NDSU's Plant Sciences Department who specializes in forage and biomass crop production, was the guest speaker.

The first stop was a research site where corn was interseeded with a cover crop. The corn was planted on May 12 and interseeded at the V-7 stage with a cool-season cover crop mix on June 24 with a modified planter offset to plant between 30-inch rows. The planter is owned by the Stutsman County Soil Conservation District and the planting was done by SCD personnel.

The corn will be harvested this fall, with the cover crop left intact. This will provide grazing for second-calf heifers that should do well with the mix of high-quality brassicas, cereal grains and the corn stalk residue. The cover crop at this site has established well.

Berti pointed out the root formation of a Jackhammer or Daikon radish that had a bend in it, indicating the plant had hit a clay-compacted layer as it grew. This type of plant is useful in tunneling into restrictive soil layers. Hal Weiser, a soil specialist with the Natural Resources Conservation Service, pointed out that different types of cover crops benefit soil health in different ways. Some, such as triticale, form mycorrhiza

different ways. Some, such as triticale, form mycorrhizal associations. This is evident by the large clump of soil around the root that are bound together by glue-like glomalins. (Continued on page 2)



Marisol Berti explains root structure of cover crops.





Hal Weiser demonstrates the differences in root structures.

Some crops, such as the Jackhammer radish. cannot form the mycorrhizal associations but serve a different purpose by tunneling and scavenging for nutrients in the soil. Yet others, such as legumes, fix nitrogen through rootbased nodules.

In general, cover crops capture

carbon through photosynthesis and replenish depleted organic matter in the soil. Adding the benefit of grazing into this interseeded cover crop mix will recycle nutrients such as nitrogen and extend the grazing season for cattle coming off pasture.

The next tour stop was at demonstration plots seeded to warm-season grasses - sorghum, sorghum-sudan and sudan varieties - that can be used in cover crop mixes. The varieties in these plots are brachytic or dwarf in nature. The plants have less stem and more relative leaf area. The varieties demonstrated all have the BMR (brown mid-rib) gene that has the advantage of a low lignin content and high digestibility. Each variety also had been seeded with a forage soybean to boost protein in the forage.

The tour concluded with Berti giving a presentation on the research that she is conducting in conjunction with growers around the state. Her work focuses on interseeding cover crops into cash crops such as corn and soybeans with the goal of providing cover and nutrient retention to a field.

Berti is experimenting with a variety of cover crops as well as methods of interseeding. A double-row planter for interseeding into corn recently was built as part of her work through a coordinated agricultural project funded by the U.S. Department of Agriculture's



Forage sorghum and sudangrass variety plots at CGREC.

National Institute of Food and Agriculture - Agriculture and Food Research Initiative global food security program and was demonstrated at the annual Big Iron Farm Show in West Fargo.

Photos by Rick Bohn, CGREC

Soil Health: Plant Diversity

Jay Fuhrer, Soil Health Specialist, Natural Resources Conservation Service, Bismarck

The foundation of soil health consists of five principles: soil armor, minimizing soil disturbance, plant diversity, continual live plant/root, and livestock integration. This article will discuss the third principle, plant diversity.

This is the third of five articles on building soil health. The journals of Lewis and Clark describe the northern Plains landscape as having abundant plant diversity. Numerous species were observed working together as a plant community to provide forage for large herbivore populations. Our soils were built across geological time in this environment.

However, settlement of the Plains brought agriculture, which resulted in a perennial polyculture being replaced by an annual monoculture. The soil food web that once received carbon exudates (food) from a diversity of perennial plants now receives carbon exudates from only one annual plant at a time. We can start to mimic the original plant community by using crop rotations that include all four crop types that

are listed below. Diverse crop rotations provide more biodiversity, benefiting the soil food web, which in turn improves rainfall infiltration and nutrient cycling while reducing diseases and pests.

Crop rotations also can be designed to include crops that are high water users, low water users, tap-rooted, fibrous-rooted, high carbon, low carbon, legumes and non-legumes, to name a few.

The four crop types with a few common crop examples are:

- Warm-season grass corn, sudan, millet
- Warm-season broadleaf sunflowers, soybeans
- Cool-season grass wheat, oats, barley, rye
- Cool-season broadleaf flax, peas, lentils

Diverse crop rotations can mimic our original landscapes with high plant diversity. They are important to the long-term sustainability of our soil resource and food security.



Harvesting spring wheat (a cool-season grass) at the Menoken Farm on Aug. 3, 2016. Previous crops grown on this field include corn (a warm-season grass), peas (a cool-season broadleaf), soybeans (a warm-season broadleaf) and other cover crops. These crops work together to supply the soil resource with the benefits of plant diversity.

To Feed or Not to Feed Moldy Hay

Michael Undi, Animal Scientist, CGREC

Current hay-making practices recommend storing round-bale hay at 15 to 20 percent moisture. However, such lowmoisture hay storage can result in leaf loss with alfalfa. Leaves, the most nutritious part of the plant, constitute the highest single dry-matter-loss component during harvest and handling of low-moisture hay.

High-moisture hay storage also can present other challenges. High moisture content can result in excessive heat production during hay storage.

In alfalfa hay storage studies in Manitoba, Canada, temperatures in excess of 150° F were recorded in hay stored at 35 percent moisture. Heating during hay storage reduces protein availability because of the sugars binding with the protein.



High moisture content also can cause a shift in mold species in hay from predominantly field mold species to storage species. This is an important consideration because some storage mold species produce mycotoxins, which are toxic compounds that can affect cattle negatively.

Mycotic abortions in cattle and farmer's lung in humans have been associated with feeding and handling moldy hay.



Whether to feed moldy hay to cattle is more a judgment call than a science-based question because moldy hay feeding has not been investigated extensively. The best course of action is to minimize feeding moldy hay.

The age of the livestock is an important consideration in

moldy hay feeding because younger animals are more sensitive to hay mold. A Manitoba study showed that when dairy calves have a choice between two hays with different mold loads, they will avoid the more moldy hay.

When moldy hay feeding cannot be avoided, mixing moldy hay with other feedstuffs will dilute the mold load. However, as a bottom line, feeding very moldy hay is not advisable, and chances are that animals will not consume very moldy hay anyway.

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Backgrounding Calves on Cover Crops

Fara Brummer, Area Extension Livestock Systems Specialist, NDSU

As the time for weaning approaches, the option for retaining ownership on calves and putting on additional weight before sale time is one that producers must ponder.



Is the additional weight gain worth the risk of retaining the calves, and is the cost of the rationed feedstuff worth the end result? Also, will additional labor

allocation and bunk space be needed to maintain calves for that three- to four-month period?

A new tool to add to the toolbox can be the option for backgrounding calves on cover crops. This scenario can decrease labor for the producer, eliminate the use of machinery such as costly mixer wagons and tub grinders, and add to soil health by

having the young weaned ruminants recycle nutrients on the landscape.

As I leave this great state of North Dakota, I think that backgrounding calves on cover crops can add one more beneficial dimension to a livestock system. Backgrounding can provide very tangible and immediate net returns for the producer if average daily gains on calves are competitive.

I believe with the right cover-crop mix and perhaps some costeffective supplementation in the field, average daily gains can not only be competitive with the traditional drylot systems but also be more cost-effective, especially if producers look at the additional benefit of soil health and potential decrease in fertilizer cost for the following year.

So far, research has focused on dry cows, cow-calf pairs, yearlings and bred heifers for grazing cover crops. Backgrounding calves on cover crops is the next piece of the puzzle to be explored.

County Corner: N.D. Range Management School

Breana Kiser, NDSU Extension Agriculture and Natural Resources Agent, Dickey County



Producers, professional personnel and others wanting to learn more about rangeland management received hands-on experience at the North Dakota Range Management School, which was held from Aug. 30 to Sept. 1 at the North Dakota 4-H Camp west of Washburn.

The NDSU Extension Service, North Dakota Chapter of the Society for Range Management, North Dakota Natural Resources Conservation Service (NRCS) and North Dakota Grazing Lands Coalition hosted the annual school.

On the first day of the school, participants heard presentations and received material from NDSU Extension and NRCS specialists. They also received a set of tools (a plastic hoop frame, grass shears and a hand-held scale) for figuring out carrying capacity. A grazing stick designed to help monitor grasslands and pastures in North Dakota was provided.

The school included field trips to local ranches, where Grazing Lands Coalition mentors spoke about their management strategies and how they help improve rangelands. In addition, Extension and NRCS specialists demonstrated exercises in the field.

Participants worked on soil infiltration exercises and learned rangeland plant identification, how to identify soils and ecological sites, and how to determine forage production by clipping grass using frames. Participants also used worksheets to figure out carrying capacity and stocking rates. All hands-on activities were designed for use on the ranch or in the field.

In addition, time was spent working with specialists on developing a grazing management plan. Participants were able to visit with the specialists, speakers, and each other to brainstorm about what might work for their own operations.

This annual school is a great place to start for those who are interested in learning how to utilize different grazing techniques for their operation and meet like-minded people who are interested in grazing management. For information on the next Range Management School, contact your local county Extension or NRCS office.

Streeter's Annual Buffalo Supper

Sandi Dewald, Administrative Secretary, CGREC

This year marks the 57th annual Buffalo Supper. The event is held the last Friday of October at the Streeter Memorial Hall.

The Buffalo Supper was started in 1960 as a fundraiser for the community by the Rev. John Schmeier, pastor of St. Luke Lutheran Church and a Streeter Lions Club member. Realizing 700 people were too many to serve for the Lions Club alone, the club co-sponsored the supper with the American Legion and Legion Auxiliary the following year.

Today, the supper is prepared and served by more than 200 volunteers from Streeter, neighboring towns and various states. This event would not be possible without the help of volunteers who return each year to help.

Many changes have been made through the years, but the menu remains the same: buffalo vegetable soup, tomato juice, roast buffalo, mashed potatoes with gravy, corn, buns, coleslaw, cranberry relish, marinated onions and pumpkin bars. The all-you-can-eat meal is served family style, with 10 people to a table, and it is served on ceramic plates with regular silverware.

Attendance varies from year to year, with an average of 1,625 tickets sold. In 1998, a record of 1,950 people were served.

The preparation starts early in October, when the work schedule is distributed.

The Wednesday before the supper marks the start of food preparation with the making of cranberry relish. The main hall is set up for meat cutting, and about 1,400 pounds of buffalo roasts are cut up in two to three hours.



On Thursday, the meat is browned and placed in roasters. Vegetables are diced for

soup and salad, and cabbage is sliced for coleslaw. Onions, about 400 pounds, are peeled for the relish, soup and salads. Twenty-one dining tables are set up. The dishwashing area is set up at the back of the hall, and after many dishes and general cleanup, Thursday is done.

Friday – supper night – starts off with volunteers peeling about 950 pounds of potatoes. Final touches are added to the relishes, tables are set and the soup is made.

The first batch of

potatoes, gravy

and corn are



Metal bison statue made by Dan Martell greets visitors in garden next to the Streeter Memorial Hall.

Photo by Sandi Dewald

started around 2 p.m. About 200 take-out orders also are prepared. Serving starts at 4:30 p.m. and continues until everyone is served, usually about 10 p.m.

On Saturday, cleanup begins, and by noon, another Buffalo Supper is over.

Staff Changes at CGREC

Kevin Sedivec, a professor in NDSU's School of Natural Resource Sciences and the NDSU Extension Service's rangeland management specialist, has been named interim director of the Central Grasslands Research Extension Center. Bryan Neville, who was director for the last four of his five years at the center, left Sept. 2 for a position with Nutrition Service Associates headquartered in Texas. Neville will be based in Minnesota.

Jessalyn Bachler has joined the CGREC as an agricultural research technician for livestock. She is an NDSU graduate, with a bachelor's degree in Animal Science. She began working at the center in May.

Fara Brummer, area Extension livestock systems specialist at the center, is leaving in October. She is returning to Oregon, where she accepted a position with the Oregon State University Extension Service.

The Central Grasslands REC's mission is to conduct research on range management, and forage and livestock production. Information on the research is presented during the annual tour and at workshops. The center's annual report and quarterly newsletter may be found at <u>www.aq.ndsu.edu/CentralGrasslandsREC</u>. NDSU Central Grasslands Research Extension Center* Department 7070 P.O. Box 6050 Fargo ND 58108-6050

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Photos by Janet Patton, Rick Bohn and Sandi Dewald; CGREC

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