FOOTHILLS FORAGE AND GRAZING ASSOCIATION
Innovation, education and regenerative agriculture

Unit 4A, 710 Centre St. SE, High River, AB T1V 0H3
Phone: (403) 995-9466 ~ www.foothillsforage.com

June 2018

Director's Note - Morrie Goetjen

Greetings Foothills Members!

By the time you read this month's issue, we in agriculture will be in the closing stages of seeding and partway through brandings and calf processing.... many cattle will have already been turned out, and not necessarily because the grass was ready... Some of us were simply devoid of any baled feed! Nonetheless, we all continue to 'stick handle' (I love that term, courtesy of Doug Wray) our way around these obstacles and try to squeeze a little profit out of our range lands, in good years and bad. I think it's safe to say, that most FFGA members are fairly adept at navigating these challenges. A large part of that adaptability, is knowing just what is actually available to producers, both in terms of ideas and products. We at FFGA are constantly trying to provide our members with ideas (some new; some recycled), to aid in this process and this coming summer is no exception.

We are part of the Rangeland and Pasture workshop on June 15th and 16th at the Beaupre Hall; a supporting role on the fencing and water workshop at Wheatland County on June 28th; and again supporting the soil health field day, at the Stavely Research Ranch, on July 6th. Our own events (as we partner up with Gentec for the first time), called Forage to Beef Demonstration Days, is scheduled for July 10th and 11th, as we talk trait selection, cell grazing management, amongst other topics. Some of these topics are not 'new', but there'll always be a nugget or two that can be gleaned from these field days and I encourage members to attend as many as possible!!

Cheers.... and if I don't see you in the future.... hopefully I see you in the pasture!

Morrie G

Perennial Forage Demo site at Morrie Goetjen's June 4, 2018

IN THIS ISSUE

JIM GERRISH GRAZING SCHOOL

JOIN US FOR A **1 DAY** INTRODUCTORY GRAZING MANAGEMENT 101 COURSE

IF YOU ARE LOOKING TO BOOST YOUR SKILLS AND ARE READY FOR THE NEXT LEVEL, SIGN UP FOR THE FULL **3 DAY** ADVANCED GRAZING MANAGEMENT SCHOOL (SPACE IS LIMITED).

KEY CONCEPTS INCLUDE;

- STOCKING RATE & STOCK DENSITY
- ENERGY & NUTRIENT CYCLES
- RESIDUAL GRASS
- REST AND RECOVERY
- RANCHING PROFITABILITY
- FENCING AND WATER DEVELOPMENT
- HIGH ANIMAL PERFORMANCE
- CREATING PASTURE FROM THE SOIL UP
- UNDERSTANDING PASTURE INVENTORY

Register online before August 8th at:
https://www.eventbrite.ca/e/jim-gerrish-grazing-school-tickets-46863026574

FFGA MEMBER DAY 1 - $60
NON-MEMBER DAY 1 - $70
FFGA MEMBER 3 DAYS - $175
NON-MEMBER 3 DAYS - $190

RENOWED GRAZIER JIM GERRISH IS RETURNING TO ALBERTA BRINGING 20+ YEARS OF BEEF-FORAGE SYSTEMS EXPERTISE; BOTH IN RESEARCH AND COMMERICAL CATTLE PRODUCTION, TO GRAZIERS ACROSS THE PROVINCE.

MD of Willow Creek

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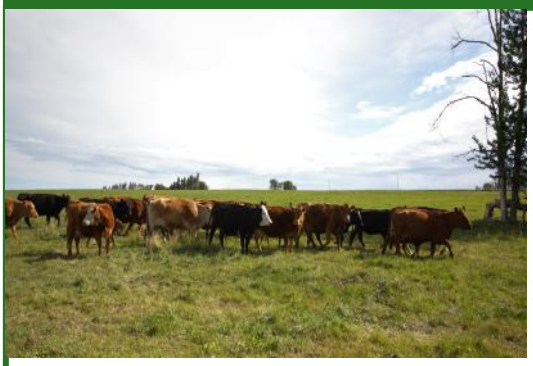
The Environmental Argument For Cattle



Make no mistake — it does take more water to produce a pound of uncooked, boneless beef (over 1,800 gallons/6,814 litres) than a pound of dry peas (178 gallons/674 litres), dry beans (488 gallons/1,847 litres) or dry lentils (577 gallons/2,184 litres), or any other protein crop. But this is only one of many pieces of information to consider.

Pastures and feed crops account for nearly all (99 per cent) of the water used in beef production. Does that mean that the land used to raise cattle should be converted to crop production?

Not necessarily. There are many reasons why not all land is suitable for cultivated agriculture and why raising beef plays an important role in sustainably feeding the population.

Thirsty crops

Water use statistics look considerably different when we balance water use with water availability. Here's an example: At 178 gallons per pound, dry peas have a very low water footprint. In 2011, Canada harvested 5.6 billion pounds of dry peas from 2.4 million acres of land. This works out to 414,562 gallons of water per acre of land used for dry pea production. In contrast, Canada produced 2.46 billion pounds of beef in 2011 from 57 million acres of land to grow the pasture, forage, and other feed. This works out to 78,813 gallons per acre of land used for beef production.

What if we cultivated that grassland and tried to grow dry peas instead?

It probably wouldn't work too well. Dry peas need more than five times as much water (414,652/78,813 = 5.3) than the grass does. Much of the land used to raise forage for beef cattle doesn't receive adequate moisture or have the right soil conditions to support crop production, but can produce grass that can thrive in drier conditions.

Forages (pastures and harvested roughage) account for approximately 80 per cent of the feed used by beef cattle in Canada. Nearly a third of Canada's agricultural land is pasture and not suited for crop production.

Canada's beef herd is primarily located in the Prairies. The southern Prairies are drought prone, and the more northerly growing seasons are too short for many crops. Central and Eastern Canada generally have higher rainfall and longer growing seasons than the Prairies, but not all this farmland is suitable for crop production either. Much of this land is too boggy, stony, or bushy to allow cultivation, but it can grow grass. Because cattle can digest fibre, they make use of the nutrients from land not suited for crop production, and convert them into high-quality protein that humans can digest.

Water isn't lost

Like city water, the water that beef-processing facilities take out of the river at one end of the plant is treated and returns to the same river at the other end of the plant. New technologies to recycle and reuse water can reduce the amount of water needed for beef processing by 90 per cent.

The pastures and rangelands that support beef production are also an important part of the water cycle. Because these lands are not cultivated, they are covered in living plant material all year round and are anchored by well-developed root systems that hold the soil in place. This above- and below-ground vegetation serves to trap snowfall, slow meltwater movement over the soil surface, and helps reduce run-off, overland flooding, soil erosion, and the movement of silt and nutrients into waterways. In grassland environments, this water often collects in sloughs, potholes or other low-lying areas that provide valuable nesting sites for birds. When grasslands are converted to crop

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production, these water bodies are often drained and cultivated.

Grasslands also have improved soil porosity due to healthy root growth and earthworm activity. This allows more water to infiltrate the soil and recharge groundwater reserves.

Greenhouse gases

Cattle produce greenhouse gases. Forages and grassland store and sequester them.

Cattle produce methane as a byproduct of digestion, particularly on pasture and other high-forage diets.

But water is not the only thing that cycles; so does carbon.

Plants take carbon dioxide out of the atmosphere, incorporate the carbon into plant structures (roots, stems, leaves, flowers, and seeds), and release oxygen back into the atmosphere. Because perennial pasture plants live for many years, they develop an extensive root system which will eventually decay and become part of the soil carbon. Carbon sequestered by these plants remains in the soil rather than being released back into the atmosphere.

Cultivating drought-prone areas instead of leaving them in permanent grassland drastically increases the risk of soil erosion, loss of topsoil, and subsequent losses of sequestered soil carbon into the atmosphere.

Cultivation also affects soil structure and water infiltration. As a general rule, when lands are left in their natural state, 10 per cent of precipitation runs off, 40 per cent evaporates and 50 per cent enters the groundwater reserves. When soils are disturbed or developed for housing or industry, water infiltration is reduced.

Grassland and forage remain the ultimate zero-tillage practice.

Ecological benefits

It's not just dead roots that provide environmental benefits. Because perennial forages aren't cultivated, and often grow in dry conditions, they grow extensive root systems in their search for moisture. For example, forage legumes like alfalfa develop roots that penetrate 53 to 63 per cent deeper into the soil than chickpeas, lentils, and other pulses. All legumes can 'fix' nitrogen from the air and convert it into soil nitrogen that can improve soil fertility, and forage legumes like alfalfa can fix up to twice as much nitrogen per acre as annual legume crops.

Lands prone to periodic flooding or drought benefit from the permanent plant cover. Roots and vegetation keep the soil in place so that it doesn't wash away in a flood or blow away during a drought. Extensive root systems also help improve soil structure and water-holding capacity and water infiltration, and allow groundwater reserves to recharge better than croplands.

Grasslands also provide habitat for small and large mammals, hawks, nesting birds, songbirds and pollinating insects, and preserve biodiversity.

Feed footprint

Crops (primarily feed grains) account for roughly 20 per cent of the feed consumed by cattle.

Some are deliberately seeded to produce feed grain for cattle, but not many. For example, barley that does not achieve malt grade is recycled into high-quality protein rather than being discarded. A similar scenario occurs for wheat that does not meet the criteria for human consumption.

Cattle also make use of many crop byproducts that humans can't use. For most crops, only the seed is used for human consumption, whether it is milled for flour, sprouted for brewing, split for pea soup, pressed for oil, or cooked and eaten whole. The rest of the plant — stems, leaves, shells, screenings, hulls, shrivelled and cracked seeds, residues from brewing and bioethanol production — are useless for human food but are excellent, high-quality feed for cattle.

Many environmentally sustainable and economically healthy farm operations produce both beef cattle and crops. In the same way, a balanced, environmentally sustainable, healthy diet includes both plants and beef.

Beef Cattle Research Blog—https://www.albertafarmexpress.ca/2018/05/16/the-environmental-argument-for-cattle/

Photo Credit:: Cows and Fish

What's the Big Deal About Soil? Everything

Soil health has become a frequent topic of conversation and for good reason—it's the basic element of the cattle industry. Healthy soil grows abundant forage which keeps cattle producing in good body condition. Unhealthy soils can cause ranchers to file for bankruptcy.

"Soil health is the capacity of a soil to function as a vital, living ecosystem that sustains plants, animals and humans," says Steven Shafer, chief scientific officer with the Soil Health Institute. "Key words in this definition are vital and living. Soil health is vital to our livelihood and soil is alive with physical, chemical and biological components."

Physical component

"Soil has structure, which is the arrangement of primary particles into secondary units called aggregates. Soil aggregates are clumps of soil particles held together by moist clay, organic matter, polysaccharide gums produced by bacteria and fungi and fungal hyphae (strands)," says Dennis Chessman, Southeastern regional soil health team leader, NRCS Soil Health Division.

"Pores between aggregates contain water and air and allow roots to grow. Structure affects water infiltration, water holding capacity, water and air movement, nutrient availability and root growth," he explains. An example of poor soil structure is plating, which is horizontal layers of soil particles created by compaction or lack of root growth. Plating prevents downward movement of water, nutrients and roots and reduces soil productivity.

"Soil texture is the percent of sand, silt and clay particles and determines water holding capacity," Shafer says. "Water is lost to deep percolation below root zones in sandy soils, whereas clay soils hold water too tightly for it to be available to plants. Available water capacity occurs in medium textured soils between levels of field capacity and wilting point."

Chemical component

Organic matter is an important part of soil chemistry and is derived from the remains of organisms such as plants, animals and their waste products. Benefits of soil organic matter include its major role in aggregate forming and its improvement of water infiltration, water holding capacity and available water at field capacity.

Organic matter mineralizes nitrogen, making it available to plants and accounts for 30% to 90% of the cation exchange capacity (CEC) of soil. CEC is a measure of soil fertility and nutrient retention capacity. In addition, soil organic matter is a major source of plant-available phosphorus and sulfur.

"Metals such as iron, manganese, zinc and copper are chelated by organic matter, keeping them available to plants. Organic matter improves plant root environment and contributes to favorable habitat for soil biology," Chessman says.

Biological component

Creatures living in the soil are critical to soil health and include bacteria, fungi, protozoa, nematodes, arthropods and earthworms. They affect soil structure, soil erosion and water availability. Soil biology is important for decomposition, nutrient cycling and plant growth. Soil is home to most of the biodiversity in the world.

"Soil bacteria fall into four functional groups," says Elaine Ingham, chief scientist at the Rodale Institute and a soil ecology consultant in Corvallis, Ore. "Most are decomposers that convert energy in soil organic matter into forms useful to other organisms. Decomposers are especially important for retaining nutrients, such as nitrogen, in their cells, prevent-

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Technology's Ability to Allow Producers to Efficiently Deliver Beef to a Consumer a World Away

Earlier this year, in our article *Bench to Barn: A Glimpse into How New Technology is Developed and Delivered*, we touched on the origins of a $4.5M initiative that led to the development of a genomics tool for commercial cow-calf producers. Which may prompt the question: "A what?" and/or "Who cares?"

As it turns out, the world cares. By 2050, global demand for food is expected to rise by 70%. To put that into context, we will need to produce as much food in the next 45 years as we have in the previous 10,000. As global poverty is reduced, an additional 3 billion people are expected to rise to middle-class prosperity (the equivalent of 82 Canadas) by 2030. Like everyone else with money, these people will consume more protein than those with less. And again, like everybody else, they will want assurances that their food is safe, nutritious, and sustainable in terms of environmental protection, water conservation, and climate change.

But that's Who cares at the global level. More locally, Canada's beef producers should care as well. Our abundance of agricultural resources and reputation as a supplier of high-quality beef give our industry a unique opportunity to benefit from these trends. This genomics tool (called EnVigour HX™) allows commercial beef producers to produce more beef more efficiently by giving them the data to manage parentage, breed composition and vigour, each of which provides tangible economic benefits.

Parentage is probably the easiest trait to relate to. At its most basic level, producers can use it to determine which bulls are producing the most calves (or pounds of weaned beef)—or to determine which bulls are not performing, under performing, or producing difficult births that require your time or additional assistance. If a bull is not producing, it is getting free room, board, and health care. Taken together, the cost of acquiring a bull and the pounds of weaned calves not produced, even one marginal bull can cost thousands of dollars in expenditures and foregone revenue.

But it is the area of breed composition and the related vigour analysis that EnVigour HX™ can change the fortunes of the commercial cow calf producer. Moving past the techy science, it's like this: different breeds have different genetics that result in different traits and characteristics in a herd. Scientists here in Alberta have developed a new way to use DNA technology to identify the "bits" of DNA from various beef breeds in commercial cattle. Until now, producers recognized that they could achieve certain (variable and imprecise) benefits by mating animals from different breeds. They called it hybrid vigour.

With EnVigour HX™, however, producers can calculate the percentage of each breed's genetics within an animal precisely and use it to develop a "vigour" score. This score has been shown to be closely linked in predicting the economic value of an animal, especially in

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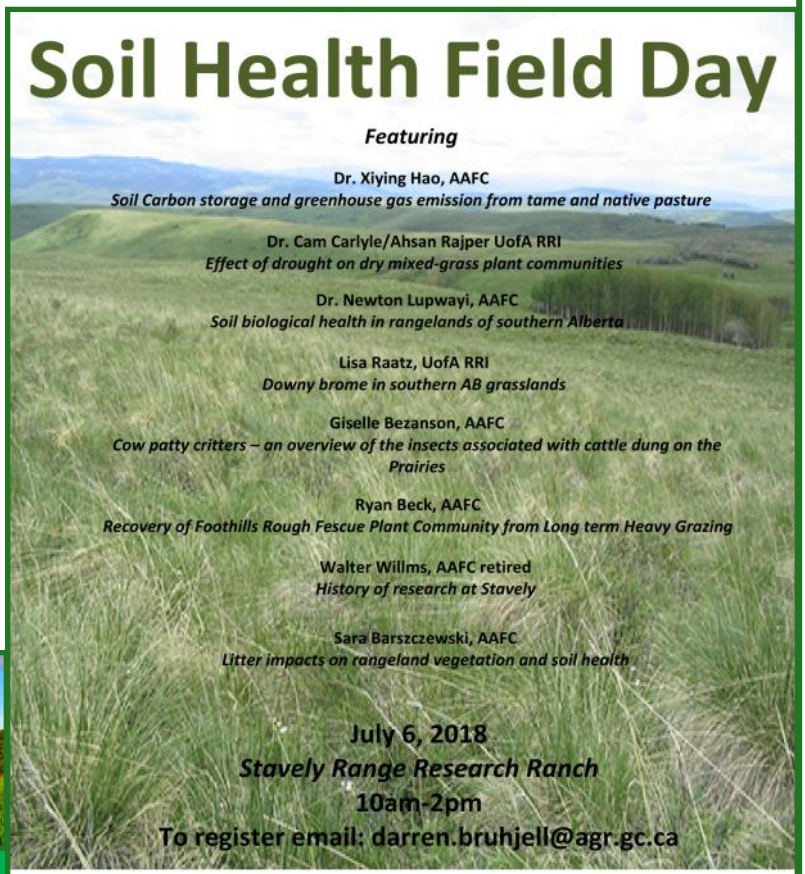

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relation to its productivity.

In short, EnVigour HX™ could be the tool that allows producers here in Alberta to feed the world and allow the emerging middle class a world away to celebrate its success with a prime piece of Alberta beef. So what does the math look like for producers?

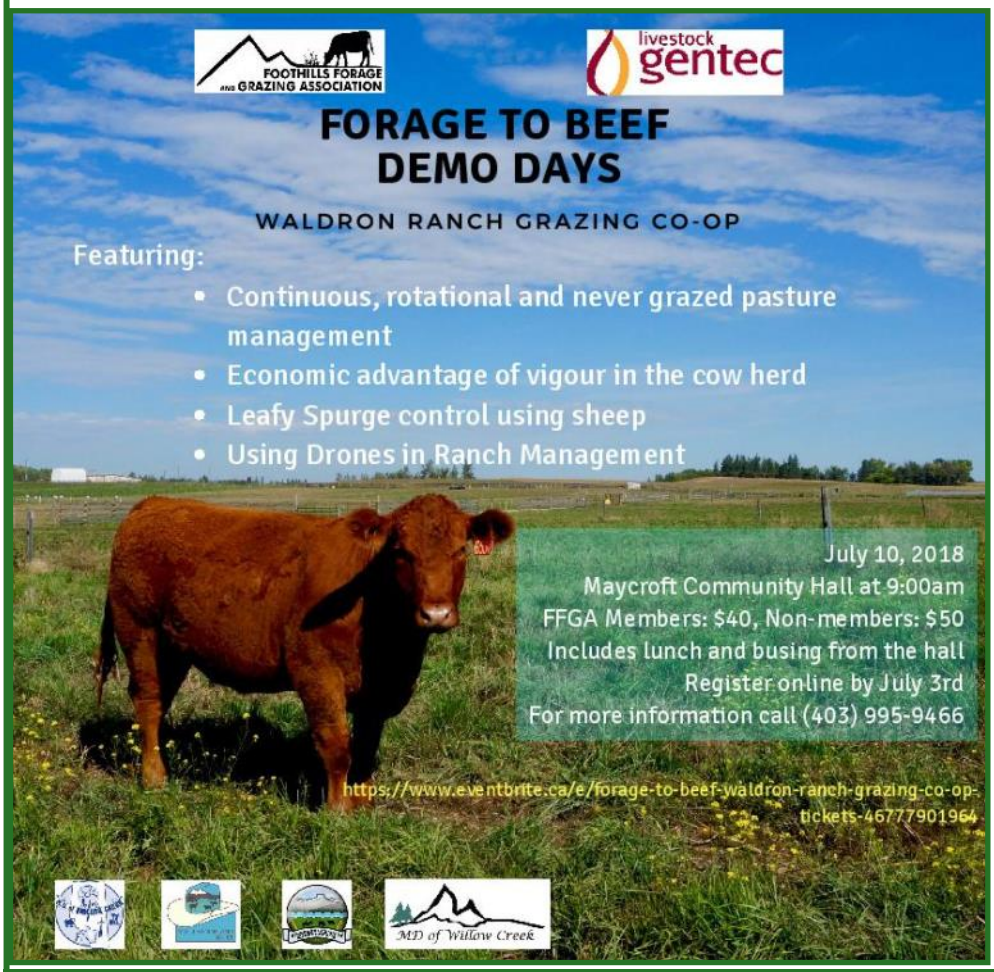
Working with Livestock Gentec, John Basarab of Alberta Agriculture and Forestry and Adjunct Professor at UAlberta demonstrated that retained heterozygosity or "vigour" ranged between 5-75% across 12 Alberta-based commercial cow/calf herds and 2,100 progeny. From this, he showed that, on average, producers maintaining a 100 cow herd would cull and replace 60 more animals every 5 years from a low-vigour herd than a high-vigour herd, if it is assumed that any animal not producing a weaned calf is removed from the herd.

Beyond the savings of not having to purchase or develop additional replacement heifers, producers of high-vigour herds enjoy even more economic advantages from producing more calves, and heavier calves weaned than those produced in low-vigour herds. This advantage put an additional $161 per cow per year in their pockets (or $81,000 per 100 cows when taken across 5 calving periods). Pretty significant stuff!

This is the second in a series of updates that Livestock Gentec and Delta Genomics will provide on the project referenced above led by John Basarab.

Clinton Brons, Director of Business Development
Livestock Gentec—University of Alberta

To read more about this study or to find the previous articles please following the below link to the Grey Wooded Forage Associations' Newsletter—The Blade starting with February's edition
https://greywoodedforageassociation.com/the-blade/



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ing loss from the rooting zone."

A second group of bacteria, the mutualists, form partnerships with plants. Most well-known of this group are the nitrogen-fixing bacteria.

The third group is the pathogens that form galls on plants. Some species of the fourth group, called lithotrophs or chemoautotrophs, are important in nitrogen cycling and degradation of pollutants. Bacteria from all four groups perform important services related to water dynamics, nutrient cycling and plant disease suppression.

Then there are protozoa, which are single-celled animals that feed primarily on bacteria, but also eat other protozoa, soluble organic matter and sometimes fungi.

"They play an important role in mineralizing nutrients, making them available for use by plants and other soil organisms," Ingham says. "Ratio of carbon to nitrogen for protozoa is 10:1 or much more and 3:1 to 10:1 for bacteria. As a result, bacteria eaten by protozoa contain too much nitrogen for the amount they need."

The protozoa release the excess nitrogen in the form of ammonium. This usually occurs near plant root systems. Bacteria and other organisms rapidly take up most of the ammonium, but some is used by plants.

Another role of protozoa is regulating bacteria populations. When they graze on bacteria, protozoa stimulate growth of the bacterial population and in turn, decomposition rates and soil aggregation. Protozoa are also an important food source for other soil organisms and help depress plant disease by competing with or feeding on pathogens.

Moving up the soil food chain, "Nematodes are non-segmented worms and like protozoa, mineralize or release nutrients in plant-available forms. They help distribute bacteria and fungi through soil and along roots by carrying live and dormant microbes on their surfaces and in their digestive systems," Ingham adds.

"Many bugs, known as arthropods, make their homes in the soil," says Andrew Moldenke, a plant pathologist at Oregon State University. "Arthropods get their name from their jointed (artoros) legs (podos)."

Large arthropods frequently seen on the soil surface are shredders that chew up dead plant matter. The most abundant are millipedes, sowbugs, termites, certain mites and roaches. Arthropods that gaze on fungi, and to some extent bacteria, include most springtails, some mites and silverfish. They consume bacteria and fungi off root surfaces releasing plant-available nutrients."

"Earthworms dramatically alter soil structure, water movement, nutrient dynamics and plant growth," says Clive Edwards, The Ohio State University. "They stimulate microbial activity, mix and aggregate soil, increase infiltration, improve water-holding capacity, provide channels for root growth and bury and shred plant residue."

"Grazing lands are managed to improve soil health by minimizing disturbance with appropriate stocking densities and adequate forage rest through pasture deferment. Keep the soil covered," Chessman advises. "In pastures, soil should never be visible when looking down into plant canopy. Increase plant biodiversity and maintain good root structures in the soil."

Robert Fears, Freelance writer based in Georgetown Texas *http://www.beefmagazine.com/pasture/what-s-big-deal-about-soil-everything*

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Staff

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Laura Gibney
manager@foothillsforage.com
Cell: (403) 998-4687

Environmental & Communications Coordinator:
Sonja Bloom
enviro@foothillsforage.com
Cell: (403) 700-7406

FFGA MISSION & VISION STATEMENTS

Mission: Assisting producers in profitably improving their forages and regenerating their soils through innovation and education.

Vision: We envision a global community that respects and values profitable forage production and healthy soils as our legacy for future generations.

This Publication is made possible by our two major funders - the Agriculture Opportunity Fund and Alberta Agriculture and Forestry.

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