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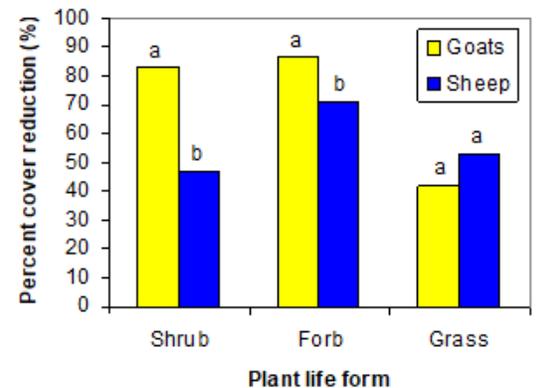
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Range 101: Ruminant Feeding Types and Selective Grazing By Sandy Smart

In my range habitat class, we discuss the differences between the classic ruminant feeding types (concentrate selectors, intermediate, and grass/roughage) as defined by Hoffman (1989) in terms of their resource selection needs. For example, concentrate selectors choose leaves and buds from mainly woody plants which are low in cell wall contents and high in “in-cell” contents over grasses and herbaceous broadleaf plants. Plants like grasses have thicker cell walls for structure and contain higher concentrations of cellulose and hemicellulose. Leaves from woody plants don’t need as much structure and therefore have less cellulose and hemicellulose. Grass/roughage eaters have the capacity (large rumens) to digest the thickened cell walls of grasses. The anatomical structure of the rumen, omasum, large and small intestine, and salivary gland system are remarkably different. What is interesting is that body size is not related to feeding type. Moose, giraffe, and white-tailed deer are all considered concentrate selectors, while cattle, bison, water buffalo, and Oribi (small African antelope weighing 25-50 lbs) are grass/roughage eaters. Intermediate types like goats, Thomson’s gazelle, and caribou can eat a variety of grass, forbs, and shrubs and shift their diet based on availability. The three feeding types are not discrete categories, but a description of a continuum from one extreme to the other.

I conducted a comparative grazing experiment with sheep and goats. I measured the foliar cover of shrubs, forbs, and grass before and after sheep and goat grazing. You will notice that the percent reduction (before minus after) in cover was greater for goats with shrub and forbs, and similar with grass between goats and sheep. This example shows how goats prefer shrub more than sheep. It also shows the wide variety in the intermediate feeder diet. It would have been neat to see how cattle would have compared. I suspect they would have low shrub, low forb, and high grass in their diet.



Percent cover reduction of shrub, forb, and grass by goats and sheep (Smart et al. 2006).

Rangeland managers can use these inherent differences in diet selection of domesticated sheep, goats, and cattle to manage plant composition of rangelands. For example, rangelands infested with brush can be converted to a more savannah or grassland dominated vegetation type with targeted goat grazing. The same process can be used to reduce leafy spurge infestations with sheep. Do you have a buckbrush or weed problem? Goats and sheep prefer these types of plants compared with cattle.

The Green Side Up by Pete Bauman



Plan now to graze weeds next season

Canada goldenrod is a native flowering plant that most consider a weed in pastures. Canada thistle and perennial sow thistle are both common noxious weeds in South Dakota, requiring managers control the production and spread of seed. In all three cases, poor grazing management, such as season-long grazing or heavy soil impacts from livestock, is often the culprit for infestations to start or persist. A common assumption is that chemical application is the only solution to weed issues, stemming from a lack of understanding of the interaction of grazing and plant biology. The use of targeted grazing can help control these plants in pastures once managers understand the importance of timing, intensity, and livestock habits.

Livestock will graze Canada goldenrod, Canada thistle, and perennial sow thistle. These plants are nutritious at certain times of the year. A review of several reports and our own research and observations confirm that at certain times these plants have crude protein, total digestible nutrients, and invitro dry matter digestibility concentrations similar to alfalfa and other common forages.

When and how to graze these plants in South Dakota:

Canada Goldenrod: Our work here at SDSU suggests that Canada goldenrod plants contain high nutritive value, with the tops of the plants consistently similar to alfalfa. We found that we can train cows to eat Canada goldenrod and that mature cows with calves naturally utilize Canada goldenrod in early to mid-June, nipping plant tops. This use is nearly imperceptible as the plant continues to grow and flower after the bud is nipped off, leading many to assume cattle do not utilize the plant. A small high intensity – short duration trial also confirmed that cattle will forage on goldenrod extensively under restricted grazing in August, but it is unclear as to the long-term impact on the goldenrod plant community. Grazing managers should target goldenrod plants in early to mid-June, prior to the onset of flowering (usually late July and August).

Canada thistle: Nutritive value of Canada thistle is perhaps the most well documented of the three plants discussed here. The primary issue for Canada thistle management is when and how to target the plant. Research from Alberta¹ compared three grazing systems for Canada thistle control: 1) season-long, 2) low intensity - high frequency, and 3) high intensity - low frequency. They found that season-long grazing where livestock are turned out and not rotated or managed resulted in increased Canada thistle populations and reduced overall forage yield. Conversely, high intensity - low frequency grazing reduced Canada thistle shoot density, biomass, and flowering and resulted in greater weed suppression. Two ‘intense’ defoliations of Canada thistle during the growing season for 2 to 3 years in succession dramatically reduced the Canada thistle population, and the plants that remained stayed vegetative (did not flower) and had higher forage quality. This system proved better for Canada thistle control than did low intensity – high frequency.

¹Bruijn, S.L., and E.W. Bork. 2006. Biological control of Canada thistle in temperate pastures using high density rotational cattle grazing. *Biological Control* 36:305-315.

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The Green Side Up Continued by Pete Bauman

Perennial sow thistle: Perennial sow thistle is very palatable and selected by cattle if they are exposed to the plant at the correct time of the year. Largely, this information is based on observation over 10 years with different groups of yearling cattle. I've observed consistent targeting of perennial sow thistle from late July through mid-August during the bud and flowering stage of the plant. My observations suggest that yearlings (and likely cows) will generally avoid the plant if grazing in a pasture with perennial sow thistle before this time. And, if they do forage on the plant in early July, the plant may continue to grow and flower. However, if targeted in the late July to mid-August time period, livestock often consume the entire plant, not just the flowers, and thus there is very little opportunity for the plant to rebound, especially if repeated for several years in a row. Targeted grazing may be necessary if there are large infestations, but generally cattle appear to seek out the plant during this period. Finally, once flowers start maturing, grazing selection drops off dramatically.

As a grassland manager, I have spent years manipulating and observing livestock for Canada thistle control, and have come to a few general observations that are also supported in reports:

- 1) Canada thistle has the potential to invade anywhere there is exposed soil. Minimizing livestock soil damage is key in preventing new infestations.
- 2) Mature cows will forage on Canada thistle buds in mid-June, and may consume a great deal of the plant at certain times and for about 7 days between about June 10 and July 1. However, the exact timing of this period of more intensive use is not always predictable in this three-week period.
- 3) Cows will teach calves to forage on thistle and other plants.
- 4) Yearling cattle will learn to utilize Canada thistle if given the opportunity.
- 5) The key to Canada thistle control with livestock is to first stop the grazing practices that promote thistle expansion (season-long grazing, heavy impacts to soils). The second step is to concentrate animals for high-intensity-short duration grazing during bud stage before thistle plants flower.
- 6) Finally, I've also observed that livestock often do not re-graze Canada thistle in September, even though the plants might appear green and palatable. Interestingly, yearlings turned out into a stockpiled pasture in early October were observed to select both dead and decadent and younger green Canada thistle plants, presumably for their higher protein and nutrition content compared to surrounding forages.



A yearling heifer near Watertown grazes Canada thistle after recent October snowfall (Photo by Pete Bauman).

What To Do With Invading Brome Grass by Dan Rasmussen

Walking through Charlie Totton's pasture in September this year is difficult. The grass is thick making me work at the task. As I walked slowly, I was trying to identify most of the plants. There were many. New clover, western wheatgrass, side oats gramma, big bluestem, little bluestem, sedges, switch grass, bluegrass, and brome were the most common. All were being grazed by the yearling heifers in the "pasture allocation" exercise at the Chamberlain Grazing School.

The most common question at the school is "What do I do about invading brome grass"? Landowners struggle with this issue from Brookings to Belle Fourche, but east river pastures are more susceptible to brome taking over the pasture. If there is one silver bullet in grazing management, it would be plant diversity. As brome grass takes over, we lose native plant diversity. When this happens, how do we get the diversity back?

One way is to increase harvest efficiency while keeping an eye on the amount of forage left for plant and soil health. The Totton Ranch is the host for the Grazing School near Chamberlain. Charlie has addressed his brome grass "problem" through a rotational grazing program. His goal is to stay in a 4-6 acre paddock with his cow herd long enough to leave 1500 lbs/acre of forage for plant and soil health. Starting with 5500 lbs/acre air dry forage, this gives us a harvest efficiency of 70%.

For Charlie, brome grass is simply one part of his multispecies pasture. His strategy is to graze the brome and bluegrass pretty hard in late April and May. Then come back through these paddocks in August. The May graze clips the brome keeping it vegetative until he comes back again. On the second time, the brome is clipped again as well as many forbs and warm season grasses growing in his pasture. The second graze on the brome keeps it from being competitive in the plant community so other species have a chance to establish themselves. The warm season grasses have a year and a few weeks to recover. The brome will be grazed again next spring or about 8 months.

Plant diversity increases water infiltration rate. This keeps rainwater in the pasture, instead of running down the ditch. Water infiltration tests are done each year during the grazing school. In Charlie's pasture, rainwater consistently absorbs into the soil faster on native grass than brome. It can be as significant as 15 seconds on the big bluestem to 3 minutes plus on the brome. This translates into rainwater soaking into the native mix pastures and running off the brome pastures.

Leaving 1000-1500 lbs/acre of standing forage and consuming 70% by the end of the grazing season is improving soil health and plant diversity on this East River range site. On a West River pasture, in order to leave 1000 lbs/acre of forage the harvest efficiency might be much lower. Every ranch has its own unique combination of resources.

Back to walking across Charlie's pasture. It is obvious there is adequate litter, no bare ground between plants and lots of diversity in forbs and grasses. Add this to great water infiltration rates and you have a healthy and productive pasture where brome grass is an asset not a problem.

Dan Rasmussen is a third-generation cattle rancher living in south central South Dakota. Dan served on the board of the South Dakota Grassland Coalition for 18 years and is currently the education coordinator for the Grassland Coalition.

Bale Grazing: The Lazy Cattleman's Way to Increase Forage Production by Garnet Perman

Bale grazing builds soil health while easing the work of feeding cattle in the winter. Dennis Hoyle (Roscoe, SD), Dallas Anderson (Eureka, SD), and Doug Sieck (Selby, SD) shared their experiences. Sieck was skeptical to begin with. He started out small 10 years ago and now bale grazing is a regular part of his winter feeding program. He sets up a checkerboard with polywire in the area to be grazed and puts out about five days' worth of bales in each "square" (see photo). Dallas Anderson has bale grazed crop land and hay ground. He sectioned off areas with polywire that held enough bales for about 5 days. Hoyle set bales in 10 rows of 14 each in a 15 acre corner of an old CRP field and sectioned the row to be grazed off with polywire.



Bale placement in preparation for winter bale grazing (photo by Garnet Perman).

Questions to answer in setting up bale grazing include wind protection, access to water, and how to contain the cattle.

While Sieck noted that aircraft cable is used in North Dakota, as respecting an electric wire on snow covered ground can be an issue. Hoyle found this to be true. After the cows got out a couple of times, he let them graze the entire unit at will and was pleased with the result. Where to place the bales depends on what the goals are. Crop, hay ground, and pasture can all be candidates. One goal may be to provide feed during or just after a snow storm. Having bales preset near windbreak and water means less work and worry when bad weather hits. Anderson said that while the litter from the very center of the bales placed on crop land can be thick enough to keep the seed from going in the next spring, the production a little farther out makes up for the skips. A year or two later, once the litter breaks down, that skipped area can be very productive. "It definitely helps the land. You can bring it out in a bag at a high price or you can let the cows help," said Anderson.

Sieck has bale grazed an old calving pasture and different hayfields. He thinks his best results have been on land with tame grasses like crested wheat, brome and an alfalfa/wheatgrass mix. "Old hay fields have a lot of potential because so many nutrients have been exported," he said. He also noted that the remaining circle is like a donut, a bit bare in the middle, but with extra production around the edge. He was surprised that he could see all the circles from his first bale grazing area on Google Earth. The benefits are many. Putting out a week or more of feed vs. feeding every day saves fuel and wear and tear on equipment. One labor and fuel saving hint is to leave the bales where they dropped if grazing hay fields. All three men said the wasted hay was less than expected. What is left acts first as bedding, and then adds organic matter to the soil as it breaks down. Sieck observed that the snow and hay residue packed together in a bale "ring" (approximately 25 ft across) are the last areas to melt in the spring, allowing the nutrients to slowly enter the soil. Churned up mud in the spring has not been a problem according to Sieck. In fact, alfalfa responds well to that kind of hoof impact. He noted that it is best to remove solar degradable twine on hay ground before grazing as it gets stomped into the residue and degrades poorly. It gets tangled in baling equipment later.

Sieck framed this group of figures regarding the fertilization effect of bale grazing just to remind himself that buying hay is okay: Each ton of hay contains 40-50 pounds of nitrogen, 12-14 pounds of potash and 40-50 pounds of potassium plus organic matter. The dollar equivalent of NPK in a ton of hay is about \$40. The impact on soil health is noteworthy. At each bale site there is animal impact, nutrient cycling, densely packed nutrients and organic matter, enhanced infiltration. The resulting increase in production lasts for several years. Healthier soils and healthier plant populations with minimal labor and financial input are a plus in any grazing or cropping operation.

Article was updated from January 2015 original printing

Garnet Perman is a freelance writer and ranches with her husband, Lyle, near Lowry, SD.

Using Native Plants to Revegetate Salt-Impacted Soils

by Abigail Blanchard and Lora Perkins

In the northern Great Plains, an estimated 26 million acres of land have salt-impacted soils. Salt-impacted soils occur when salts from underlying marine sediments move upward through the soil when soils are saturated and accumulate at the surface after the soil moisture evaporates. Once enough salt accumulates, many plant species cannot grow and seeds cannot germinate. Plants that are able to grow experience limited water uptake and high salt accumulation causing salt toxicity.

Traditional methods to remediate salt-impacted soil include installing tile drainage, applying gypsum, and leaching salts. However, these methods were developed in more arid areas with much more irrigation (such as the Southwestern U.S.). In our region, studies have shown that these methods can be ineffective at remediating salt-impacted soils and may even worsen the problem. Therefore, we are working on identifying native plant species suitable for revegetating salt-impacted soils. The hope is that growing native plants in salt-impacted areas will provide cover, decrease erosion, and start to reestablish soil health.

We examined the survival of eight species in salt-impacted soils on private cropland previously managed in a conventional corn/soybean rotation in Clark County, South Dakota. Four grass species (alkali sacaton, Canada wildrye, slender wheatgrass, and western wheatgrass) and four forb species (blanketflower, Maximilian sunflower, showy milkweed, and showy ticktrefoil) were grown in the greenhouse (March 2019) and planted in the field (June 2019). Species were chosen based on their germination ability in saline conditions. We planted 2,016 transplants (252 per species) into soil with high, medium, and low/no salt concentrations. Before planting, existing vegetation was mowed (where there was any vegetation) and Dewitt woven ground cover was used (see photo).

End-of-season sampling (October 2019) revealed that native grasses had greater survival than forbs in all salt concentrations. In general, grasses had significantly higher survival in low and medium salt concentrations than the high salt concentration, except alkali sacaton. Interestingly, alkali sacaton survival increased as salt concentration increased. In other words, alkali sacaton had greater survival in the high salt concentration than in the low salt concentration. Sadly, none of the forbs were alive at the end-of-season sampling in the high salt concentration. Blanketflower, Maximilian sunflower, and showy milkweed had surviving transplants in the low and medium salt while showy ticktrefoil only had surviving transplants in the low salt.

With these results, land managers and landowners can make a more informed decision on how to revegetate salt-impacted soils in the Northern Great Plains.



Alkali sacaton transplant growing in saline/sodic soil (Photo by Abigail Blanchard)



CONERNER

- News from the SD Section of the Society for Range Management

By: Emily Helms

The Slim Buttes Buffalo Ranch was awarded the SD Section of SRM’s Area IV Excellence in Range Management Award in 2019. They were chosen to represent SD at the International Society for Range Management Meeting in held in Denver, CO in mid-February 2020. The Slim Buttes Buffalo Ranch was nominated for this award by Jaime Fuhman, SD NRCS Resource Unit Conservationist from Buffalo, SD.

The Slim Buttes Buffalo Ranch is operated by Sandy, Jacki, and Brody Limpert and is located in Harding County. The ranch runs approximately 1,200 bison in a rotation of over 30 pastures that range in size from 600 to 800 acres per paddock. Each pasture has at least five tire tanks and one dam to water the bison. The bison are rotated about every 7 to 9 days. Each pasture is grazed only once during the growing season, and sometimes during the dormant season as well. They always change up their season of use.

The ranch owners have spent 10 – 15 years updating infrastructure on the ranch to get to where they are today. They have installed over 30 miles of pipeline and 180 tanks to help facilitate their grazing management.

Their intensive rotation of their pastures has increased the productivity of the land by allowing plants rest at differing times during the year. They have seen an increase of warm season species, and also an increase of wild-life species present.

They are always willing to share their knowledge with others. They’ve hosted tours on their place, as well as were featured in one of the Grassland Coalition’s Amazing Grassland videos. Sandy is also a Voice for Soil Health.



Slim Buttes Buffalo Ranch Excellence in Range Management poster presented at the 2019 annual SD Section of SRM in Deadwood, SD (Photo by S. Smart).



The Limpert family, Brody, Sandy, and Jacki manage Slim Buttes Buffalo Ranch. Here they pose in the South Dakota Amazing Grassland video shoot. Watch their story online at: <https://www.youtube.com/watch?v=nHLyoldWKN>



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Calendar of Events

Event	Date	Location	Contact Person	Phone
NRCS State Technical Meeting	Dec. 3	Online MS Office Teams	Kathy Irving	605-352-1205
SDGC Annual Meeting	Dec. 15	Online Zoom	Judge Jessop	605-280-0127

Please remit any comments, suggestions, or topics deemed necessary for further review to: Sandy Smart, SDSU Box 2140B, Brookings, SD 57007, alexander.smart@sdstate.edu, (605) 688-5503

