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Celebrating 20 years: Education and Outreach by Sandy Smart

This year the South Dakota Grassland Coalition is celebrating its 20th year. As part of this special anniversary we are highlighting the work of our various committees. This issue we spotlight the work of the Education Committee. This is the bread and butter of the Coalition. The annual SD Grazing School is our most noted program. The School first started in 2003 and features presenters from SDSU, NRCS, and ranchers. Over the years, the hands-on nature and the rancher-delivered messages have turned this annual school into the Coalition's signature program. The school has become so popular that we offer two schools back to back in the second week of September.



Students have to determine the appropriate size paddock for a 1-day grazing period using real animals (2006 SD Grazing School).

The Coalition has hosted the annual bus tour, holistic resource management workshops, pasture walks, annual bird tour, and annual winter road show among others. One of the most memorable times for me was the 2007 annual Bus Tour at Bill Slovek's ranch. That was the first time I heard Gabe Brown speak on soil health and other topics before he became famous. That July day was especially memorable because I remember riding in Bill's pickup with the temperature hitting 117 °F. We learned about Bill's impressive rotation that combines flash grazing and the possibility to graze each pasture in the winter.



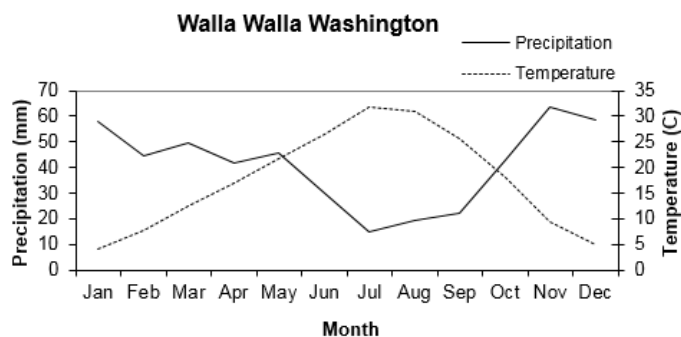
2007 Annual Bus Tour at Bill Slovek's ranch where participants braved the excessive heat to learn about Bill's pasture AI system (Photo by Sandy Smart 2007).

Range 101: Rangeland Ecosystems of the World -

Intermountain Grassland/Shrublands of USA by Sandy Smart

The grassland/shrublands of the Intermountain West is quite different from the grasslands of the Great Plains. The most notable difference is the climate, which is responsible for the development of the vegetation seen in this region. Unlike the Great Plains, where 75% of the annual precipitation falls from April through September, it is just the opposite in the Intermountain West.

Notice in the figure from eastern Washington, most of the precipitation occurs from October through May. In the summer it is hot and dry. Grasses with a fine, shallow root system are at a disadvantage compared with deep rooted shrubs. The moisture received in the winter tends to infiltrate the soil where deep rooted shrubs can access it in the summer when the upper profile tends to dry out. Thus most of the grasses are cool-season bunchgrasses which finish their production by May or early June. Typical grasses are bluebunch wheatgrass, Sandberg bluegrass, and Idaho fescue. Annual grasses like downy brome and Japanese brome do quite well in this environment, as you could imagine.



Historically, this region did not co-evolve with large herds of bison as did the Great Plains. Supposedly about 10,000 years ago mass extinctions of large herbivores occurred. Thus, these perennial cool-season bunchgrasses are more sensitive to heavy defoliation compared with our rhizomatous grasses. One of the classic research papers explored the plant vigor of crested wheatgrass (originating from Mongolia grasslands subjected to a long history of grazing) compared with bluebunch wheatgrass (native to western North America). When these grasses are intensively clipped in late spring, crested wheatgrass regrows 3 to 5 times more canopy from new tillers than bluebunch wheatgrass. However, bluebunch wheatgrass continues to grow its root system while crested does not. Bluebunch wheatgrass may have adapted this strategy to deal with the hot dry summers in the western U.S., whereas the climate where crested wheatgrass originated from is similar to a precipitation pattern of the Great Plains.

Proper grazing use of 35% is typically recommended for these native grasses compared with the 50%, take-half, leave-half in the midwest. Shrubs like big sagebrush thrive here and support sage grouse, an iconic upland game bird of this region. Ranchers tend to use mountain pastures in the summer and graze closer to home in the fall, winter, and spring.



Greater sage grouse (Photo by Ron Nichols, NRCS Photo Gallery).

Nutrient Regulation in Invasive and Native Grasses by Joshua Harvey and Joshua Leffler

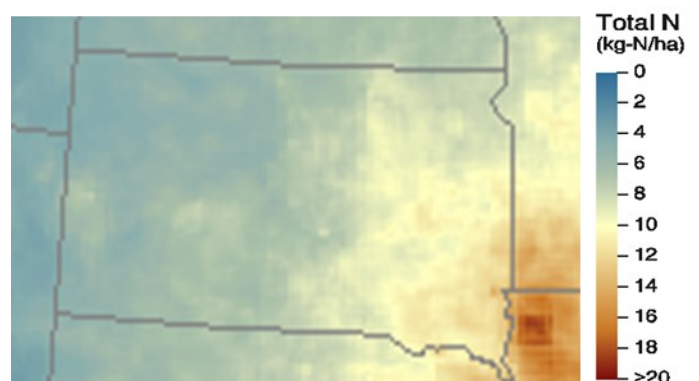
Native vegetation in grasslands, which are critical habitats that provide ecosystem services and economic opportunities for South Dakotans, are widely being replaced by invasive grasses. The utility and stability of grassland services and opportunities are undergirded by their native vegetation, which is at risk. In order to preserve our grasslands and the value we derive from them, we must understand why invasive grasses can outcompete and replace native vegetation. However, the question of why invasive plants are capable of replacing native plants is still an active area of research with many unanswered questions. Using a concept of *stoichiometric homeostasis*, we show that invasive plants' success is in part due to how they manage their nutrition.

Just as your body regulates the quantity of various nutrients it takes up and retains, so too do plants regulate the amount of nutrients they take up into their tissues through their roots. A term for this nutritional regulation is *stoichiometric homeostasis*; that is, the regulation (*homeostasis*) of the balance (*stoichiometry*) of internal nutrients. Imagine a potted plant that gets fertilized weekly with an ever increasing concentration of nitrogen (N) fertilizer. If the concentration of N within the leaves of that plant were to remain the same over the course of several weeks, then that plant would have a high level of stoichiometric homeostasis (*H* for short). Alternatively, you could say that the plant is *highly regulatory* with respect to N. Now imagine a plant whose leaf concentration of N steadily rises at a rate similar to the increasing rate of fertilizer concentration. Such a plant would have a low level of *H* and could be said to be *poorly regulatory* with respect to N. Recent research done in the Konza Prairie of Kansas showed that with fertilization at rates of 100 kilograms of N per hectare (about 90 lbs. per acre), highly regulatory (high *H*) plant populations decreased, while poorly regulatory (low *H*) plant populations increased. Can these observations help explain the success of invasive grasses?

We believe they can. In a greenhouse experiment we determined *H* in two native (western wheatgrass, Canada wildrye) and two invasive grasses (smooth brome, crested wheatgrass) by cultivating them across a range of known soil nutrient concentrations and examining leaf nutrients. We found that the invasive grasses had a lower value of *H* than the native grasses. We suspect that this trend holds for many invasive and native grasses. What does this mean for our grasslands? Agricultural runoff, atmospheric deposition, and soil management practices can all lead to increased levels of N in soils, creating conditions that promote the success of invaders. The challenge to conserve our native vegetation, the value it provides, and the effort to prevent the spread of invasive grasses is then, in part, the challenge to maintain the chemical integrity of our prairie soils.



A swath of smooth brome in a Volga grassland. Brookings County has experienced rates of atmospheric N deposition up to 20 kg per hectare per year (Photo: J. Harvey).



Rates of atmospheric N deposition across SD in 2015. There is considerable year-to-year variation in the extent and intensity of N deposition (Source: NADP).

Grass in the Bank: Dan Rasmussen's Drought Plan by Kate Rasmussen



Dan Rasmussen (Photo by Sandy Smart, 2009).

Dan stepped out of the pickup and waited for the evening songbird chorus to return after being hushed by our arrival. He parked on the top of Cedar Butte—a long, grassy plateau surrounded by badlands—to point out the array of plant species growing at our feet. Cattle haven't grazed the area during the growing season for over a century. Because of its history, the spot provides a model for the kind of plant diversity Dan shoots for in the rest of the pastures on the 33 Ranch. After a few moments, the air became so thick with songbird calls it was difficult to pick them out individually. I kept my ears peeled for the croaking chirp of a bird called the Loggerhead Shrike—a carnivorous

songbird trademarked by its unusual methods of food banking. With a hawkish beak, the Shrike skewers its prey, typically frogs or mice, on sharp objects like barbwire to stockpile for later.

"Prairies and ranchers depend on each other for long term survival. Not enough people realize how important prairies are," Dan said as we shuffled the grass with our boots to scare off any snakes before taking a seat. According to World Wildlife Fund, the American Great Plains lost more acres to land conversion than the Amazon rainforest in 2014. Dwindling with their habitat, grassland birds have experienced an alarming decline. Songbird populations, and indicator of healthy grassland, have dropped more than 80% since the 1960's.

Dan operates the cattle ranch his grandfather homesteaded in 1914. He studied economics in college and combined his econ knowledge with a love of grassland ecology. After graduating from SDSU, he picked up a knack for education while teaching agriculture at a rural college in Botswana before coming back to the ranch. The education skills he learned in Africa have come in handy for helping with the Grazing School—a land stewardship education event the Coalition puts on twice a year. The event teaches producers ideas needed to work out the grazing to recovery time ratio their pastures need.

"By allowing the plants enough rest, we encourage the growth of underground energy stores that will be there for us when the markets and the rain aren't," he said. The underground energy stores Dan referred to are the perennial root structures probing deep beneath the topsoil. This hidden labyrinth is home to billions of microbes essential to plant health. The microbes break down the organic matter, freeing the minerals and nutrients that sustain the grasslands. "As land managers we share responsibility with everything that happens on the land. If we graze a pasture, it changes the plant community, hopefully, for the better. If we do nothing and choose not to graze a pasture it changes the plant community," Dan said as we took in the sweeping view of the landscape.

Rasmussen Continued on Page 5

Rasmussen continued by Kate Rasmussen

One has to wonder, what does the landscape look like when left completely alone? As if anticipating my inquiry, Dan led me to a small enclosure nearby. The enclosure was put up in the 50's to monitor the grazed versus un-grazed plant communities. Inside the enclosure, dried perennials had built up enough of a mat to choke themselves out and give way to invasive annual plants. A few annuals sprouted out of the thick layer of built up organic matter while big blue stem, lead plant, blue grama, and other beneficial perennials flourished just outside the enclosure. "By over or underutilizing prairie we encourage or discourage the competitive advantage of the perennials. When we overgraze perennials and they recede, annual shallow rooted invasive species such as cheat grass and bluegrass have an advantage."

Dan played a major role in starting the Coalition's Grazing School and structuring it to help producers gain tools needed to make sound stewardship decisions on the land they manage. "Every choice we make has an impact. The key is learning to make the right decisions over time. Perennial plants are deep rooted and adapted to South Dakota prairie. Perennials are the heart of our prairie."

Three nighthawks carved loops in the half-light, diving for insect's suspended over the grass. As we watch the small raptors feed before dark, Dan tells me about a saying his father—a former Coalition board member—often said: "grass is like having a savings account in the bank." Although we spotted no shrikes, the unconventional songbird has the right idea of storing fuel for later. Encouraging perennial grasses gives producers the opportunity to stockpile energy stores for the future.

Dan often says he doesn't have grazing on the place all figured out. He does, however, have a reservoir of patience and an eye for the big picture: "Sustainable ranching is truly a rare type of business. Our long-term survival directly corresponds with the quality of wildlife habitat. When we cater to plant diversity, the cattle and wildlife get the best possible nutrition. Where there is healthy grassland, there are fat cattle."

Kate Rasmussen is a freelance writer and ranch hand based near Belvidere, SD.



Dan explaining management techniques during a SDGC Pasture Tour of the 33 Ranch in 2005 (Photo by Sandy Smart, 2005).

What I Learned at the Grassfed Exchange by Garnet Perman

It's not every year that the Grassfed Exchange is in South Dakota. The 10th Annual Grassfed Exchange is scheduled for June 20-22 in Rapid City. Several Grassland Coalition members have attended in the past. Here's what some of them have gained from the experience.

The very first Exchange was the brain child of Wayne Rasmussen from Plainview, NE with help from Terry Gompert, and was held in Yankton in 2009. It featured cattle for sale and some speakers. Larry Wagner, Chamberlain, took several head to sell at that event and recalls the sale being a bit of a bust, but remembers the educational part as being very good. We attended again when it was held in Nebraska near the Rasmussen farm. "Cover crops were new at the time," said Wagner. Rasmussen was a pioneer in grazing cover crops and related his experience. Wagner also learned more about what grassfed cattle should look like and what it takes to finish them. Wagner seeks small framed cattle with big bellies that can consume the amount of grass necessary to finish well. He also gained some insight into marketing grassfed cattle which he's used with his own grassfed animals.

Dan Rasmussen, Belvidere, also attended the first event in Yankton. The information regarding marketing is what also stood out to him that year. He later attended the Exchange when it was in Bismarck. He was able to put together a notebook of useful contact information while talking to the cattle buyers and beef processors that were vendors there. Bill Helming of the Helming Report was one of the speakers. Dan started subscribing to his newsletter after hearing him speak and visiting with him. The newsletter has been helpful with understanding marketing and commodities. A panel of buyers was "brutally honest". "Some I didn't want to hear, and some I did," said Rasmussen. Rasmussen also remembers hearing very good information about soil health.

This year's Grassfed Exchange features a presentation by Glen Elinga of Alder Spring Ranch in Idaho. Rasmussen has marketed grassfed animals there in the past. Marketing in the grassfed industry can be a challenge. He's found that personal relationships are an important component of finding a reliable market.

Mike McKernan, Twin Brooks, is a two time GE attendee, in Bismarck in 2013 and Albany, NY last year. He mentioned the excellent information he received on soil health and marketing as well. Ray Archuleta's presentation of soils and how to manage grasses left an impression. McKernan incorporates the idea that grass is built from the soil in his management planning. He also enjoys visiting with the other people in the audience. "You're gonna learn a lot from the speakers but you will learn as much or more from the other attendees," he said.

One of the things all three men mentioned is that they heard new ideas for the first time at the Grassfed Exchange. This year's program promises more of the same. McKernan called some of Jonathon Lundgren's latest research "eye opening". Soil health, grazing management, marketing and even a human health angle are all on the schedule. Information about the conference is covered elsewhere in this newsletter, or can be accessed at <https://grassfedexchange.com>.

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

SDSU Range Club and Student Activities at the 2018 SRM Meeting in Reno, NV by Sandy Smart



2018 Range Club, Plant Identification and Undergraduate Range Management Exam Team

Left to right: Katelin Frerichs (UR), Andrea Collins (RC, URME), Shyanne Seidel (RC, URME), David Flanery (ID, URME), Lindsey Meiers (ID, URME), Katlyn Beebout (RC, ID, URM), Dr. Lora Perkins (URME Coach), Dr. Sandy Smart (RC Advisor), and Blake Roetman (RC, ID, URME). RC = Range Club, ID = Range Plant Identification, URME = Undergraduate Range Management Exam, Undergraduate Research = UR).

Competitions were held at the 71st Annual Society for Range Management meetings in Reno, NV, Jan 28th – Feb 1st. The URME Team placed 13th out of 25 teams and the ID Team placed 12th out of 25 teams. Katelin Frerichs, under the guidance of Dr. Lan Xu, presented a poster entitled “Identifying and Characterizing of Salt-Tolerant Alfalfa (*Medicago sativa* Subsp. *falcata*) Germplasm”. Graduate students Surendra Bam, Jamie Brennan, and Jennifer Lutz also gave oral and poster presentations of their research.

SDSU professors in attendance included Dr. Pat Johnson, Dr. Lora Perkins, and Dr. Sandy Smart. Dr. Perkins and Xu chaperoned the undergraduate students and High School Youth Forum students, Hunter Eide and Danika Gordon on a hike at Lake Tahoe.





Sandy Smart
Box 2170, ASC 219, SDSU
Brookings, SD 57007

Calendar of Events

Event	Date	Location	Contact Person	Phone
SARE 30th Anniversary 'Our Farms, our Future Conference'	April 3-5	St. Louis, MO	Sandy Smart	605-651-0766
National Land and Range Judging Contest	April 30 – May3	Oklahoma City, OK	Dave Ollila	605-394-1722
SD Professionals and Youth Range Camp	June 5-6	Sturgis	Dave Ollila	605-394-1722
Bird Tour	June 8-9	Lowry	Judge Jessop	605-280-0127
GrassFed Exchange	June 20-22	Rapid City	Pete Bauman	605-882-5140
Rangeland Days	June 26-27	Redfield	Dave Ollila	605-394-1722

Please remit any comments, suggestions, or topics deemed necessary for further review to: Sandy Smart, SDSU Box 2170, Brookings, SD 57007, alexander.smart@sdstate.edu, (605) 688-4017