



Grassroots

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INSIDE THIS ISSUE:

Grassland Conservation 2
continued

Seeds of Wisdom: Gabe Brown 3

Gabe Brown continued 4

Winter Road Show and Soil Health Workshop 5

Winter Grazing Management 6

Cheatgrass Management 7

Send a Cow to College

Grassland Conservation Should Remain High Priority

by Ben Turner and Roger Gates

Passage of the 2014 U.S. Farm Bill which includes programs such as SodSaver and policies such as conservation compliance (which restrains cultivation on highly erodible or marginal lands) provides incentives to enhance conservation of grasslands. However, these policies will likely only slow down, rather than reverse, recent trends in farmland expansion into existing grasslands. Driven by economics, policy, and social shifts in rural America, this is certainly a complex problem worthy of holding our attention for years to come.



Ben Turner, former Ph.D. student of Roger Gates, is now a Post-doctoral Researcher at New Mexico State Univ.

Systems thinking, which combines both qualitative and quantitative data with computer simulation, is a methodology for investigating and interpreting complex problems. Using information from farmers and ranchers across South Dakota, combined with USDA's National Agricultural Statistics Service (NASS), Natural Resource Conservation Service (NRCS), and U.S. Census Bureau data, SDSU investigators created a systems model to forecast land use change across the northern Great Plains (South Dakota as well as Nebraska, North Dakota, Wyoming and Montana). Soil environmental risk (SER) was also assessed at the regional level based on varying degrees of cultivation intensity across differing land use qualities. This model was used to test and compare public policy and economic scenarios to identify favorable future conditions (Figure 1 on page 2).

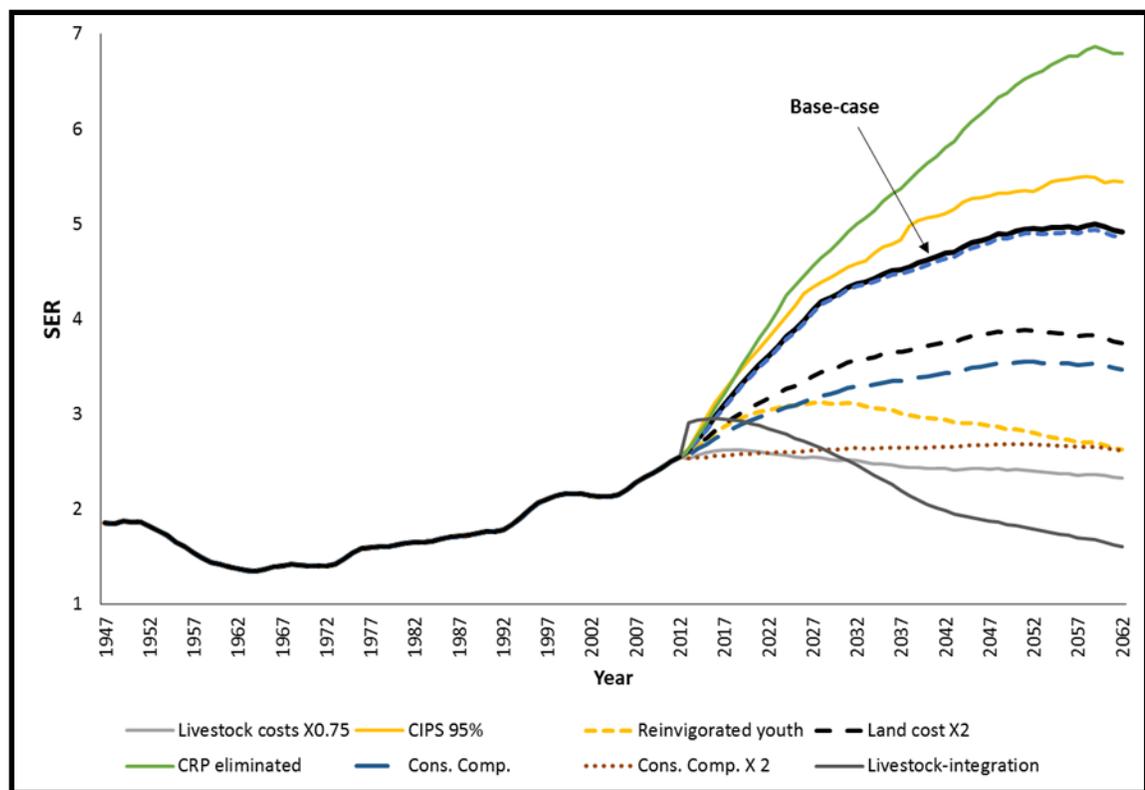
Under the 2012 'base-case' scenario, where no policy changes occurred, an additional 9 million acres would be converted away from grassland by 2060, while SER would increase from 2.6 to 4.29 (or 65%). Eliminating the Conservation Reserve Program, for which budget constraints continue to limit acreage enrollments, lead to an increase of almost 12 million acres by 2060 with an associated increase in SER to 5.2 (an increase in 100%). For reference, estimated SER values during the Dust Bowl ranged between 5 and 10.

Grassland Conservation Continued on page 2

Grassland Conservation continued

Increasing crop insurance premium subsidies (CIPS) to 95% of the rate covered also caused increased projected SER. Less financial risk means an increase in soil environmental risk.

Not all of the scenarios tested were so alarming. More stringent conservation compliance would essentially keep land use at today's levels, while policies aimed at increasing younger individuals to start in or return to livestock agriculture would result in similar conditions but with enhanced rural community-resilience. Integrating livestock with farm operations provided the most noticeable reduction in SER, due to higher demand for grass acres and additional crop varieties to enhance grazing opportunities.



The systems approach provided some of the first forecasts for both land use change and associated negative impacts of grassland loss in the region. Although gains have been made in conservation policies, more will be needed if stakeholders and policy makers want to avoid serious consequences comparable to the Dust Bowl era.

Ben Turner is a Post-doctoral Researcher in the Department of Animal and Range Sciences at New Mexico State University. You can contact Ben via email at bturner@nmsu.edu. Roger Gates is an Extension Range Specialist and Professor in the Department of Natural Resource Management at South Dakota State University. You can contact Roger at roger.gates@sdstate.edu.

Seeds of Wisdom: Gabe Brown's Low Stress, High Profit Agriculture by Peter Carrels

The countryside of the Northern Plains would look much different if it were populated by more people like Gabe Brown.

Some might contend that the region's land and water resources would be healthier, and the vitality, fertility and resilience of soils would be improved. Some might even say that the quality of our food would be better. Brown's thoughtful, ecological land management practices were learned through turmoil and hardship, like many meaningful, lasting lessons are learned.

His profound revelations about stewardship and agricultural ethics were prompted in the aftermath of four straight years (1995-1998) when hail or drought wiped out crops on his sprawling farm and ranch in Burleigh County, North Dakota. Nearly broke and lacking access to credit and capital, Brown desperately needed to figure out how to grow crops and generate income without resorting to expensive synthetic fertilizers and other conventional farm chemicals.

"That series of four years was hell to go through," reported Brown, "but it was the best thing that could have happened to me. It changed the way I farm, and it changed the way I look at agriculture and soils." Brown had abandoned tillage in 1993, so he was already inclined to seek out improved ways to manage his land. The next step was to gain a better and more intimate understanding of the natural resources on his property.

With the help of his county conservationist, Brown measured rainfall infiltration rates on soils. Because annual precipitation averages only 15 inches in the area where he and his family operate their 5,000 acre enterprise, he wanted to know the capability of soils on the place to absorb precious moisture.

"We discovered," said Brown, "that the infiltration rate was about half an inch per hour, and that's not very good." He realized that although he'd stopped tilling his land there had been many decades before that when the land was subjected to intensive tillage. "The aggregate stability of the soil had been destroyed by tillage," he explained, "and that's why the land couldn't effectively absorb moisture." Brown also measured organic levels of his croplands, and discovered rates ranging from 1.7 to 1.9 percent. He and the county conservationist understood that this was unacceptable.

A voracious reader and hungry learner, Brown began researching traditional and non-conventional approaches to agriculture. "I read and studied Thomas Jefferson's journal and many other books about soils and farming. I realized that long before industrial farming came to dominate agriculture, farmers operated differently, and they had been successful. I wanted to learn how they did that."

Cover crops became a focus of his investigations, and he soon discovered that his land dramatically benefited by their use. Brown began using cover crops during all seasons on all his land. On some land he blended up to 25 species of cover crops. "We now grow cover crops on all our crop land every year. That might be before a cash crop, as a companion crop alongside or mixed in with a cash crop, or after a cash crop has been harvested."

Gabe Brown Continued on page 4

Gabe Brown continued by Peter Carrels

The strategy, he explained, is to protect the soil and maintain living roots in the soil at all times. “It’s the presence of living roots,” he explained, “that feeds soil biology and starts nutrient cycling.”

Today, after some 15 years of careful and deliberate management practices, Brown has tripled organic levels in his soils, with some soils reaching 6.1 percent. He has also dramatically improved the moisture infiltration rates of his soils. Some of his lands can now absorb up to 8 inches of rainfall in an hour. “It’s not likely we’ll ever see a rain event like that,” he acknowledged, “but an infiltration level that high gives a good indication how far we’ve come with our stewardship objectives.”

Not only is Brown conserving his land, he is –remarkably– building new top soil. “If we follow the principles of avoiding tillage, keeping the ground covered at all times with carefully selected and diverse plants, and keeping roots in the ground we can add soil at a surprising pace. Scientists say that it takes 500 years for nature to build an inch of top soil. We can do that in a matter of a few years.”

Brown also avoids synthetic nitrogen fertilizers, and describes their detrimental effects on soils. “The reality is that synthetic fertilizers destroy the health of the soil. Farmers are told to keep adding more and more of it, but it’s unnecessary.” Despite his aversion to synthetic fertilizers, Brown’s corn fields out-yield the county average by 20 percent. And those corn fields have not been treated with pesticides or fungicides for many years. “When you apply something to kill a pest, you also kill beneficial species,” he said. “We do use herbicides here and there, but very rarely and at a much reduced rate. I treat my farm and ranch like an ecosystem, and it’s a low-stress approach for the land.”

Diversity is the overarching theme of Brown’s farm-ranch enterprise. He runs 350 cow-calf pairs, and up to 800 yearlings on 100 carefully tended pastures throughout his entire operation, including on cropped lands. There is no confinement feeding. He also has a flock of sheep, pastured hogs, and 600 free-range laying hens. His crops grow mostly from organic seed, and he’s raising corn, oats, barley, sunflowers, spring and winter wheat, alfalfa and others. Use of synthetic chemicals on all crops is kept to a bare minimum. Of his 5,000 acres, 2,000 are native prairie, 2,000 are cropped, and 1,000 exist as what he calls “tame prairie” or pasture. “We’re trending toward more grasslands,” he explained. “We’re continually seeding cropland back to perennial, native pasture.”

Combining zero till, diverse cover crops and integrated livestock grazing throughout the operation creates a sustainable agricultural environment that Brown describes as “re-generative”. The business he has developed relies on those re-generative practices and it revolves around “stacked enterprises” creating multiple income streams that handsomely reward him and his family. Brown’s grass-fed beef label, for example, is doing well, and nearly everything he sells is direct-marketed to consumers.

Brown Continued on Page 5

Brown Continued by Peter Carrels

He does not participate in the farm program, and he complains that the farm bill restricts progressive concepts like cover crop uses. Word is spreading about his successes. Last summer more than 2,000 people from all over the globe visited Brown's operation. He travels regularly to conferences and gatherings to learn, network and share. And on Friday, August 15th, Brown spoke at length about modern farming and regenerating soils on National Public Radio's nationally broadcast "Science Friday". Brown's message is gaining traction, too. Cover crop tactics and holistic management practices are gaining popularity.

"It's not easy to admit that I farmed the wrong way for many years," he candidly declared. "I'm now trying to prove that there's another way, a better way, to farm."

Judging from the condition of his soils and land, and from the commercial health of his farm and ranch business, the proving part has passed.

Peter Carrels writes about natural resources, the environment, and the relationship of people to nature. He lives in Aberdeen, SD.

SDGC Annual Winter Road Show and Soil Health Workshop to Host Gabe Brown

Join us for an opportunity to learn from Gabe Brown, a pioneer of the current soil health movement to regenerate our soil resources.

The Winter Road Show Schedule:

Wednesday, December 10 10:00 am - 3:00 pm Sinte Gleska University ~ Mission, SD **Contact:** Judge Jessop - SD Grassland Coalition (605) 280-0127 or judge.jessop@sdconservation.net

Thursday, December 11 10:00 am - 3:00 pm Jo Deans ~ Yankton, SD **Contact:** Les Labahn - Randall RC&D Association, Inc. (605) 487-7035 or leslie@cme.coop Or Sue Schultz, randallrcd@cme.coop

Friday, December 12 10:00 am - 3:00 pm AmericInn ~ Chamberlain, SD **Contact:** Judge Jessop - SD Grassland Coalition (605) 280-0127 or judge.jessop@sdconservation.net

South Dakota's Soil Health Challenge: Don't Get Left in the Dust:

Tuesday, December 16 8:30 am - 3:30 pm Ramkota Hotel & Conference Center, Rapid City, SD **Contact:** Ruth Beck (605) 773-8120 ruth.beck@sdstate.edu or Anthony Bly (605) 782-3290 anthony.bly@sdstate.edu, Pre-registration is required by Thursday, December 11 at 5 pm.



Gabe Brown, farms and ranches just east of Bismarck, ND.

Winter Grazing Management by Garnet Perman

Curt Knight of Gann Valley has planted 1400 acres of cropland back to grass since 2004 and concentrated on developing a profitable forage only cattle program that includes winter grazing. Today, he knows what works for him and is willing to share what he's learned.

Every producer's forage resource is unique. Develop grazing strategies based on the plants in your pastures, their seasonal growth habits and year round nutritional content. Know how to store forage for winter grazing. If you plant grasses, pick species that fill the gaps in your system. Develop herd genetics that maximize the resource always remembering that the desired end product is a high quality carcass that provides protein for people. "Cattle efficiency will add as much or more to your program than a good grazing system," said Knight. Observation of individual animal's grazing habits, disposition, mothering abilities and measuring several specific traits helped Knight develop cattle that perform very well on his forage resource. Be flexible. Knight uses spring and fall calving programs as well as custom grazing. His rotational system uses 64 pastures on 5500 acres. He advocates moving to new pasture often, and moving when conditions warrant it. For example, the optimal period for grazing brome grass is quite short. Graze it or cut for storage when the time is right so regrowth can occur. "You can always go back," he said.

For Knight, knowing his resource includes doing his own research because very little information is available concerning grasses for winter grazing on the Northern Plains. He plants test plots with various forage cocktails, clips samples 6 or 7 times during the year and has them analyzed at a lab. The criteria he looks for includes digestibility, acid detergent fiber, neutral detergent fiber, protein and water soluble carbohydrates. He's found that some grasses when interseeded with certain legumes provide enough nutrition to get pregnant and lactating cows and growing calves through the winter in excellent condition. He's a fan of orchard grass, fescues and blue grama, travois alfalfa and cicer milkvetch. His introduced grass and legume pastures are smaller and grazed early in winter. Native pastures are grazed later. Knight thinks of legumes as grass feed, not animal feed because they contribute to increased forage production and soil health.

Over the years, Knight developed a spring calving Tarentaise herd, a fall calving Red Angus herd and spring and fall calving crossbreds. His mature cattle average a frame score 4 and weigh 1400 pounds. Finding 100% forage raised bulls is a struggle, so he raises his own. An "A team" of 40-50 cows is used to develop bull replacements. Some of the traits he measures include udder score, body condition, and weight and hip height of both weaned calves and adult cows. He ultrasounds for carcass traits when pregnancy checking replacement heifers. He also keeps carcass data from his calves. His cattle routinely grade 90% choice or better, yield grade 1 and 2.

A fall calving program broadens utilization of his grazing system and adds value when fall calves hit generally higher April and May markets. Knight usually feeds only one bale of supplemental hay per cow/calf per year. Carryover hay is marketed by taking cattle in and feeding them on pasture. He calculates the fertilizer value of a grass hay bale at about \$50.

If you're interested in tapping into the wealth of information he's gained in his quest to make pasture profitable Knight can be contacted at 605-293-3203. He has also developed a power point on cattle efficiency and grazing strategies.

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

Cheatgrass Invasion and Management

by Lora Perkins

Cheatgrass (*Bromus tectorum* L.) is a cool-season annual grass introduced to North America during the late 1800s. Cheatgrass occurs in all lower 48 states, is a major invasive plant in the Intermountain West, and is increasing in the Plains. Personally, I have seen cheatgrass growing among rocks right on the Pacific coast, high in the Sierra Nevada and Rocky Mountains, growing out of the sidewalk cracks in Brookings, SD, and I have studied cheatgrass in the Great Basin.

Cheatgrass has several attributes that enable it to become so dominant. These attributes include timing of growth, competitive ability, and abundant litter production. Cheatgrass can sprout in the fall, persist all winter, and start growth in the spring well before natives. This head start lets cheatgrass occupy areas before natives start to green up. However, cheatgrass does not necessarily need this head start to be successful. When cheatgrass grows concurrently with natives, cheatgrass has the ability to suppress native plants. Growing alongside cheatgrass, grasses, forbs, and even shrubs will have reduced performance and growth. Arguably, the largest contributor to cheatgrass invasion is the abundance of litter it produces. This litter acts as mulch to increase subsequent cheatgrass establishment and performance and this litter increases the size and frequency of wildfires. These fires are especially impactful in areas like semiarid shrublands that historically did not have large or frequent fires.

Cheatgrass control is tricky. The information on whether grazing is a viable option to control cheatgrass is very equivocal. Old advice was that cheatgrass could be decreased by intense early season grazing; however, strong new information suggests that this does not work. Grazing decreases native cover, introduces more cheatgrass seed, and does not control cheatgrass at all! Cheatgrass is an annual that produces abundant seed. Although, herbicides can control a standing crop, multiple-year application is required to deplete the seed bank. Exciting new work is investigating fungal pathogens that attack cheatgrass seeds and seedlings. In the future, an optimal control plan *may* be to spray the standing crop of cheatgrass at the same time you treat the seed bank with fungal pathogens.



Cheatgrass (Photo by Lora Perkins)

Lora Perkins is an Assistant Professor of Rangeland Ecology at SDSU.

Send a Cow to College: Investing in Cow-Calf Teaching and Research

by Sandy Smart

In the September newsletter I outlined the investment SDSU is making in the new cow-calf teaching and research facility. The SDSU Foundation is in the middle of raising the money to make this happen. They started a tax-free donation of cull cows at any sale barn in South Dakota as part of their “send a cow to college” program. I spoke with Charlie Totton of Totton Angus and he said that he donated two cull cows to this program through the Chamberlain Sale Barn. “This year has been a good one and I have benefitted from expertise that SDSU has provided over the years. We need to support the beef industry in this state, make it more competitive, and keep land in grass”, Charlie said.

Mike Barber with SDSU Foundation, said that “53 cows totaling over \$66,000 have ben donated through the program”. If you feel like this is something you could do check out their website www.sdsufoundation.org/cow-calf, or contact Mike Barber at 1-888-747-7378, or email Mike.Barber@sdstate.edu.



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

Calendar of Events

Event	Date	Location	Contact Person	Phone
Winter Road Show featuring	Dec 10	Mission	Judge Jessop	605-280-0127
Gabe Brown	Dec 11	Yankton	Judge Jessop	605-280-0127
SDGC Annual Meeting and	Dec 12	Chamberlain	Judge Jessop	605-280-0127
Gabe Brown				
Soil Health Workshop	Dec 16	Rapid City	Ruth Beck	605-773-8120
Holistic Management workshop	Jan 5-6	Rapid City	Randy Holmquist	605-730-0550
Holistic Management workshop	Jan 8-9	Pierre	Randy Holmquist	605-730-0550
Holistic Management workshop	Jan 12-13	Sioux Falls	Randy Holmquist	605-730-0550

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