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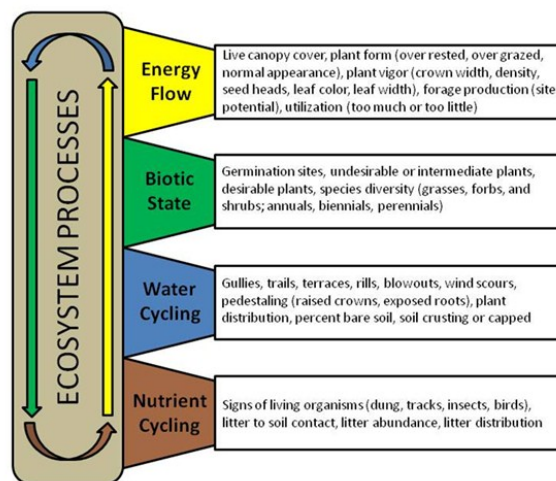
Soil Health on Rangelands: Nutrient Cycle by Sandy Smart

In this final article on rangeland soil health, I want to focus on the nutrient cycle. How would you know if a pasture is showing signs of an efficient or good nutrient cycle? In the diagram to the right, we monitor the nutrient cycle by looking for signs of living organisms (at both small and large scales) and how the litter builds up or decays.

First, let's look at the living organisms themselves or signs that they are around. We can evaluate such things as dung, from both livestock and wildlife. If the dung is decaying relatively quickly you know the nutrients are cycling (see photo to the right). If the dung patties take several years to decay, the nutrients are likely going into the atmosphere rather than into the soil.



A bee feeding on dotted gayfeather (Photo: A. Smart, 2015).



Ecosystem processes and monitoring diagram (modified after Pyke et al. 2002; Pellant et al. 2005; Orchard 2013).



Roller type dung beetle (upper right corner) and holes from other burying type dung beetles (Photo: A. Smart, 2014).

Higher order levels of life benefit from the cycling of nutrients. Beneficial insects such as dung beetles and pollinators provide valued services to the

ecosystem. Diversity in plant life will promote higher level diversity in insect (see photo on the left) and bird life.

Nutrient Cycle Continued on page 2

Nutrient Cycle Continued by Sandy Smart

The next thing to look at is litter. Litter is one of the best indicators because it is easy to monitor. If too much litter is present, it could inhibit tiller density and site productivity because it indirectly limits nitrogen mineralization. Sometimes, under these conditions, plants will show yellow or light green color in the leaves because nitrogen is not being mineralized quickly enough. Another sign to look for is low production of seed from perennial plants. Research has shown that removing litter by burning tallgrass prairie is equivalent to fertilizing with nitrogen in producing seed heads of warm-season grasses. If not enough litter is present (i.e. too much bare ground) biological activity will decrease because soil temperature may become too high and moisture too low from excessive evaporation.

I conducted a small experiment in eastern South Dakota where I compared two areas (side-by-side) that had been grazed the previous year and an ungrazed control. The total aboveground biomass in the grazed area one year later was 5900 lbs/acre and 6100 lbs/acre in the ungrazed control. Interestingly, was the difference in litter and current year's production between the two plots. The grazed area had a total of 3400 lbs/acre of live biomass and 2500 lbs/acre of litter. The ungrazed area had 1900 lbs/acre of live biomass and 4200 lbs/acre of litter. To the right is a photo of the grazed and ungrazed areas. This is a good example of excess litter limiting both the energy flow and nutrient cycle.



Pasture that was grazed the previous year (on the left) and ungrazed (on the right). Notice the reddish color of the seed heads and darker green of the grass compared with the lack of seed heads and lighter color of grasses from the ungrazed area on the right. (Photo: A. Smart, 2014)

Setting the correct stocking rate will usually resolve this problem in a few years if the pasture is in a season-long continuous grazing system and it is not too large to cause a grazing distribution problem. In this case, setting the stocking rate to achieve 50% utilization is the optimal target to maintain adequate residual herbage. If a pasture is in some type of rotation and the litter is too thick, then applying high stock density grazing for a short period in the spring will trample the litter, enhancing soil contact for rapid breakdown. Trampling during summer months can still be effective if precipitation is adequate. However, this usually is not the case as it may take winter snowfall to enhance soil contact for rapid breakdown the following spring. If a pasture is in a rotation and the litter is too low, then a seasonal deferment or a complete year of rest may be enough to provide adequate residual cover to build litter prior to the next growing season. General recommendations of minimum residual herbage levels for shortgrass, midgrass, and tallgrass rangeland should be 300 to 500, 750 to 1,000, and 1,200 to 1,500 lbs/acre respectively.

Sandy Smart is a Rangeland Management Extension Specialist and Professor in the Department of Natural Resource Management at SDSU. He coordinates the USDA-SARE program for South Dakota.

Business is Business and Family is Family by Dave Pratt

In a healthy family business there is a clear line separating business and family. But in most family businesses the line between work and family is blurred. Am I talking to my parent or the CEO, my daughter or my employee, my business partner or my spouse? In agriculture, defining the line between the family and the family business is even more challenging because most of us live inside our businesses. When we are at home we are at work and when we are at work we are at home.

This boundary between work and life is important. Without it, what we do becomes who we are. If what we do is who we are, who are we when we stop doing? How do we make the transition to the next generation? It often happens over Dad's dead body, literally. Without the line between work and life, how do we hold family members accountable in the business without having a food fight in the dining room? (Or is it the boardroom?)



Conservation planning meeting in the field. (Photo: NRCS Photo Gallery)

There are several important things we can do to create an effective boundary separating our businesses and our lives. The first and most important is to hold regular, formal WOTB (Working *On* The Business) meetings. WOTB meetings focus on the important issues facing the business. They provide an effective forum for business discussions, planning, and for making strategic and tactical decisions. *Ranching For Profit* alumni use their WOTB meetings to define the business's mission and create a shared vision so that everyone is on the same page. They use WOTB meetings to create and document drought plans, marketing plans, and make other decisions crucial to the success of the operation.

One of the questions that should be addressed in a WOTB meeting is *Who does what?* Defining and assigning roles and setting performance targets make it clear who is responsible for what, and specifically *what* that what is. It is one thing to say that someone is responsible for the cow herd. It is quite another to say they are responsible for the herd *and* assign them a target of producing a \$300,000 gross margin from the enterprise. To make sure roles and accountabilities are clear we recommend that family ranches create a formal organization chart. We build the chart by defining the basic roles that every business has (e.g. production, marketing, finance) and then assigning one person to each role. Even though the role is assigned to just one person, everyone in the operation will probably be involved at some point in getting things done. The organization chart just shows who is responsible to make sure things happen.

Sometimes when there are only two or three folks in an operation it can be tempting to see a formal organization chart as over-kill. It's not! We've found that it is an indispensable tool to facilitate constructive communication and to separate business roles from family roles in every business, regardless of its scale. The chart is every bit as important for small outfits as it is for large organizations.

The organization chart can also be the template for your management succession plan. After you construct a chart showing who's responsible for what, I recommend that you project the chart into the future, showing

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Business and Family Continued by Dave Pratt

who will be responsible for what, when. Instead of the nebulous promise that “Someday this will all be yours,” it is much more constructive to say, “In 5 years we see you as the operations manager.” Then outline the training they will need to be successful in that role.

Perhaps the single biggest thing we can do in our ranches to create a dividing line between our life and our work is to actually pay ourselves a fair wage. I recommend that, in addition to a business account, you have a family account into which you deposit your pay check. You should run the business out of the business account and live your life out of the personal account. You may think I’ve lost my mind when I suggest cutting yourself a pay check, thinking, “We can’t afford to do that!” You should still cut the check. Then, if you want to (or need to), you can loan it back to the business. You should show the loan on the books because someday the business needs to pay you back with interest. It is particularly important to document this if there are off-farm owners and heirs.

One of the most important and most difficult questions to navigate in family businesses is, “How do we bring family members into our businesses?” We should ask another question first, “Should we bring family members into the business?” We do not owe our adult children jobs. Before they become adults we owe them all the love, support and nurturing we can muster to help them become the people we would want to hire even if they weren’t related to us. But if they don’t have the aptitude or competency to do the things we need to get done, we ought not hire them. When we do hire them, it ought to be based on what the business needs first and what they want to do second. If our need is marketing and they want to be the production manager, they’ll either have to get a job somewhere else or learn sales.

Establishing a clear boundary between work and life is important. By building this boundary, *Ranching For Profit* alumni have created stronger businesses, happier families and healthier lives.



Dave Pratt will teach *The Three Secrets for Increasing Profit* at *Ranching For Profit* Workshops December 14 (Belle Fourche), December 15 (Bison), December 16 (Ipswich), December 18 (Watertown) hosted by SDGC. Dave will also lead *Hard Work & Harmony*, a workshop on working together in family businesses at the SDGC annual meeting December 17 (Chamberlain).

Dave Pratt, Ranch Management Consultants, Inc.

The Green Side UP - SD Grazing School by Pete Bauman

Annual traditions take a while to grow into something that is expected. Here in SD, one of the emerging September traditions among livestock operators is the South Dakota Grazing School sponsored by the South Dakota Grassland Coalition. The Coalition has many strong traditions they've developed over the years including annual courses, tours, and various events, but none are looked upon with anticipation by both the instructors and the students as is the popular Grazing School.

The Grazing School team has evolved over time to include many agency personnel while retaining the core component that makes it so successful – that being the leadership of the Coalition's grazing school committee and annual instruction by several of the Coalition's past and present board members.

The authenticity of the Grazing School is evident in the annual waiting list and the desire of past participants to return. Generally, each school accepts about 35 students; there is always a waiting list. In the past the committee has even offered two schools back-to-back to accommodate high interest. There are already over 30 would-be students on the list for September 2016!!! A true testament to the value this course has provided to students over the years.



Gregory County Rancher and former NRCS Rangeland Management Specialist, Dave Steffen, explains the use of the grazing stick (Photo: T. Herrmann, 2015).

I've had the privilege of participating in grazing schools both as a student and a field instructor, and it is always a rewarding experience. I always say that in my professional career, the South Dakota Grazing School ranks among the very best training sessions I've ever attended, which says a lot because I've had to sit through a lot of training sessions over the past 17 years. Coalition Board vice-chair Dan Rasmussen serves as the chair of the Education Committee and also chairs the Grazing School Committee. He, along with Coordinators Judge Jessop, Leroy Ness, and a team of dedicated volunteers do an outstanding job pulling the school together. The thing that strikes me most is that while there are some obvious behind-the-scenes tasks, this group makes it look easy which really creates a relaxed atmosphere for the students to learn and engage in the sessions.



Host rancher, Charlie Totton of Totton Angus shows students his equipment for daily moves of cattle in his mob grazing scheme (Photo: T. Herrmann, 2015).

For the second year the field session of the school was hosted on land operated by Totton Angus near Chamberlain. While it is fairly common to have out-of-state students, this year's group was entirely from within South Dakota's borders, representing an excellent cross-section of livestock production interest from up-start operations to experienced ranchers to a handful of agency land managers looking to better understand grazing management.

SD Grazing School Continued by Pete Bauman

The school appeals to men and women alike and there is typically a variety of ages represented. This year's class ranged from 25 to 63 years old with an average age of 44 years. Most non-agency students were cow/calf operators and a couple sheep operators also attended.



South Dakota Grazing School class of 2015
(Photo: T. Herrmann, 2015).

they learned, citing goal setting as a common theme they'd incorporate at home. Informally, many indicated a desire to continue their education through taking advantage of other courses and tours.

For more information on the Grazing School visit sdgrass.org. To be placed on the waiting list for 2016 contact Judge Jessop at judge.jessop@sdconservation.net.

Pete Bauman is an Extension Range Field Specialist in Watertown, SD.



2015 Friend of the Prairie Award

This year's Friend of the Prairie Award goes to Cody Vallery-Mills and Kindra Gordon for their efforts to promote stewardship of rangeland resources through their news publications over the years.

To recognize individuals for their conservation efforts, the South Dakota Grassland Coalition has established the "Friend of the Prairie" award. This award recognizes those working in public roles to ensure stewardship of the state's natural resources through sustainable and profitable management. The awardees are given a framed display featuring the pasque flower and western wheatgrass, the state flower and grass of South Dakota.



Pictured from left to right is: Judge Jessop, SDGC Project Coordinator, Cody Vallery-Mills, Kindra Gordon, and Jim Faulstich, SDGC Chairman (Photo: R. Goddard, 2015).

New Weed Alert: Crown Vetch

by Brant Douville and Lora Perkins

Crown vetch, *Coronilla varia* or *Securigera varia*, is a perennial forb in the legume family. Crown vetch flowers are pink, lavender, or white. The flowers form in clusters above the plant that are pointed and crown shaped, hence the name “crown vetch” (see photo on the right).

Crown vetch was introduced to the United States in the 1950s from the Mediterranean region of Europe to be used as a tool for erosion control and ground cover along roadsides, rights-of-ways, gravel bars along streams, and other areas more susceptible to erosion.



Crown vetch (Photo: L. Perkins, 2015).

Crown vetch produces a very dense canopy cover, is rhizomatous, and has a multi-branched root system. This growth habit offers good soil holding ability and allows crown vetch to be very successful during drought-like conditions. However, these same traits enable it to invade our grasslands, decrease our rangeland health, impact our native species diversity, and potentially degrade wildlife habitat. Crown vetch rhizomes have reportedly been found that are over 9 feet long and a single plant has been reported to spread over 80 square feet within a just a few years. Crown vetch outcompetes native and non-native plants and has the ability to rapidly spread in rangeland areas.



Crown vetch overtaking a native pasture in western South Dakota (Photo: L. Perkins, 2015).

Since crown vetch has only recently been identified as a weed of concern, no control or restoration strategies have been developed and scientifically supported. Ongoing research at South Dakota State University is investigating the best way to control crown vetch on the landscape and determining the best natives to plant back into previously invaded areas to resist re-invasion. Before those experiments are done, the best control strategy is prevention. Crown vetch is suspected to invade new areas through introduced hay or livestock. Of course, it is always good practice to be mindful of unwanted weeds when moving hay or cattle from location to location, extra diligence may be wise since crown vetch is an emerging problem in South Dakota.

Brant Douville is a graduate student studying under the guidance of Dr. Lora Perkins in the Department of natural Resource Management at SDSU. Dr. Lora Perkins is an assistant professor of rangeland ecology and studies the theory of weed invasion on rangelands.



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Calendar of Events

Event	Date	Location	Contact Person	Phone
SDSHC Annual Meeting	Nov 30	Pierre	Sandy Smart	605-651-0766
SDGC Winter Road Show Annual Meeting	Dec 14-18	Chamberlain	Judge Jessop	605-280-0127
Jim Gerrish	Feb 15-20	TBD	Judge Jessop	605-280-0127

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