



March 2017 Issue:

Soil Visions

A Farmer's Perspective

NRCS Soil Health Webinar

March 14, 2017 at 2 p.m. EASTERN Time

In this upcoming webinar, Rodney Roulon will present both economic and soil health data from his on-farm studies as he as implemented his system. He will discuss how increasing soil organic matter by over 1.5 percent has resulted in a yield increase of 12.8 bushels of corn per acre. In addition, Rodney will show that the net economic benefit derived from soil health is more than \$69 per acre. [Click here](#) to learn more about the webinar and to sign in. **Note:** No advance registration is required and space is not limited, but participants should sign in 15 minutes early. This webinar offers CEUs and will be recorded for future viewing. It is presented by the [USDA NRCS Soil Health Division](#). Contact [Hollie Kuykendall, Ph.D.](#), National Technology Specialist, for more information.

Up Coming Events

March 14 - NRCS Soil Health Webinar

March 18 - Ag Day at the Washington Pavilion

Spiral of Soil Regeneration Part 1 & 2 (Dr. Randy Anderson)





Soil Health and what real farmers are saying

To hear their stories, go to YouTube, search "NRCS South Dakota."

South Dakota Soil Story
"Transitioning to No-till" with Liz and Steve Sigdestad
<https://www.youtube.com/watch?v=OvpYIUia2Vc&t=125s>

South Dakota Soil Story:
No-Till Works with John Shubeck
<https://www.youtube.com/watch?v=5Bmip-EZfbA>
South Dakota Soil Story

"Cover Crops and Grazing" with the Namken Ranch
<https://www.youtube.com/watch?v=yDTaUFLHUss>

South Dakota Soil Story
"Learning Soil Health" Dennis Hoyle
<https://www.youtube.com/watch?v=nCVzNuYOIDE&t=20s>

Ag Day

In celebration of National Agriculture Week, March 19-25, 2017, the Washington Pavilion will be hosting its 14th Annual Ag Day. This event gives children and families a wonderful opportunity to learn about agriculture's significance – in South Dakota and beyond. Our exhibits are exciting, educational hands-on activities – great for the whole family! A free lunch is offered, featuring South Dakota-made products.



Wallaces Farmer.

FARM OPERATION

Record yields from the bottom up using no-till, cover crops

[Jason Johnson](#) | Mar 03, 2017

A southeast Iowa farm family harvested record average corn and soybean yields in 2016 after managing cropland soils with no-till and cover crops. They attribute the yield bump to a "bottoms up" approach, by improving returns on typically poor-performing fields.

Brothers Kevin, Jason and Kyle are primary operators of the Prevo family farm just outside of Bloomfield. The trio keeps busy growing corn and soybeans on 800 acres, rotating cattle through 600 hay and pasture acres, and managing a dozen 1,200-head hog buildings. Their respective wives — Angela, Amanda and Clarissa — also help out on the farm. And their mom, Cindy, does all the recordkeeping. The Prevo brothers are the fifth generation on the family's Century Farm.

Although their work overlaps, each brother oversees a different part of the family business. Kevin is the primary agronomic decision-maker for the crop ground; Jason cares for the 140-head of cattle, hay and pastureland; and Kyle manages the hog buildings and the manure application from those facilities.

Record corn and soybean yields

The Prevos transitioned to no-till farming with cover crops five years ago, hoping to reduce runoff and improve water infiltration on their heavy clay soils. They prepared themselves for a minor yield drag, as they had so-often heard about with no-till. They have been surprised, however, with the results. "I always heard you would get at least five years of yield drag on no-till, but we never saw that," says Kevin. "We actually had our best-ever yield averages in 2014, until we topped it in 2016 for both corn and soybeans."

Kevin attributes the average yield increase to soil improvements on traditionally lower-producing ground. "Our yield monitor never went crazy high. The improved average yields are because the low-producing acres aren't pulling us down," he says. "We are improving from the bottom up, and I really believe cover crops are the reason why."

Jason Steele, area soil scientist for USDA's Natural Resources Conservation Service, says when farmers transition to no-till farming they should immediately incorporate cover crops into the system. "It's important to build up that soil biology with cover crops," he says. "Organic matter will increase in the poorer soils first, providing immediate improvements in infiltration rates and water-holding capacity."

The Prevos are going on three straight years of whole-farm record average soybean yields. Kevin says corn yields aren't far behind. "We beat our corn yield average record this year by 20 bushels per acre over our 2014 highs, and we did it on traditionally poorer-producing soils."

Good use of animal resources

Along with cover crops, the Prevos are using their valuable livestock resources to help produce a consistently high-yielding crop. They knife hog manure into crop residue and a growing cover crop in the fall to add nutrients in the soil. "I like the idea of growing the cover crop before the manure application," says Kevin. "We use the quick response of the cover crop to absorb any residual nitrogen that's on the surface."

"From a soil health standpoint, that nitrogen taken up into the plant will become available down the road in July," says Steele. "It's almost like a late season sidedress of N."

Like many Midwest livestock producers, the Prevos are turning their cattle out to their fields to feed on cover crops. Fall 2016 was a banner year for cover crop growth in most of Iowa. "When the cover crops are growing like they are this year, with good growth in fall of 2016, we may not feed cattle hay until February," says Kevin. "We would like to get to the point where we're only feeding hay during calving season."

Steele says livestock cover crop grazing will actually help cover crop growth. "Cover crops will grow and regrow faster with the cattle grazing them," he says. Last fall, the Prevos drilled in cereal rye and oats after harvest. "The cattle grazed the cover crop down right away, and when I went out there a couple days later, there was regrowth," says Jason Prevo. "They would graze it again, and it would come right back up."

Stewardship never ends

The Prevos signed a five-year Conservation Stewardship Program contract through NRCS in 2016. They adopted nine new management activities they will implement throughout the life of the contract. Examples include using cover crop mixes to improve soil health, making equipment adjustments to reduce pesticide drift, applying phosphorus fertilizer below the soil surface, rotating livestock feed areas for water quality and monitoring key grazing areas for improved grazing.

Kevin says their year-round system is labor-intensive, but well worth it, and he says they have the manpower to handle it. With the three brothers, along with their father, Mark, uncle Bruce, and their wives helping out during busy times of the year, they are able to drill in cover crops directly behind the combine. "I am not a fan of aerially applying cover crops. I think I can get a better stand by drilling in the seed right behind the combine," says Kevin.

Steele says the Prevos' system is a sustainable system that is allowing them to plan much better. "The crop management system they have in place will allow them to market good grain yields year after year from their fields," notes Steele. "It allows them to better plan and prepare. They don't have to ride the roller coaster of yield highs and lows every other year that makes it really hard to market grain and be profitable."

For more information about conservation planning and programs to help you become a more sustainable producer, visit your local NRCS office or ia.nrcs.usda.gov.



The combination of no-till and a diverse mixture of cover crops is helping to improve soil health by adding living roots to the soil nearly year-round.



Since they began fall planting cover crops five years ago, the Prevos have used the plantings to supplement livestock feed.

Understanding the Carbon Cycle on Your Farm

These days everyone seems to talk about carbon. Carbon credits. Carbon dioxide. Carbon copies.

Ok, that last one is less talked about.

But do you know how the carbon cycle affects your farm, or how your farm management affects the carbon cycle?

When we think of the benefits of carbon on the farm, we tend to think of the value of grain, or the value of gain from livestock eating the forage.

These benefits are real and irreplaceable. Without saleable products from photosynthesis, farmers would soon be out of business. But there are other crucially important roles for carbon on your farm, and those roles also contribute to the financial success of your operation.

True to its name, the carbon cycle is an active, ongoing process. Carbon dioxide in the air is combined with water through the process of photosynthesis into carbohydrates (compounds including carbon, hydrogen, and oxygen). The byproduct of this complex process is oxygen, a critical need for all living things. In today's economy, we would call these "co-products" because both carry high value. These carbohydrates can be further manipulated by the plant to form enzymes, vitamins, cellulose, or a myriad of other products.

The plant uses many, but not all, of these carbon compounds through respiration: for growth, maintenance, and reproduction. The excess carbon compounds are used in different ways. Some are stored in plant tissues, including the leaves, roots, stems, and, of course, the grain, for use when photosynthesis slows or stops, such as at night or in the winter. Others are offered to soil microbiology (fungi, bacteria, and a host of other microscopic creatures that live in the soil) in exchange for nutrients, minerals, and compounds found in the soil that the plant needs for growth.

For a minute, we are going to follow the carbon cycle above ground. Plants are eaten, whether by an animal, an insect, or a bacterium on the soil surface. It would be inaccurate to say that the “waste” left in your field is not being utilized. Something, or more accurately, billions and billions of things are eating it, otherwise it would not go away. Some of those lower organisms are eaten by other organisms, and so on. The energy contained in the carbon compounds is used for growth, maintenance, and reproduction of the consuming organism, and the excess minerals and nutrients are excreted as waste. Carbon dioxide is then released as a byproduct. The carbon dioxide produced continues the carbon cycle through photosynthesis and respiration.

The use of carbon by consuming organisms explains why manure is a richer fertilizer than hay. As some of the carbon is removed through respiration, the remaining nutrients are concentrated.

Underground Allies

Back to the carbon that is traded to the soil microbiology. These compounds become part of the soil food web, a complex and under-appreciated community. The soil food web includes, at its base, the plants that are growing in the soil. These plants feed the next level of the food web with their exuded sugars and dead roots. These are the grazers of the underground, making use of energy from plants and other photosynthetic organisms, such as algae.

But this is only the beginning. Other, larger organisms feed on the bacteria, actinomycetes, and fungi that “graze”. Still larger organisms feed on those smaller organisms, and so on. Some of the soil organisms are eventually eaten by above ground organisms, like a robin eating a worm. Just like the above ground cycle, these higher organisms use some of the energy contained in the carbohydrates, and excrete waste in the form of nutrients and carbon dioxide.

Some carbon is built into stable carbon molecules. This carbon is sequestered long term into the soil. This is the storage mechanism of the soil, a bank account for lean times when photosynthetic carbon is unavailable. This carbon is a key component for soil structure, water-holding capacity, and fertility, all economically important values to the farm.

However, not much of the total carbon photosynthesized actually ends up as stable soil carbon. Most carbon is cycled as it feeds the living system. This means that it takes time (years, if not decades) to build soil carbon in a meaningful way, just as it takes time to use it up. Management of your soil is the main determinant of how quickly you can build or lose soil carbon.

Feeding the Herd

Why should we care about our underground allies? Well, for one thing, consider their sheer number. Depending on the health of your soil, it is possible that there are more organisms in a handful of soil than there are people on the earth. In addition, the weight of soil organisms can weigh twice as much as the cattle the land supports. That’s a lot of mouths to feed, and a lot of carbon and other nutrient cycling!

That brings up the second reason to care for them. Without soil biology, our earth would be buried in plant parts, and/or possibly non-productive. Without soil organisms to break down the biomass, and cycle the nutrients, we would not have nutrients returning to the soil, and any plants produced would simply lay on the surface of the soil without breaking down. They are at the heart of cycling nutrients, including carbon, in the soil.

A third reason to promote soil biology is the interdependence between soil microbiology and plant life. As mentioned earlier, plants trade sugars to soil biology in exchange for critical nutrients. Scientists have even discovered fungi that extend right into the plant’s roots, making the transfer of nutrients even easier. Without soil biology, most plants wouldn’t be able to survive.

The medical community has also started to uncover microbial roles for breaking down the food we eat. Microbial digestion has been studied for years in ruminant animals, but we are only just beginning to understand their role in our digestion and well-being. In other words, without microbes, life seems impossible! If that’s not a reason to care, perhaps we should re-evaluate our decision-making paradigm!

Promoting soil life involves following a handful of guidelines. Keep a roof on their house, and keep the soil covered through cover crops and grazing management. Keep their home intact, by disturbing it less through no-till management. Keep them fed, with a diversity of plants and living roots growing as many days of the year as possible. Help them thrive by feeding them with enzymes and partially digested carbon from grazing animals on the land.

The next time you hear about the carbon cycle, will you feel confident about its motion and function on your farm?

Joshua Lefers
Coordinator
South Dakota Soil Health Coalition

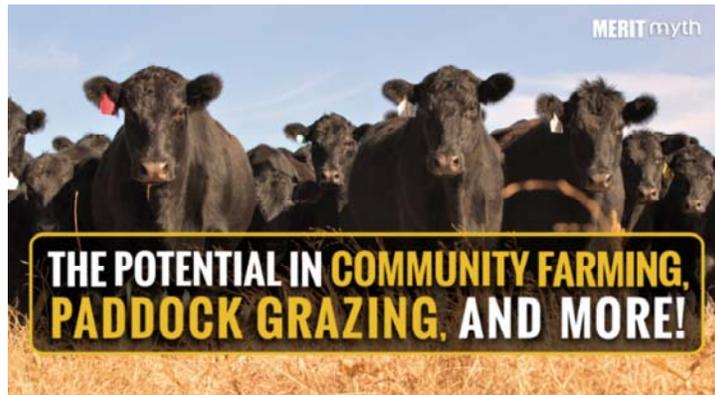
Soil Health Principles

Soil health is a very important natural resource concern; however, knowledge of how to build soil health is not widespread. The principles of soil health should be addressed as often as possible. At a recent South Dakota Soil Health Challenge meeting in Mitchell, Jay Fuhrer (USDA-NRCS) presented his five principles of soil health:

1. Soil Armor
2. Minimizing Soil Disturbance
3. Plant Diversity
4. Continual live plant root
5. Livestock Integration

Soil armor (photo below) is important for reducing water and wind erosion, decreasing water evaporation, moderating soil temperatures, reducing the impact of energy from raindrops, suppressing weed growth, and providing a habitat for surface dwellers, which are an important part of the soil food chain. Minimizing soil disturbance, which Jay divides into biological, chemical and physical tillage, enables the soil armor (surface plant materials/residue) to persist. Biological disturbance includes overgrazing of forages that reduce soil armor and below ground biomass. Physical and chemical disturbance occurs from tillage burying crop residues and over stimulating microbial breakdown and excessive carbon release into the atmosphere. Prairie plant diversity aided and allowed soils to develop prior to the introduction of annual cropping systems. Plant diversity uses sunlight and water to sequester carbon and other nutrients, preventing leakages into ground and surface waters. Understanding the four crop types: warm season grasses and broadleaves, and cool season grasses and broadleaves is necessary for designing cropping systems that improve soil health. A continual living plant root either from the commodity crop, cover, or from forage crop provides carbon exudates to feed the soil food web, which is exchanged for nutrients for plant growth. This process is also important for soil aggregate formation, which increases soil pores for improved water and air exchange. Lastly, livestock integration balances soil carbon and nitrogen ratios by converting high carbon forages to low carbon organic material, reducing nutrient transport from the soil, and promoting pasture and rangeland management in combination with cover crop grazing. For a full-length version of Jay Fuhrer's soil health principles, click [here](#).

Photo of beneficial soil armor.



COMMUNITY FARMING: SOIL HEALTH AROUND THE DINNER TABLE

For the last several years, an 8-member group of Nebraskan producers has gathered in the pursuit of [shared knowledge](#). In that time, the positive effects of the union have been undeniable. Nobody knows this better than group member and Palmyra, Nebraska native Mike McDonald.

“One person in the group raised 6,000 bushels of cereal rye,” said McDonald. “Together, we cleaned it and, in a cost-efficient manner, were able to increase the drilling rates.”

As McDonald can attest, this is just the tip of the iceberg. What separates this group from your average producer get together is that they don't stop at surface-level issues. Just like the roots of their crops, they always dig just a little deeper. One of the more popular topics of discussion? Cover crops. More specifically, livestock and how it relates to the practice.



PUTTING SOIL HEALTH TO THE TEST

It's pretty obvious that high intensity paddock grazing can be a bit labor intensive, so to include such a practice in one's operation, you'd have to thoroughly believe in its efficacy. Mike McDonald and members of his group have seen enough of the benefits of the practice to incorporate it despite the concerns. In fact, McDonald believes in it so thoroughly that he loaned 40 head of livestock from a fellow group member for a 20-acre site.

So what were these benefits?

According to McDonald and his group: increased soil fungi and other microbes (these are the “good guy” microbes that [Dr. Elaine Ingham](#) talks about), decreased herbicide usage, and increased overall pool of [organic nutrients](#) (yes, nutrient pools can be organic as well as inorganic). Or look at it this way: increased efficiency and effectiveness leads to increased sustainability.

Of course, paddock grazing isn't the only value-added practice that the 8-member group has tested and employed. McDonald also has up to 41 bee hives on his property that are responsible for increased production. After their discussions and research, the group also endorses cutting out virtually all fertilizer and herbicides as well as focusing on income diversity. Of course, with knowledge comes responsibility and the group acknowledges that. To incorporate livestock into an operation, one must be aware of cover crop maturity dates prior to planting, and proper grazing windows, but the results speak for themselves.



A UNITED FRONT

The idea of [community](#) learning shouldn't be new to those who've followed along with us at Merit or Myth – uniting the South Dakota farming community has been a crucial discussion point for us. We're excited to see such practices playing out in surrounding areas and confident that similar stories will start popping up across the [Mt. Rushmore State](#) soon.

In the meantime, keep your ear to the ground and listen for what your soil is telling you. There's no telling what you'll hear next!

Join the revolution,
– Barrett



– SOURCE: <https://www.no-tillfarmer.com/articles/6448-peer-groups-cover-crops-and-livestock-equals-learning-plus-growth-dnt-ntop>
March 8, 2017 [Blog](#)

Our condolences to the farms & ranches in Oklahoma, Kansas, Texas and Colorado that have been victim to wildfires.



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