



Land Health Part 1:

Understanding Soil Health

Soil health specialist explains the five factors essential for healthy soil.

by **Kindra Gordon**, field editor

To get producers' attention with regard to soil health, Doug Peterson likes to ask them to ponder the following scenario: If there are thousands of pounds of organisms in soil, do you put as much thought into feeding them as you do your cows and steers?

Along with that, water is typically the most limiting natural resource in land management, he likes to point out, emphasizing, "The most important part is how much soaks in [to soil] and how much we let evaporate back out."

It quickly becomes apparent land management that contributes to improved soil health may deserve more attention.

Peterson, a Missouri-based regional soil health specialist with the Natural Resources Conservation Service (NRCS), travels the Midwest teaching NRCS staff and producers about soil health and its impact on natural resource processes, as well as management

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practices to effectively improve soil health and productivity.

Care for the microorganisms

He notes that we've long known that "soil

is alive with worms and microorganisms," but only in the last 20 years has research helped document the value of microorganisms to soil health.

He explains, "Microorganisms help hold the soil together (creating soil aggregates), so when it rains water goes through the pores, but it doesn't take the soil with it. ... We want aggregate stability, whereas tillage breaks it down."

Recognizing this, Peterson, who has been an NRCS employee for 30 years and is also a producer himself, notes, "We need to regenerate a lot of our lands, while still also being profitable."

He believes through management that can be done. Peterson cites research that shows organic matter, soil structure, infiltration rate, bulk density, and water- and nutrient-holding capacity of soil can all be improved — and relatively quickly.

10 books about soil and land management

Soil health advocate Doug Peterson suggests one of the best ways to better understand soil health is to read the viewpoints and experiences of others. Following is a list of books Peterson has read and reread to enhance his own knowledge of the subject.

- ▶ *The Nature and Properties of Soils*, by Nyle Brady and Ray Weil
- ▶ *Holistic Management: A Commonsense Revolution To Restore Our Environment*, by Allan Savory with Jody Butterfield
- ▶ *Agroecology: The Ecology of Sustainable Food Systems*, by Stephen Gliessman
- ▶ *The One Straw Revolution*, by Masanobu Fukuoka
- ▶ *Teaming with Microbes*, by Jeff Lowenfels and Wayne Lewis
- ▶ *Soil Biology Primer*, by Elaine Ingham
- ▶ *The Worst Hard Time: The Untold Story of Those Who Survived The Great American Dust Bowl*, by Timothy Egan
- ▶ *Collapse: How Societies Choose to Fail or Succeed*, by Jared Diamond
- ▶ *Dirt: The Erosion of Civilizations*, by David Montgomery
- ▶ *Farmers of Forty Centuries*, by F.H. King

“We once thought these things couldn’t be changed, and that’s not true. We can change these pretty dramatically in two to three years,” he reports.

Healthy characteristics

Peterson defines a healthy soil as that which:

- ▶ has a stable surface;
- ▶ is increasing in soil organic matter;
- ▶ has a microbial population that efficiently decomposes organic residues;
- ▶ does not contain phosphorus, nitrogen or herbicides/pesticides in sufficient quantities to cause water-quality issues; and
- ▶ is regenerative.

Peterson promotes five principles that he believes contribute to soil health on both

cropland and range or pasture. He says these principles can even help increase soil organic matter levels within a few short years. These principles include:

1. Minimize disturbance to the land. Of this he notes that haying can be as damaging to soil health as tillage. He adds, “To some degree, grazing and even chemicals can be disturbance.”
2. Keep the soil covered with forage residue and litter. Peterson advocates that keeping the soil covered benefits soil temperatures. Temperatures can heat up when the soil is not covered, which can impact soil biology or its microorganisms.
“Think of the water you drink in the heat; plants are the same way,” he adds.

3. Strive for diversity of species. Ideally, plants should include cool- and warm-season grasses, as well as broadleaves.
4. Maintain a living root in the soil for as much of the year as possible. Peterson emphasizes this provides a means for “feeding the soil livestock” — or microorganisms to benefit soil health all year long.
5. Integrate livestock into the system. Peterson explains that integrating livestock to graze cover crops or crop aftermath offers opportunities to enhance soil nutrient value, while also having the added benefit of red meat to sell.



Editor’s Note: *Kindra Gordon is a cattlemaster and freelance writer from Whitewood, S.D.*