Managing Water Practices Also Boost Yield Gain 20 Percent for Weerts Farm

Kingsbury County farmers Erland Weerts, his brother Eugene and Eugene’s son Steve appreciate the Houdek soils they find in most of their fields. Houdek soils are deep, well drained, loamy soils that represent many soils formed in South Dakota under the influence of prairie grass. The dark color of the surface layer is a result of decayed plants and other materials that have been deposited over thousands of years.

As the fifth generation of his family to farm some of the same ground his great-great grandfather purchased in 1906, Steve says the topsoil loss his predecessors experienced in the 1930s drought years as well as low organic matter are two of the challenges they deal with each year.

“As weather conditions permit, the Weerts’ graze cover crops, a mix specifically designed to provide grazing as well as other soil building benefits.”

“Since we began leaving crop residue in the field and following our wheat with cover crops, we have seen increased organic matter and improved water infiltration,” Steve says. “We’re now working on managing excess water in some of our fields and finding ways to reduce compaction without using tillage.”

Natural Resources Conservation Service
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profiles in soil health

This increase in Organic Matter is huge as this is considered the number 1 indicator of good soil health. Soil compaction can result from use of tillage or heavy equipment in the field. It can also be a result of natural soil-forming processes. As equipment sizes increase, the axle loads also increase and managing tire pressures and traffic patterns can drastically affect compaction within a field.

“When soil particles are compressed together, pore space, where air and water should be, is reduced,” says Jim Finnegan, District Conservationist with the Natural Resources Conservation Service (NRCS). “Compaction force may also crush soil aggregates, negatively affecting soil aggregate structure.”

The effects of soil compaction include reduced water infiltration, increased soil erosion rates, higher bulk density and decreased crop yields for long terms. Plant root growth and function are also reduced due to soil compaction. As a result of soil compaction, rooting depths are limited reducing the plants ability to take up nutrients and water.

Crop residue helps prevent crusting and compaction by protecting soil from natural environmental forces that cause soil layers to become hard. Compaction depths can be tested through the use of a soil penetrometer, typically a tool used by researchers and agricultural consultants. However penetrometers need to be used with caution since soil strength is very dynamic, and is very sensitive to soil water content, which fluctuates daily. A relatively wet soil with a moderately high bulk density may give a relatively low penetrometer resistance reading. Another soil (or same soil at a different location) with the same bulk density, but now relatively dry will give a much higher penetrometer resistance reading.

“Most of our fields are pretty flat. We’re managing soil compaction issues by using as little tillage as possible,” Erland says. “We don’t use horizontal tillage at all. Our vertical tillage equipment breaks up the

Heavy crop residue is one of the strategies the Weerts family uses in a field with a significant slope. The residue helps reduce wind and rain erosion. It also helps keep soil microbiology active throughout the year, promoting increased soil organic matter, resulting in improved plant health and yield.

The Weerts’ family also uses cover crops to reduce or mitigate soil compaction. Deep tap roots of some cover crops grown in fall and spring when compacted layers are relatively soft and can penetrate the layers.

“Headlands are one area where we find it difficult to shake compaction,” Erland says. “Radishes and turnips are typically part of our cover crop mix. In addition to resolving compaction issues, the cover crops help conserve moisture and keep soil microbiology active.”

“We also rely on heavy crop residue to protect soils after crops come out,” Erland adds. “We use a regular John Deere no-till air seeder and John Deere corn planter to plant into residue. We run trash whippers in front of the planter, but haven’t had to make any other modifications in order to get consistent emergence.”

Steve notes that current conservation practices are aimed at steadily improving soil quality.
“Over the past 10 years, with no-till and cover crops, we’ve improved yield about 20 percent,” Steve says. “We want to continue managing for sustainability and higher quality fields as we advance toward handing the land over to the 6th generation of the Weerts family.”

No-till Farming System and Cover Crops Correct Compaction

One of the Weerts’ fields is significantly sloped. Erland notes that no-till has worked particularly well in that field.

“If you use conventional tillage there, you can hardly produce a crop,” Erland says.

What’s likely happening in the Weerts’ field is that, over the years, hilltop areas in the field have naturally become more compacted than the rest of the field as a result of topsoil depths eroding at the crest of slopes, resulting in exposed compacted subsoil layers and poor tilth. Typically, this kind of topography means nutrient levels, water storage capacity and organic matter levels are lower at the top of the slopes.

“Those kinds of conditions can delay crop emergence, reduce plant development and reduce overall yield,” Jim Finnegan says. “The erosion and compaction issues can be corrected over time through use of no-till, crop residue and cover crops.”

Zero-till provides the greatest benefit in this kind of situation. Steps to increase organic matter and improve soil structure will also support greater crop health and yields. Cover crop combinations of fibrous and tap-rooted plants in a rotation to penetrated compaction layers, develop deep root channels and add organic matter to soil also helps correct compacted soil.

The natural soil processes of “wetting-drying” and “freeze-thaw” will also help minimize effects of soil compaction in the top 3-6 inches. In irrigated fields, fall irrigation may enhance freeze-thaw effects.

Maintaining protective residue cover on the soil surface will reduce negative effects of rain or irrigation that cause soil crusting. Minimizing or eliminating tillage prevents aggregate breakdown. Planting into crop residue is also recommended.

“If crops have to be harvested when soils are wet, keeping axle loads to a minimum will help,” Finnegan says. “Radial tires at low inflation pressures create a larger footprint and less compaction. Whenever possible, load trucks and wagons on a road or on headlands and manage traffic patterns in the field.” One way of accomplishing this is to fill the grain cart on the go and travel to the end of the field on the same track as the combine took and then travel on the headlands instead of cutting across the field to the truck.

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