Diversity... Diversity... Diversity...

Diversity, Doug Landblom says those are his top four tips for producers. Landblom, a beef cattle specialist at North Dakota State University’s Dickinson Research Extension Center is on year seven of a 10-year study examining the connection between diversification, soil health and cattle production.

At the end of the day, it’s diversity that is going to improve soil health,” says Landblom. “The more organic matter from plant roots that microbes can decompose and [the more] diverse residue protecting the soil surface, the better soil health will be. Microbes in the soil, decomposing organic matter, is similar to a cow’s rumen where microorganisms facilitate forage decompositions. Plant diversity increases soil organic matter content, which is the food the soil organisms feed on. The result is increased soil nutrient cycling and nutrient availability for plant uptake.”

Since 2010, Landblom and visiting Turkish scholar Sorgül Sentikli have been working on a crop rotation that puts more plant roots in the soil and enhances soil health, using a multi-crop rotation along with integrating beef cattle for grazing. The rotation goes like this: spring wheat, cover crop (dual crops), corn, a blend of field peas and barley, then sunflower. The center is continuous spring wheat. The rotation includes four crop types, i.e., cool-season grass (cereal grain), warm-season grass (corn), cool-season broadleaf (field pea) and warm-season broadleaf (sunflower). Landblom stresses the importance of the order in which crops occur in the rotation. Covers crops follow spring wheat, because the goal is to increase organic matter that will decompose rapidly. Feed corn follows the cover crop.

Seeding a cover crop with an average carbon-to-nitrogen ratio from 30 to 40 will provide adequate nitrogen for crop production once the soil has been rejuvenated over time. He says this while not a quick fix, progress is more rapid when there is adequate soil moisture. Field pea-barley that follows corn as a grazing crop has nitrogen-fixing capabilities, is a low water-use crop, has mycorrhizal (fungi) associations, and precedes sunflower. Although sunflower is a higher water-use crop, the crop’s rotation placement is unique for its ability to form mycorrhizal (fungi) root associations, and it provides a deep-rooted nutrient “mining” contribution to the cropping system.

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“Of course, there is an investment for producers to implement a rotation like the one used in our study,” said Landblom. “Diversity is important, as shown using the five-crop rotation. Producers who haven’t grown a row crop before may need to purchase some equipment, and that can be expensive.”

Landblom suggests producers go slow initially, using the equipment they already own. There are several crop alternatives to the ones used in their rotation. Scientists at the USDA-ARS North Great Plains Research Laboratory at Mandan, N.D., have developed a crop sequencing calculator, Version 3,1, that is very useful for crop sequence decisions. The lab also has a cover crop chart, Version 1.2, that can facilitate planning as well.

Bottom line, says Landblom, is that diversity from crop rotation and livestock grazing, when possible, coupled with no-till seeding methods, contributes to reduced production cost over time and greater system net return. — Jody Kerzman