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## **Building operational resilience with soil health**

*By Stan Wise*

*South Dakota Soil Health Coalition*

PIERRE, SD – Resilience. It’s one of the prizes that keeps conservation-minded land managers striving for improved soil health. Operational resilience in the face of floods, market fluctuations, rising input costs, extreme temperatures, and of course, drought. A healthy, functional soil can help a farm or ranch survive all of them.

It’s a concept that Terry Ness fully adopted in 1990 on his operation just east of Pierre, SD, and he’s been devoted to it ever since.

Ness began farming in 1976, but his soil health journey began more than a decade later when he heard about the no-till research Dwayne Beck was conducting at the nearby Dakota Lakes Research Farm.

“I think there was an article in the Dakota Farmer that was all about (Beck) moving to Dakota Lakes, and as soon as I saw that article, I went down there because I knew I wasn’t doing it the right way,” Ness said. “I had never even heard of no-till before then.”

Ness said he visited the research farm weekly to speak with Beck for a year and a half.

“It was after talking to him that I was brave enough to just jump in with both feet and get rid of my tillage equipment and get a no-till drill,” he said. “And it worked really, really, really good with his guidance.”

In addition to no-till practices, Ness adopted other principles of soil health by managing his crop residue to keep his soil covered, incorporating biodiversity by growing more than 30 different crops over the years, keeping living roots in the soil by growing cover crops, and grazing livestock on his cropland.

“I’ve never seen my sheep happier than when they’re grazing on the cover crops,” he said.

### **Building a legacy of resilience**

Ness’s efforts are paying off with improved soil health.

“When I started farming, my organic matter was a little more than one percent,” Ness said. “All of the land that I’ve been (no-till) farming for 35 years is probably at an average of four percent right now.”

With each one percent increase in soil organic matter, land can hold approximately 20,000 additional gallons of water per acre.

Six years ago, Ness dug a soil pit in a spot where he knew he had no topsoil when he started using no-till practices 36 years ago. He was surprised to discover he had six inches of topsoil in that spot. Five years later, he dug another soil pit right beside the first pit, and he found that he now had 8 inches of topsoil in that same area.

Ness has been able to significantly reduce the amount of fertilizer he applies to his crops. “When I first started, I was putting on 100 pounds of actual nitrogen and 60 pounds of phosphorus,” he said. Six years ago he stopped applying the starter phosphorous and cut his nitrogen back to 50 pounds, and he has seen no negative effects.

Ness also noted that precipitation on his land stays on his land, even after intense rainfall events. “For 36 years, I’ve had zero runoff.”

He said the water on his land infiltrates and recharges the soil profile, helping him to survive dry years without crop failures.

## **Surviving weather extremes**

South Dakota knows what severe drought looks like. The worst drought in the state’s history occurred during the 1930s. According to U.S. Department of Agriculture Weather Bureau data, Pierre received only a tenth of an inch of rain and only 8 days with high temperatures below 100 degrees F in July 1936, the height of the Dust Bowl.

National Weather Service data indicates that from 1934-1936 the Pierre Regional Airport, roughly 6 miles southwest of the Ness Farm, received roughly half of the 20.2 inches of annual precipitation that is currently considered the normal amount for the same location. According to the National Agricultural Statistics Service, the average corn yield for Hughes County in 1936 was 1.8 bushels per acre.

Ness said his farm experienced several dry years over the last decade. In 2017, 2020, and 2021, the Pierre Regional Airport received roughly 14 inches of annual precipitation. So, while conditions weren’t as bad as the height of the Dust Bowl, they were still very dry.

In those years, Ness said that he only experienced one corn crop failure in one field of rented ground that he had taken over just two years prior. Before that, the land wasn’t managed with no-till practices, and the soil had not yet had time to recover. All of his other corn acres experienced average yields in those dry years.

South Dakota State University Extension State Climatologist Laura Edwards underscored the benefits of regenerative agriculture that Ness has experienced on his operation.

“I think regenerative ag practices serve multiple purposes, and one of those is to be more resilient in the face of extreme weather,” Edwards said. “I tell people we don’t need to invent a new toolbox to survive a changing climate. We already have that toolbox with regenerative agriculture or soil health practices.”

To learn how regenerative land management can make your operation more resilient, visit [www.sdsoilhealthcoalition.org](http://www.sdsoilhealthcoalition.org) or contact the South Dakota Soil Health Coalition at [sdsoilhealth@gmail.com](mailto:sdsoilhealth@gmail.com) or 605-280-4190.



*SD Soil Health Coalition photo*

Terry Ness explains his regenerative ag practices during a 2024 tour of his operation just east of Pierre, SD.

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Records kept by the U.S. Department of Agriculture Weather Bureau indicate that Pierre, SD, experienced only one tenth of an inch of rain and only eight days with high temperatures below 100 degrees F in July 1936.

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