



PART 1 : SOIL HEALTH

Changing consumers ignite food revolution

It's transforming Minnesota's food companies and economy.

Story by [Kristen Leigh Painter](#) • Photos by [Glen Stubbe](#) • Star Tribune
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HENDRICKS, MINN.

Elike Richards drives two hours to Maple Grove every month to shop at Whole Foods and

Trader Joe's, both of which offer more organic groceries or minimally processed food than she can find near her home in Alexandria. In the summer, she goes to farmers markets for locally grown produce. For meat, she visits a local family farm that raises sheep and cattle using environmentally friendly land management practices.

Richards, a 34-year-old mother of two young children, first took interest in how and where food is grown more than a decade ago, when she was in college.

"I started looking at the footprints of how we get food to our plate in America," she said. "It is really discouraging."

Today, Richards is convinced that making healthier food choices for her own family is essential.

Millions of consumers around the world are making similar choices — to buy and eat food that is more pure and produced in ways less harmful to the environment. Those decisions in the grocery aisle are transforming the agricultural economy of Minnesota and the Midwest.

Farmers are under pressure from consumers and food companies to adopt new techniques that take less of a toll on the environment, and to take better care of animals they raise. Sales of grocery shelf staples such as Wheaties, Betty Crocker cake mixes and some packaged meat

products are flat or in decline, forcing food industry giants such as Minnesota's Cargill, General Mills and Hormel to rethink the kinds of products they sell.

Figuring this out "is the challenge of our time for the food and agriculture industries," said David MacLennan, chief executive of Minnetonka-based Cargill. "You need a lot of other companies and governments and ... local farmers to come along with you."

Much of the food industry has rallied around the idea of "sustainability," which in the most precise definition refers to the ability of a food system to last over time. But the word has become a broad banner for issues like animal welfare, soil management, fair farm wages or climate change.

In 2015, nearly three quarters of consumers said they sometimes or usually had such concerns in mind at the grocery store, according to the food research firm the Hartman Group. Sales of organic food, the most recognizable segment, have doubled in the past decade to about \$47 billion in 2016, according to the Organic Trade Association. While organic represents only 5 percent of total U.S. food sales, it is growing much more rapidly than overall food sales.

With sales of the packaged food staples that dominate American grocery aisles stagnant or sinking, the food industry has no choice but to adapt. Doing so will require re-engineering complex production chains developed over decades to provide massive amounts of food at the lowest possible price.

"Big food companies that dominate the food world are really having to move faster," said Kent Solberg of the Sustainable Farming Association of Minnesota. "But the billion dollar question is if it can be fast enough and big enough of a change that the consumer will be responsive to it."

Many of the changes start with how individual farmers treat the earth itself.

Source: Minnesota Natural Resources Conservation Service
MARK BOSWELL • Star Tribune

Low soil biodiversity

Highly tilled soils don't absorb rainfall. Instead, the water stays on the surface as runoff, taking with it nutrients, herbicides and pesticides. Over time, few beneficial organisms remain in the soil.

High soil biodiversity

No-till soils absorb rainwater and promote greater biodiversity in the soil. Beneficial soil organisms help the fields to resist harmful pests and pathogens. Water and nutrients remain for the next growing season.

'A deep historical reason'

Jack Weber's neighbors thought he was crazy when he started rotating four different crops through his fields, cut back sharply on pesticides and stopped breaking up the soil between plantings.

Even his father and uncle weren't sure it was a good idea to abandon methods that farmers had relied on to produce a dependable crop of corn and soybeans for years.

But Weber, a 34-year-old who got into farming after two tours in Iraq, wanted to rely less on chemicals to manage pests and diseases and more on the soil's natural biology at his farm in Hendricks, Minn.

In the long run, Weber believes his way will be both more profitable and better for the environment.

"A farm is a business, and you have to think about running it like a business," he said. "But you also have to think about doing the right thing."

Weber isn't just breaking from the practices of his family. He's rejecting many industrialized methods that, over the past half century, made Minnesota farmers among the most productive in the world.

Critics say conventional farming's reliance on chemicals and the growing of a single crop such as corn on the same field year after year — known as monoculture — creates environmental problems that ultimately jeopardize the resilience of the food system.

"There is a deep historical reason for both of those systems; it was a very logical idea at the time," said Ricardo Salvador, an agronomist and director of food and environment at the Union of Concerned Scientists, a nonprofit science organization skeptical of industrial agriculture. "But now we've become dependent on a system which is not really what we would design if we could start from scratch."

Weber didn't intend to break from convention. When he started farming, he used the same methods everyone else used.

His first few years were a disaster.

His fields produced mediocre yields, and the soil kept washing away in deep gullies. If he'd stayed the course, Weber said he is convinced he would eventually have depleted his land until it was unusable, either for himself or future generations.

"We did stuff the wrong way for a few years," Weber said. "The only people I had ever talked to before that were conventional farmers."

Then his father-in-law, a district conservation officer with the USDA's Natural Resources Conservation Services, suggested he try some new techniques that might improve the health of his soil.

Weber didn't convert his farm to organic, a process that can take three years or more. Instead, he employed several practices that soil scientists say can produce healthier fields than conventional agricultural practices.

Keep a cover crop on the ground at all times. Minimize soil disturbance. Rotate crops from year to year, or seasonally. Graze livestock on the land.

These practices allow the biological ecosystem beneath the surface — from worms to bacteria — to become more robust. This strengthens the structure of the soil, making it more water absorbent and less prone to erosion and runoff.

An active soil system also sequesters more carbon, keeping it in the ground rather than letting it escape into the atmosphere, where excessive levels can cause problems such as warming temperatures.

A NEW WAY: When Weber started rotating crops through his fields and stopped breaking up the soil between plantings, his neighbors thought he was crazy.

Ultimately, it's about resilience, said Kristin Brennan, a soil expert at the U.S. Department of Agriculture's National Resource Conservation Services in Minnesota. Healthy soil helps farms better weather periods of drought and heavy rains.

Weber's yields improved by 150 percent over the span of several years, he said, and now farming is fun. He sells his soybeans, corn, wheat and small grains to Cargill, General Mills, the large Minnesota farm cooperative CHS and others.

His wheat might end up in General Mills' Golden Grahams cereal, his corn in livestock feed from Cargill and his soybeans crushed into oil by CHS and turned into margarine by a customer.

All the extra time and energy Weber puts into his farming practices don't earn him a higher price from those big customers. Unlike with organic products, the current food system doesn't segregate crops grown on farms using different soil-health techniques. Weber's crop gets blended with the crops produced by conventional methods, meaning consumers can't choose foods based on soil practices.

Without a financial incentive, there are fewer reasons for skeptical producers to switch to soil practices that encourage rich bacterial ecosystems and better water absorption.

“That’s the next step,” said Steve Swaffar, executive director of No Till on the Plains. “Opening up avenues for growers who feel they are being more responsible so that their products can be recognized and distinguished from their neighbors who don’t use regenerative practices.”

Even without such a system, advocates of soil-friendly farming see many benefits.

Grant Breitreutz has been experimenting with better soil health practices on his Redwood Falls farm for nearly 20 years. Reducing his dependency on chemicals and artificial fertilizers means lower costs — and higher profits — on his crops.

He builds the health of his soil using a three-crop rotation each year, including a cover crop mix with six to eight species. The cover crop “tills” his land, breaking it up with its roots, without disturbing the topsoil with a steel till.

After growing season, in November and December, he grazes his cattle on the cropland. The cattle spread their manure and fertilize the soil.

He no longer needs genetically modified seeds because his land can fight off damaging insects and weeds with its own robust biology.

“We don’t need to spray for soybean aphids because we have so many natural predators. Same thing in our corn. We don’t get corn borer,” Breitreutz said.

And the wildlife traipsing through his fields is increasingly diverse. “For every species that we recognize on our land, there are seven species out there that we see and don’t recognize,” Breitreutz said. “I’ve run across several birders out here because of that.”

Corporations weigh change

General Mills gets about 80 percent of its row crops, like wheat, corn, oats and sugar beets, from North American farmers. Most of them still employ conventional agricultural methods that rely on monoculture and chemicals.

But that hasn’t stopped the maker of Cheerios and Gold Medal flour from making soil resilience one of its key sustainability issues. It recently committed to spending nearly \$3 million over three years on soil health initiatives. That’s a small amount of money for a company with sales of almost \$16 billion, but Jerry Lynch, the company’s chief sustainability officer, insists that improving soil health is crucial to General Mills’ future as a business.

Video (02:16): No-till farming holds water and nutrients better and reduces soil erosion and carbon emissions.

There's only so much land that can be used to grow food, so the company needs existing croplands to be as productive as possible, Lynch said. Monoculture has gradually whittled away at this.

"You'll see us invest in this for quite a while because it is a very large lever to pull that can move us forward on so many metrics," Lynch said. "It's very rare that you will find one thing that helps you sequester carbon in the soil, improve water quality, improve water retention, improve biodiversity on the landscape, reduce the need for chemical applications and improve productivity."

Soil health advocates and nonprofit organizations say the support of major corporations and government partners will be essential if they are ever to see widespread adoption of such practices across the industry.

General Mills and the Nature Conservancy developed a "soil health road map" last year that outlines 10 scientific, economic and political steps that need to be taken to achieve their goal of seeing 50 percent of U.S. cropland utilize soil-friendly practices by 2025.

For example, research shows improved soil health could help farmers ride out extreme weather, like droughts and floods, said Pipa Elias, head of the soil health program for the Nature Conservancy. The Soil Health Roadmap suggests farmers like Weber should get a lower crop insurance rate, which would entice more growers to make the switch.

"One of the most positive changes recently is companies seeing that this isn't some fun little branch of their company that work on feel-good stories," Elias said. "Instead they are really seeing soil health as being central to their future existence."

Farmers face resistance

For farmers, one obstacle can simply be a resistance to change.

"Our neighbors laughed at us," said Breitreutz, about his decision to change his farming style. He and his wife, Dawn, even lost some friendships over it. "This is a mental thing. This is a social thing. This is a peer pressure thing."

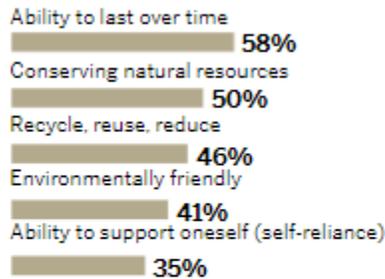
MANY DEFINITIONS

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TOP FIVE RESPONSES



BOTTOM FIVE RESPONSES



Source: The Hartman Group, August 2017, Sample size of 1,243 people in the U.S., ages 19-70

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The fields of growers who use these soil health practices don't always look as neat as other people's crops, which can be off-putting to conventional farmers accustomed to tidy rows and predictable schedules.

For Jack Weber, there was an added dynamic: family. His dad ranches cattle, and his uncle farms some of the best row cropland in the area, he said. Neither one of them farm the way he does.

“Sometimes it seems like he's gone off left field,” said Jeff Weber, Jack's dad, “but it seems to be working for him.”

In the local farming community, Jack Weber said others “take pot shots” at him. But with the growing popularity of soil-friendly practices, the soil health community is growing. Weber often

connects with like-minded farmers on social media. He's active on Twitter and doesn't hesitate to speak his mind.

A recent survey by the USDA's Sustainable Agriculture Research and Education grant program found that farmers who have experimented with cover crops — largely considered the gateway into the soil health movement — are seeing success and steadily increasing how much of their land they cover each year.

The average number of acres that survey respondents planted has risen from 217 acres in 2012 to more than 400 acres of cover crops in 2016.

Weber said it usually takes about three years of no-tillage and crop rotation for a field to become more productive and more profitable.

“That's why a lot of people quit. Their yields might drop at first and so they go right back to conventional, to the way they were doing it,” Weber said. “Your yield will probably drag in year one, maybe even year two, because your soil is used to being tilled. But then in year three is usually when you start seeing benefits.”

‘No one wants to be the weird farmer’

Several organizations exist solely to help farmers adjust their mind-set. Farmer-to-farmer education is shown to be far more effective than top-down approaches, said Shona Snater, soil health organizer at the Land Stewardship Project, which plans “field days” around Minnesota where farmers can learn from other farmers focused on soil health.

“Even though soil health is a hip thing, it is still seen as a weird thing, and no one wants to be the weird farmer,” said Brennan of Minnesota's NRCS. “And so the more and more farmers who are implementing it, the less weird it seems and the more who are willing to take it on.”

About this series

The Future of Food is a four-part Star Tribune series that examines how the food industry is adapting to consumer demands for healthier food that is produced in environmentally sound ways.

Weber is encouraged that more farmers are paying attention to what he is doing.

“My yields are on par with my uncle, who has better farmland,” Weber said. “I don't know if he's trying to humor me, but he's always asking me about my approach. He's curious and I know he's thinking about it.”

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