Meghan in one of her pastures

R. DROBIS

Table Rock Farm

Soil Health Case Study

Meghan Hauser, Table Rock Farm, NY

Can economic performance improve with adoption of soil health practices?

AUGUST 2022

USING DATA FROM NY DAIRY FARM BUSINESS SUMMARY

Farm at a Glance

COUNTY: Wyoming, NY

WATERSHED: Genesee River

CROPS: Hay, corn silage, peas, triticale

FARM SIZE: 1,800 acres; 1,150 milking cows plus 950 dry cows & heifers

SOILS: Fine-loamy on gentle to steep rolling hills

SOIL HEALTH PRACTICES: Cover crops, minimal tillage, nutrient management, diversified crop rotation

Introduction

Fourth generation farmer Meghan Hauser manages Table Rock Farm's 1,150-head dairy alongside long-time crop specialist, Jeffrey Jordan, and a dedicated team of 35 employees. Meghan and her family own 1,008 acres of their 1,800 crop acres where they implement a 6-year rotation of 3 years corn silage and 3 years alfalfa hay.

For as long as Meghan remembers, Table Rock Farm has planted a rye cover crop after corn to, "protect against runoff." The farm has tried inter-seeding and broadcasting rye, to now using a drill to plant a rye and oat mix, which coincided with a seed tender purchase in 2016. They include radishes in the mix when they can get into the field early. In 2012, the farm switched to a shorter-season corn to allow earlier planting of cover crops. Recently, the farm has been experimenting with "planting green," or planting into a living cover crop.

In 2002, they began following a Comprehensive Nutrient Management Plan (CNMP) to optimize nutrient placement and timing. Jeffrey started planting 60 acres of peas in 2005 then added 150 acres of triticale in 2017 (both planted between corn harvest and alfalfa planting) to diversify their crop rotation, protect the soil, and grow additional feed.

In 2001, Jeffrey encouraged the farm to reduce tillage to increase soil organic matter, water infiltration and storage, and to improve cover crop establishment. They sold their plow and began using a zone-builder subsoiler to break up compaction with minimal surface disruption. Rather than purchasing a no-till drill, Jeffrey made modifications to their conventional drill over time to work in minimally tilled soil. Jeff now minimally tills all owned acres, using the subsoiler on newly acquired land and areas, such as headlands, where compaction is an issue. Recently, they have experimented with other minimal tillage tools such as a roller harrow to break clods or a speed tiller to reduce surface compaction while facilitating better seed to soil contact when planting triticale. Farm operation efficiency has improved since reducing tillage, says Jeffrey, as time, labor, and equipment are allocated to other activities.

Meghan Hauser

R. DROBIS

After selling their plow, Meghan says they noticed immediate improvements to soil health, especially reduced erosion. "After several summer torrential downpours, we didn't have any washouts," Meghan notes, "[and] the ground stayed in place." And, nowadays, Jeffrey observes that, "in the summer you can feel the softness of the soil under your feet while before it felt like concrete…[and] we have earthworms now!"

Soil Health, Economic, Water Quality, and Climate Benefits

A marginal analysis was conducted using Table Rock Farm's Cornell University Dairy Farm Business Summary (DFBS) data† from 1993 to 2020 to answer the question, "Can economic performance improve with adoption of soil health practices?" The analysis compares the average value of crops produced and crop production costs between the "before" period ('93–'00) and "after" period ('01–'20), which Meghan selected to reflect the change from their former system (conventional tillage with rye cover crop) to their current system (minimal tillage, cover crop mix, diversified crop rotation, and a CNMP). We recognize that during both periods the farm changed their field operations for soil health reasons, such as planting cover crops in the

Corn planted green, growing through a cover of oats, rye, and tillage radish

M. HAUSER

USDA United States Department of Agriculture Natural Resources Conservation Service

Great Lakes RESTORATION

American Farmland Trust

early '90s, but Meghan chose 2001 as the start of their current system as that was the year they stopped plowing their fields and soon after implemented a CNMP.

Variables from the DFBS data include acres and yield by crop, fertilizers and lime, seeds and plants, spray and other crop expenses, and various machinery expenses. The table below summarizes any changes in these variables. Note, we do not attribute specific practices to cost changes because the DFBS data do not breakdown costs by crop or specific farm operations.

The DFBS data show that Table Rock Farm was able to adopt soil health practices, alongside other changes in their field operations, while improving economic performance as the farm's net income increased by $79/ac, or $142,848/yr, for the 1,800-acre study area, achieving a 125% return on investment.

The value of crops produced (price x yield) increased by an average of $111/ac and, importantly, is more consistent year-to-year.* There are decreases in costs as well. The "fertilizers and lime" expense category decreased by $7/ac, which Meghan believes is from improving soil health and reducing synthetic fertilizer use by accounting for nutrients in applied manure. Additionally, "spray and other crop expenses" decreased by $25/ac. Jeffrey commented that, "we are spraying less," thanks to greater weed suppression and more resilient crops.

The farm experienced an increase in "fuel, oil, and grease," "machinery repairs and farm vehicles," and "machine hire, rent, and lease" cost categories by $32, $13, and $10 per acre, respectively. Those increases in costs cannot be attributed to any one change based on the DFBS data, but Meghan believes the addition of newly leased land (almost double from "before" to "after" period), which required clearing, installing drainage, and manure applications contributed to these increases. Additionally, the farm experienced a $7/ac increase in "seeds and plants," which they believe reflects purchasing improved seed varieties. Overall, despite these increases in costs, the benefits outweigh the costs according to the DFBS data.

AFT used USDA's Nutrient Tracking Tool and COMET-Farm Tool to estimate Table Rock Farm's use of minimal tillage, cover crop mixes, diversifying their crop rotation, and nutrient management on a 21-acre field and found that they reduced their nitrogen, phosphorus, and sediment losses by 33%, 75%, and 90%, respectively, and reduced their GHG emissions by 165%, corresponding to taking 2 cars off the road.

Closing Thoughts

The team at Table Rock Farm combined soil health practices to achieve their land stewardship mission to improve the land while being profitable, and, according to this analysis, Table Rock Farm's investment in soil health practices coincides with improved economic and environmental performance.

Economic Effects of Soil Health Practices on Table Rock Farm, NY (2011 Prices)

Using 1993–2020 Survey Data from Cornell University's Dairy Farm Business Summary

Increases in Net Income

Increase in Income

ITEM	PER ACRE	ACRES	TOTAL
Increased value of crops produced (price x yield x acres)	$111	1,800	$200,556
Total Increased Income			**$200,556**

Decrease in Cost

DFBS EXPENSE CATEGORY	PER ACRE	ACRES	TOTAL
"Fertilizer & lime"	$7	1,800	$12,060
"Spray & other crop expenses"	$25	1,800	$44,100
Total Decreased Cost			**$56,160**
Annual Total Increased Net Income			**$256,716**
Total Acres in this Study Area			**1,800**
Annual Per Acre Increased Net Income			**$143**

Decreases in Net Income

Decrease in Income

ITEM	PER ACRE	ACRES	TOTAL
None identified			$0
Total Decreased Income			**$0**

Increase in Cost

DFBS EXPENSE CATEGORY	PER ACRE	ACRES	TOTAL
"Seeds & plants"	$7	1,800	$13,032
"Fuel, oil, & grease"	$32	1,800	$57,798
"Machinery repairs & farm vehicle"[1]	$13	1,800	$24,228
"Machine hire, rent, & lease"[2]	$10	1,800	$18,810
Total Increased Cost			**$113,868**
Annual Total Decreased Net Income			**$113,868**
Total Acres in this Study Area			**1,800**
Annual Per Acre Decreased Net Income			**$63**

Annual Change in Total Net Income = $142,848

Annual Change in Net Income Per Acre = $79

Return on Investment = 125%

*Please see the working paper (link below) for more on the increased consistency in the total value of production. †This analysis uses cost and benefit data reported by Table Rock Farm annually from 1993 to 2020 to Cornell University Cooperative Extension through the NY Dairy Farm Business Summary survey. We calculated average yields and expenses "before" ('93-'00) and "after" ('01–'20) adoption of minimal till, diversified crop rotation, a cover crop mix, and a nutrient management plan. [1] "Machinery repairs & farm vehicle" do not include milk parlor repair costs. To exclude these costs, the 1993–2000 milk parlor repair costs were estimated as not provided in DFBS survey those years (for methodology, see working paper linked below). [2] Machinery depreciation and interest costs are not included in this analysis because they are fixed costs, and not applicable. • All values are expressed in real terms using USDA price indices, 2011 = 100. • Prices by crop used from years 1993–2020 (USDA, New York NASS Prices Received, 1993–2020). • For information about: (1) study methodology, see working paper: bit.ly/CCEDFBSWorkingPaperTRF, (2) USDA's Nutrient Tracking Tool, see https://ntt.tiaer.tarleton.edu/welcomes, and (3) USDA's COMET-Farm Tool, see comet-farm.com • This analysis is supported by a 2019 GLRI grant (00E02807).

For more information about this study or to discuss soil health practices, please contact

- Aaron Ristow, American Farmland Trust, New York Agricultural Stewardship Program Manager, aristow@farmland.org, 315-748-5029
- John Hanchar, Cornell College of Ag & Life Sciences/CCE, Extension Associate, jjh6@cornell.edu, 585-991-5438
- USDA NRCS Wyoming County Office, 36 Center Street, Warsaw, NY 14569, 585-786-3118

To read more case studies, visit farmland.org/project/genesee-river-demonstration-farms-network & farmland.org/soilhealthcasestudies