

# Profitability and Environmental Outcomes from Conservation in the Sauk River Watershed

An Analysis of Data for 2019-2020





## Acknowledgements

- ◇ **Partnership** - *Headwaters Agriculture Sustainability Partnership (HASP)*
- ◇ **Technical Team** - *Environmental Initiative, Stearns County Soil and Water Conservation District, AgCentric, and Houston Engineering, Inc.*
- ◇ **Funding** - *Compeer Financial, Edge Dairy Farmer Cooperative, Midwest Dairy, Minnesota Department of Agriculture AGRI Grant, Minnesota Department of Agriculture Dairy Business Planning Grant, and McKnight Foundation*



## Project Overview

**Purpose** - The mission of the Headwaters Agriculture Sustainability Partnership (HASP) is to engage in projects that benefit the environment, the economic viability of farmers, and the vitality of our rural communities. The purpose of this project is to build upon HASP's mission by exploring the return on investment from conservation practices implemented in dairy operations within the Sauk River Watershed.

### Goals -

- ◇ Connect environmental outcomes from conservation to farm profitability.
- ◇ Promote peer to peer sharing among farmers around effective conservation for the environment and farm profitability.
- ◇ Connect these stories to broader communities and audiences interested in conservation.

**Future** - This report summarizes 2019 and 2020 data for the three participating farms. Our partnership plans to continue to increase the number of farms in this study. Our long-term hope is to develop a broad understanding of how conservation is providing improved environmental outcomes while maintaining or improving farm profitability in central Minnesota.

**Report Layout** - Each participating farm is highlighted on a storyboard, which includes the following information:

- ◇ a background on the farm,
- ◇ description of the conservation on the farm and why it was implemented,
- ◇ description of how conservation practices impacted the farms production,
- ◇ plans for how conservation will be used on the farm in the future, and
- ◇ crop-by-crop appendices.

# Analysis

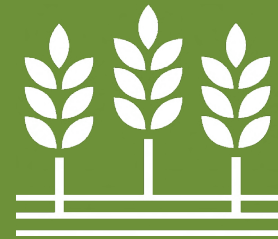
## What

Demonstrate the profitability of on-farm conservation to understand the connection between farm finances and conservation.



## How

1. Use metrics from established financial and sustainability programs
2. Analyze metrics by whole farm and individual crops



## Methods

When analyzing practice impacts, we only assessed for the effect of contour strip cropping, filter strips, grassed waterways and sediment control basins. The farms in this study employed these practices to varying degrees along with other practices that were not included in these impact assessments. Therefore, the practice impact data provides a general sense of the effect of practice adoption but is not a complete representation of the farms' soil erosion or soil carbon score.

### Financial

#### WHAT

a farm financial software

#### WHY

investigate effects of conservation on farm budgets

#### HOW

stewardship and benchmark metrics



### Water Quality

#### WHAT

a voluntary state program

#### WHY

certification is a common status for farmers

#### HOW

nutrient, tillage, and pest management



### Sustainability

#### WHAT

a national sustainability assessment program

#### WHY

sustainability tool that provides detailed assessment

#### HOW

soil carbon, soil conservation, greenhouse gases, water quality



Field to Market

# How to Read Scorecards

## Crop-Specific Financials Key -

- ◇ **Gross Return** - gross income from crop, per acre (\$/acre)
- ◇ **Yield** - crop yield per acre (bu/acre for corn and soybean; ton/acre for alfalfa and corn silage)
- ◇ **Cost of Production** - cost of producing one unit of crop, including labor and management (\$/bu for corn grain and soybean; \$/ton for alfalfa and corn silage)
- ◇ **Value** - value of crop per unit (\$/bu for corn grain and soybean; \$/ton for alfalfa and corn silage)

## Field to Market Key -

- ◇ **Soil Conservation** - total field soil loss (tons/ac/yr). Smaller values indicate greater environmental benefit.
- ◇ **Soil Carbon** - unitless metric representing whether the cropping system is depleting, maintaining, or increasing soil organic matter and carbon. Negative values indicate soil carbon depletion, near-zero values indicate soil carbon maintenance, and positive values indicate soil carbon increases (plotted on a scale from -1 to 1). Larger values indicate greater environmental benefit.
- ◇ **Greenhouse Gases** - greenhouse gas emissions, in carbon dioxide equivalents per unit of crop (tons of alfalfa or corn silage; bushels of corn grain or soybeans) produced in a year. Smaller values indicate less greenhouse gas emissions.

*Note that not all crops have a benchmark value for environmental metrics.*



## Agricultural Water Quality Certification Key -

- ◇ **Minnesota Agricultural Water Quality Certification Score** - scaled measure of water quality protection, out of 10. Larger values indicate greater environmental benefit. Minimum score for certification is a score of 8.5 (unitless).





# Kerfeld Hill-View Farm



# Kerfeld Hill-View Farm



## Farm Description

Tim Kerfeld runs a dairy farm with his family. He is the second generation on the farm and his son will be the third. They milk 250 cows and farm 400 acres, growing mostly corn as well as some soybeans, alfalfa, grass mix, and cover crops.

## Conservation Story

Kerfeld was motivated to adopt conservation practices to reduce erosion he saw affecting his soil. He also aims to keep up with technology and best practices to ultimately leave a healthier farm for the next generation of his family.

*"You want to keep the ground here... You want to leave the land in a better position than when you got it."*





# Practice Impacts

*Contour Strips*



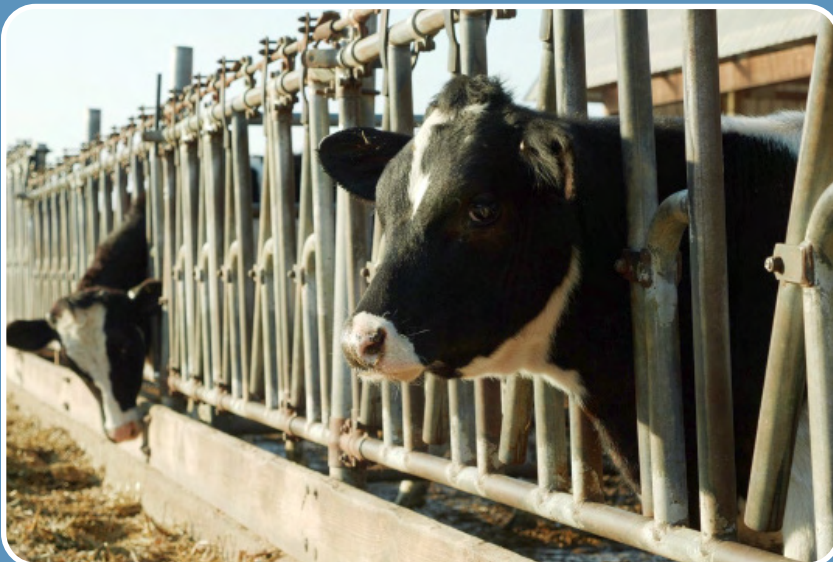
- ◇ Minimum till up to no till: reducing tillage has been a primary practice Kerfeld has used to reduce erosion.
- ◇ Cover crops: Kerfeld plants cover crops in the fall to capture the last of the nutrients and make forage for cattle.
- ◇ Contour strips, grassed waterways and sediment control basins: decreased the amount of annual soil erosion by 0.99 tons per acre while increasing the soil carbon score by 0.19 based on modeling assessments in 2019.
- ◇ From 2019-2020, soil erosion decreased between 0.17 and 2.8 tons/acre/yr, in part due to cover crops implemented on those fields.

*"We've been at it a few years already. What we see is that rather than just growing corn and hay for your cattle, there are other options. And they could be healthier options for your cattle."*

## Moving into the Future

Kerfeld believes implementing conservation practices is part of how he keeps up with best practices and improves his land for the next generation.

*"I believe conservation is going to continue. We can't just keep tilling, flipping the earth upside down. We have to keep moving."*

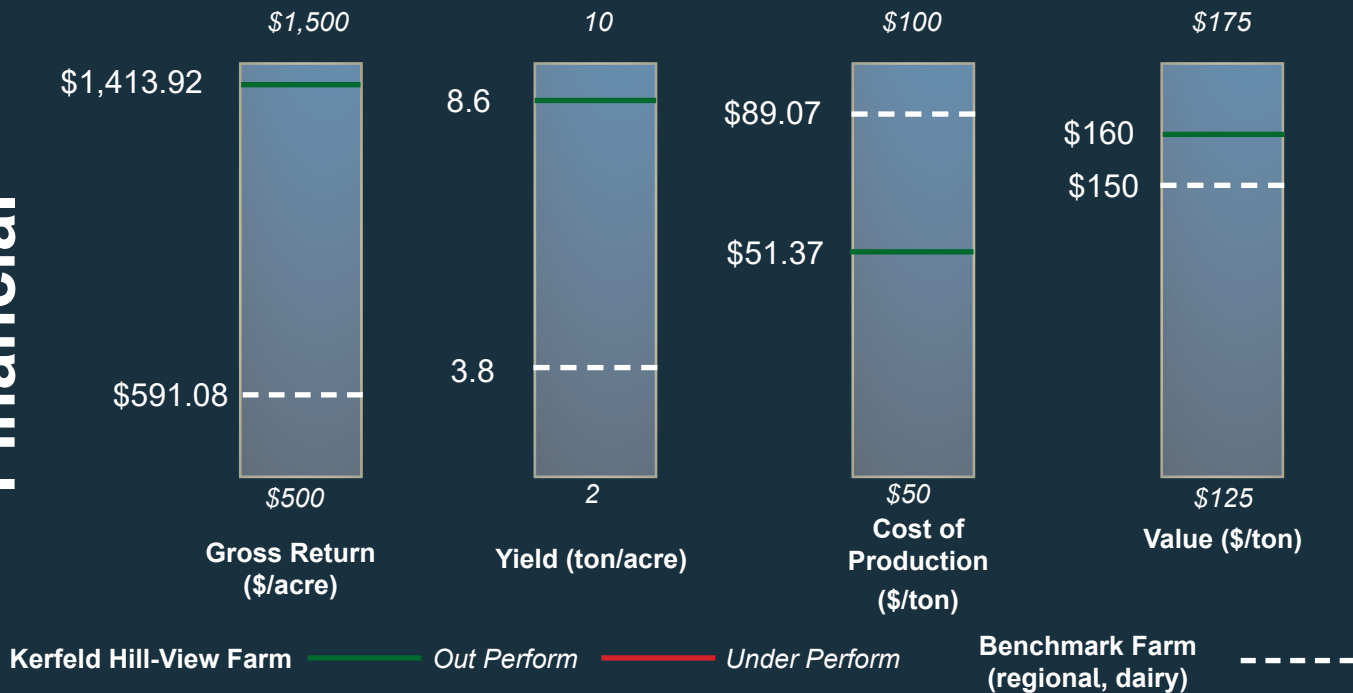


### Main Takeaways:

- ◇ Technology and best practices are constantly changing, and farmers have to change with them to stay financially and environmentally sustainable.
- ◇ It takes digging into the numbers to see some of the financial and environmental benefits but some of the impacts of conservation practices like less erosion you can see on the field.

# 2019 Alfalfa Results

## Financial



## Summary Stats:

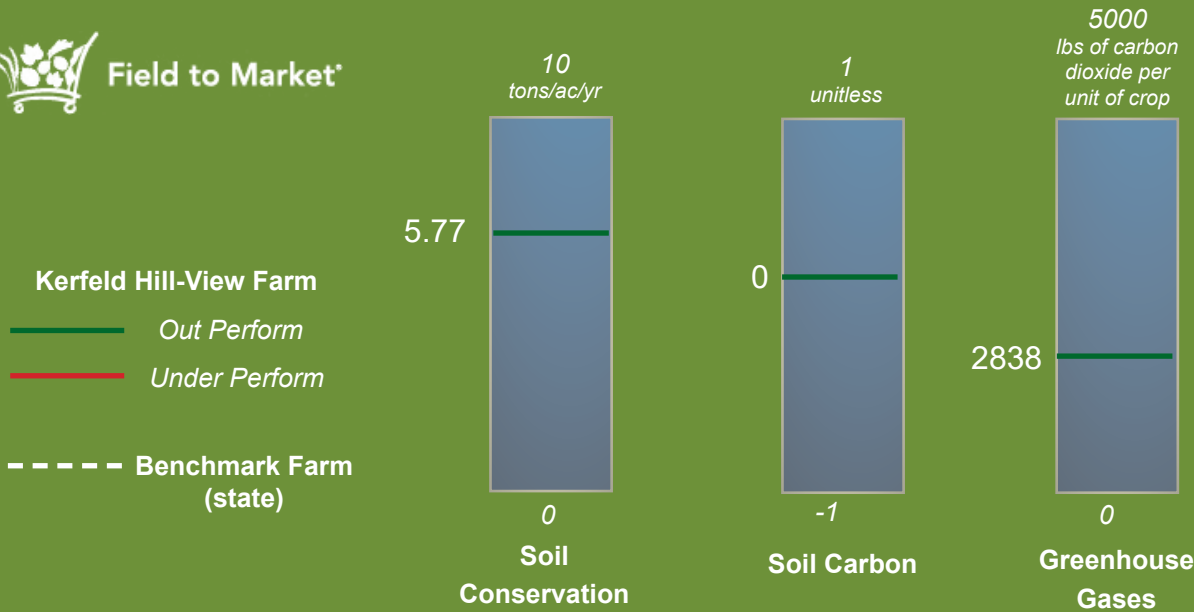


Acres: 200  
Fields: 14

## Sustainability



Field to Market



**Note:** Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.

**Note:** Not all crops have a benchmark value for environmental metrics.

**Note:** For more information on metrics on this page, turn to the How to Read Scorecards page.

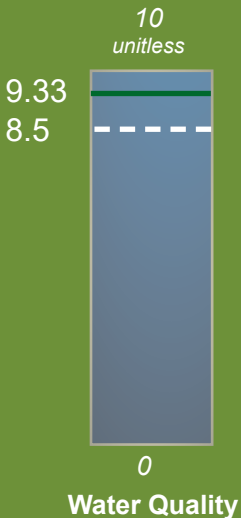


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Kerfeld Hill-View Farm

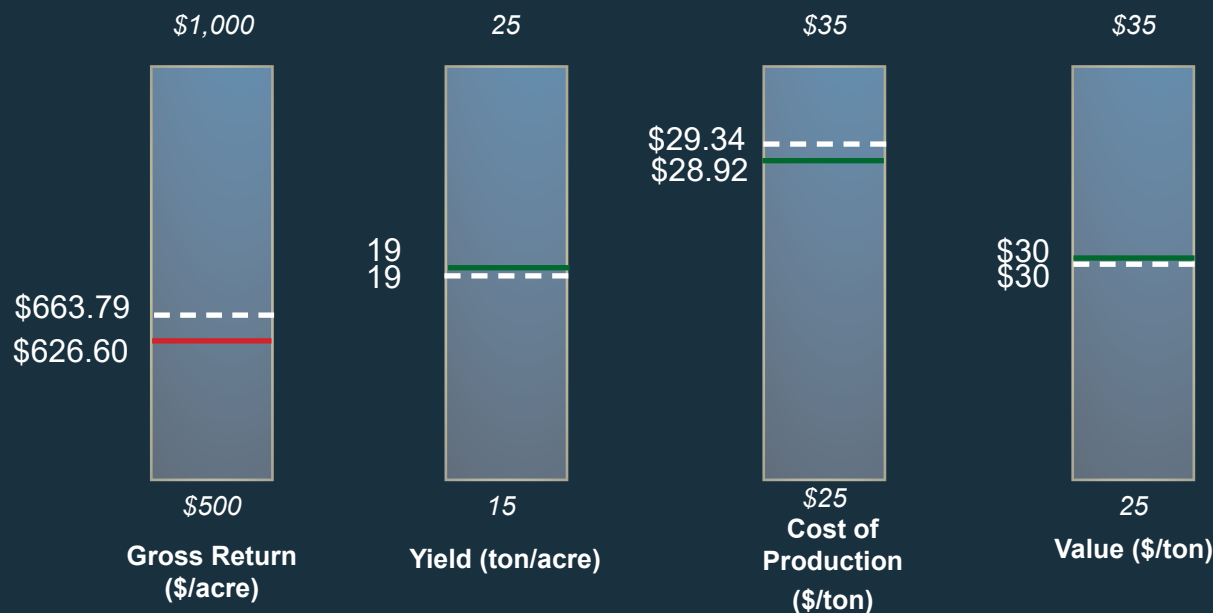
Out Perform (green line)  
Under Perform (red line)

Certification Eligibility Cut-off (8.5) (dashed line)



# 2019 Corn Silage Results

## Financial



Kerfeld Hill-View Farm — Out Perform — Under Perform --- Benchmark Farm (regional, dairy)

## Summary Stats:



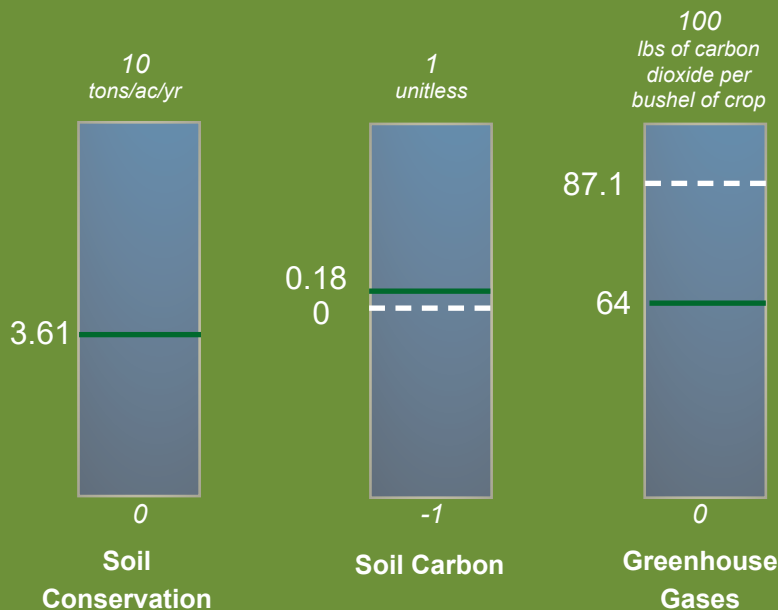
Acres: 236  
Fields: 8

## Sustainability



### Field to Market\*

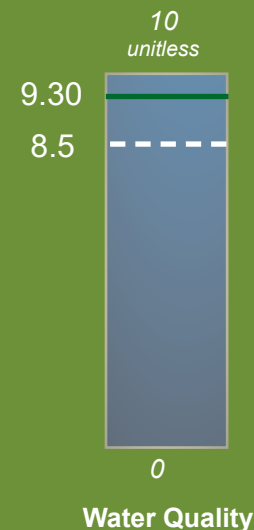
Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform  
--- Benchmark Farm (state)



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Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform

--- Certification Eligibility Cut-off (8.5)



Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



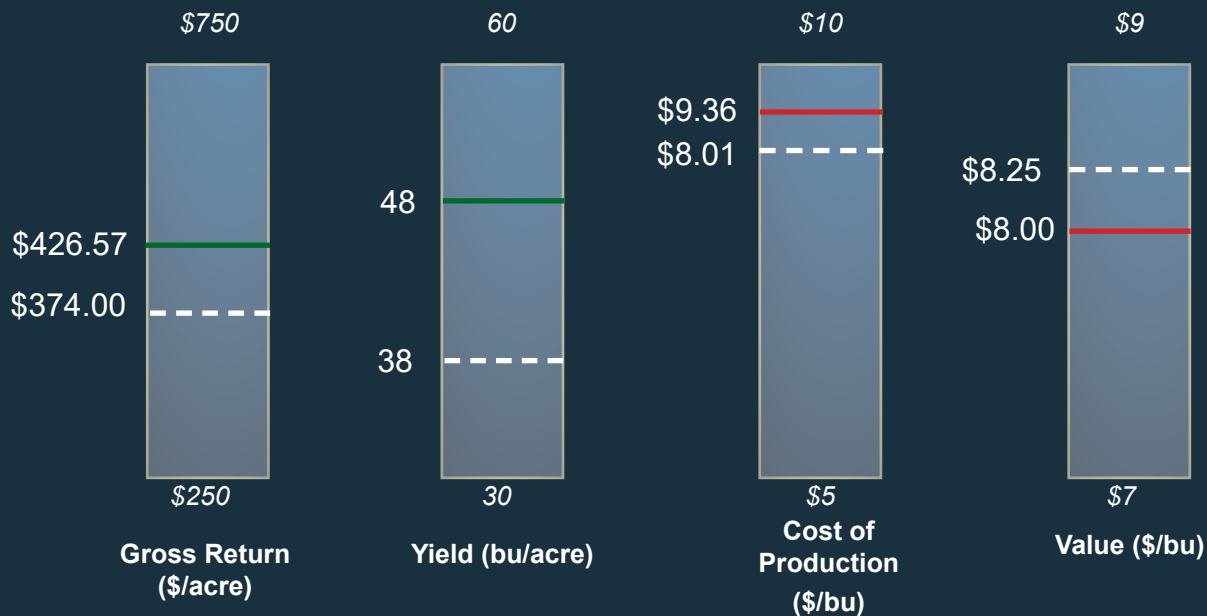
# 2019 Soybean Results

## Financial

### Summary Stats:



Acres: 111  
Fields: 1



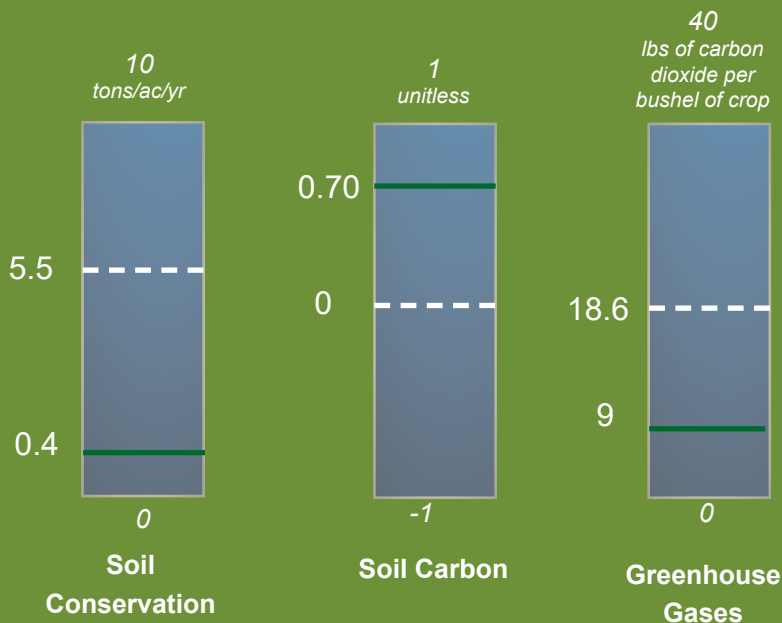
Kerfeld Hill-View Farm — Out Perform — Under Perform — — — — Benchmark Farm (regional, dairy)

## Sustainability



Field to Market\*

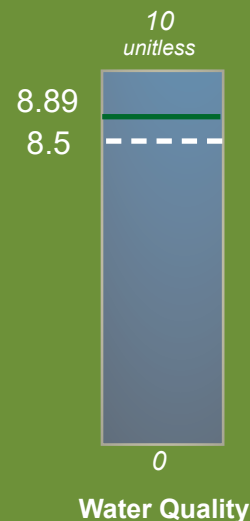
Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform  
— — — — Benchmark Farm (state)



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Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform

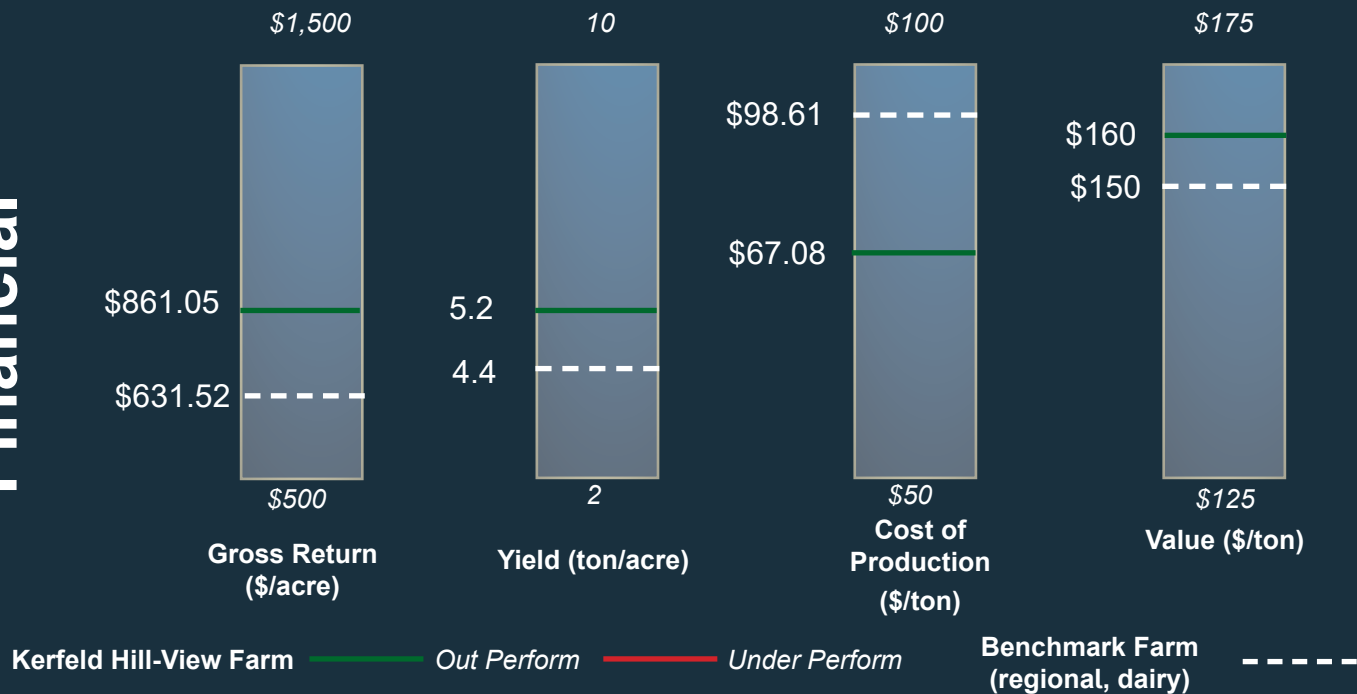
— — — — Certification Eligibility Cut-off (8.5)



Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# 2020 Alfalfa Results

## Financial



## Summary Stats:



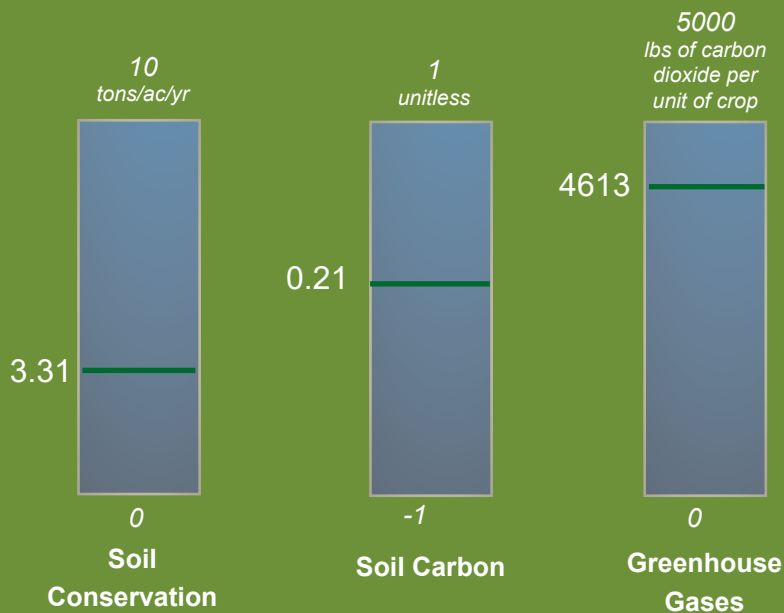
Acres: 217  
Fields: 11

## Sustainability



Field to Market

Kerfeld Hill-View Farm  
Out Perform  
Under Perform  
Benchmark Farm (state)



**Note:** Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.

**Note:** Not all crops have a benchmark value for environmental metrics.

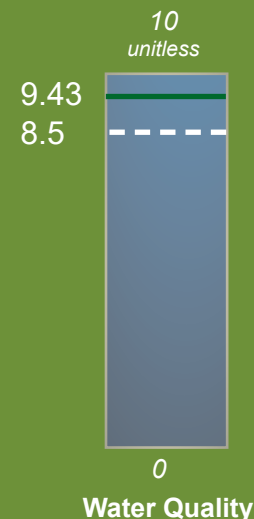
**Note:** For more information on metrics on this page, turn to the How to Read Scorecards page.



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Kerfeld Hill-View Farm  
Out Perform  
Under Perform

Certification  
Eligibility Cut-off (8.5)



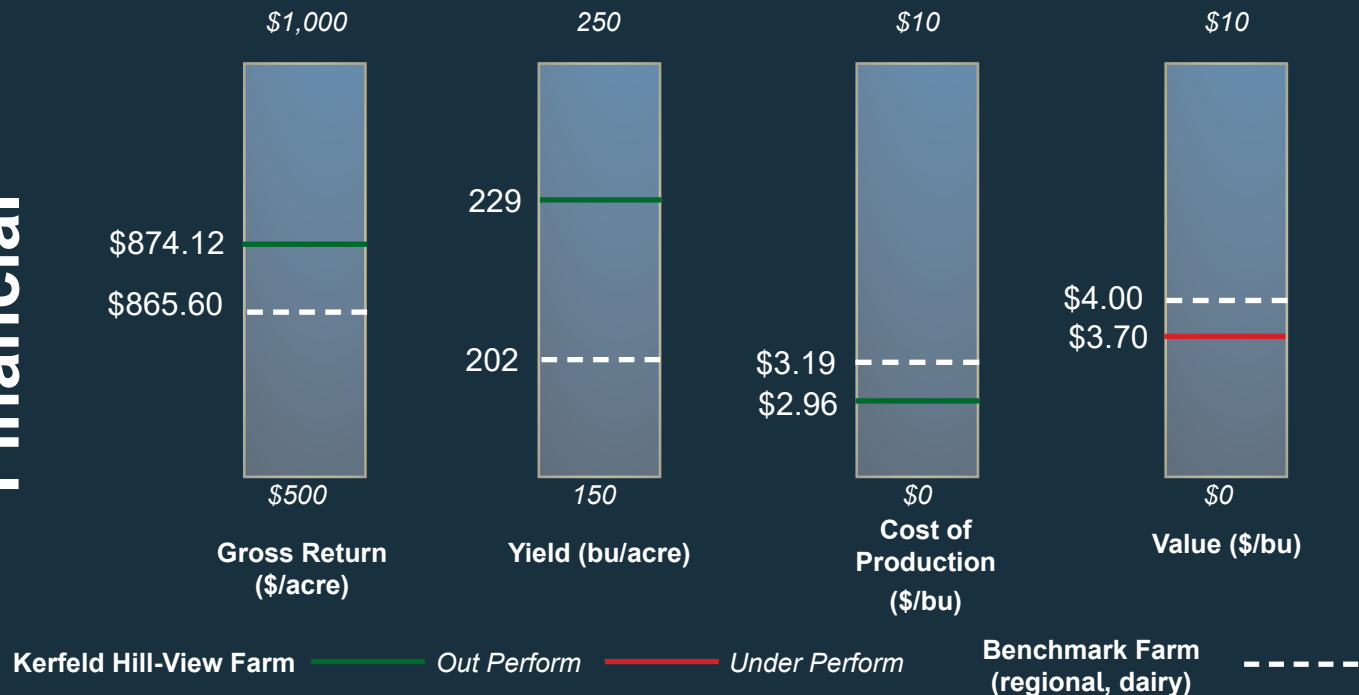
# 2020 Corn Results

## Financial

### Summary Stats:



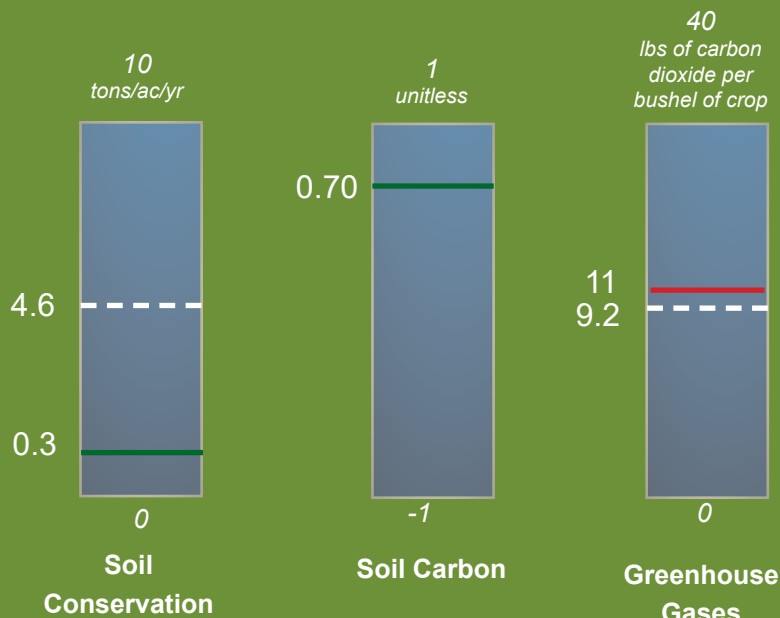
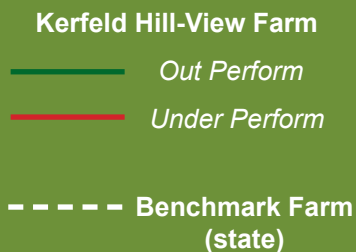
Acres: 111  
Fields: 1



## Sustainability



### Field to Market\*



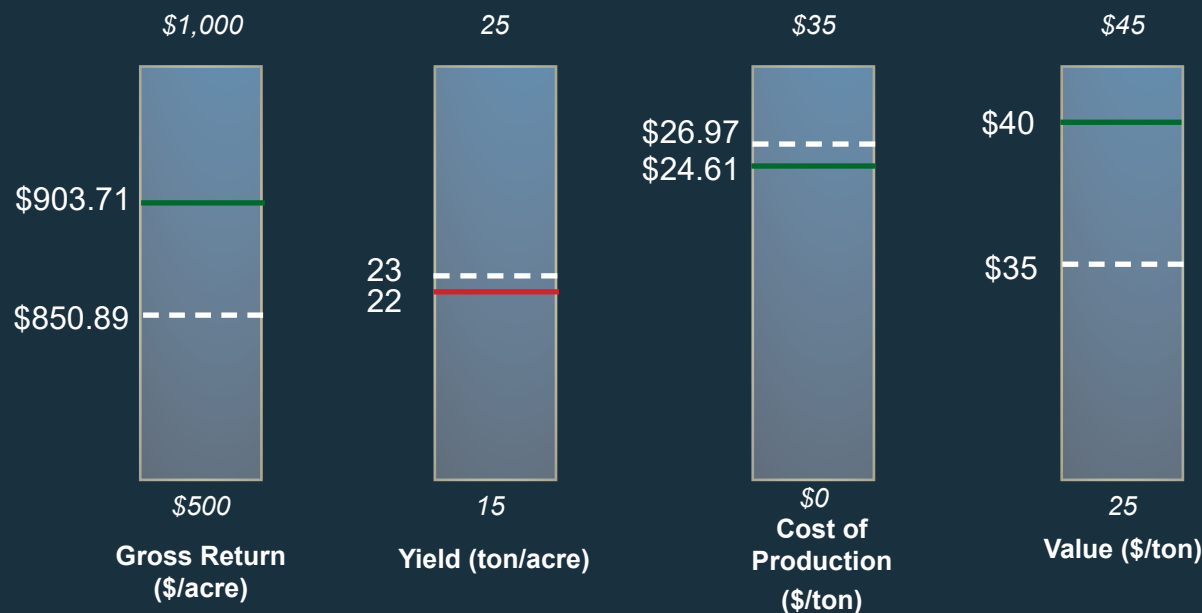
Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



# 2020 Corn Silage Results

## Financial



Kerfeld Hill-View Farm — Out Perform — Under Perform --- Benchmark Farm (regional, dairy)

## Summary Stats:



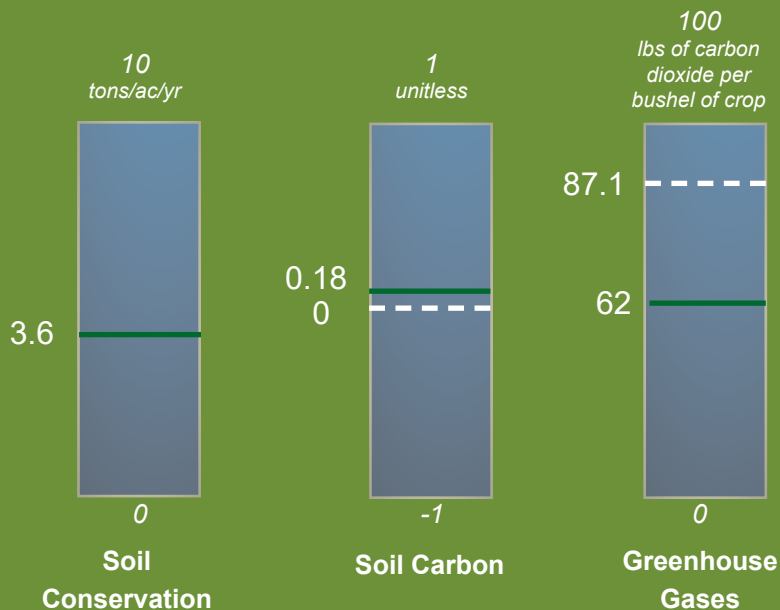
Acres: 219  
Fields: 11

## Sustainability



### Field to Market\*

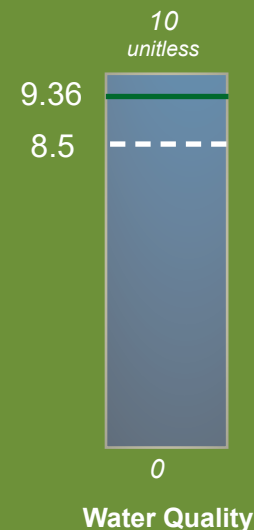
Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform  
--- Benchmark Farm (state)



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Kerfeld Hill-View Farm  
— Out Perform  
— Under Perform

--- Certification Eligibility Cut-off (8.5)



Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# Mill Creek Dairy Farm





# Mill Creek Dairy Farm



## Farm Description

Tom Gregory milks 600 cows and farms 450 acres growing corn, alfalfa, and cover crops. He owns and rents the land, which is spread over three farms.

## Conservation Story

Gregory has been intrigued by wildlife ever since he was a kid exploring the creek that ran around his family's farm. Since he started farming, he has been motivated to use conservation practices to bring biodiversity back to the land. He also knows that traditional farming practices get nitrates into the water and he aims to adopt practices that improve nutrient application and water quality. He first experimented with cover crops in 2012 at the encouragement of his son. His continued commitment to conservation practices will leave the land more productive and naturally abundant for his children and grandchildren.

*"The wildlife is so abundant compared to when I started. We leave areas for them to nest, we leave areas for them to feed on. It shows."*





# Practice Impacts

Cover Crops



- ◇ **Stacking slab:** Gregory built a stacking slab to prevent leaching from manure into the groundwater. The stacking slab has capacity for more manure than he needs on his farm so he can supply manure to other farmers in the area.
- ◇ **Minimal till:** Gregory aims to reduce tillage as much as possible, using just one pass with a chisel plow and digger. The ground is somewhat rough, but still has the necessary soil-seed contact.
- ◇ **Manure application and management:** Using manure as fertilizer has improved soil health and allowed Gregory to reduce the use of herbicide and insecticide. He also notices that his soils don't dry out as quickly and crops are less affected during a dry period.
- ◇ **Cover crops:** Gregory uses cover crops to hold the soil in place through the winter and grow feed for the cattle in the spring. He grows oats or winter rye and plants corn directly into the cover crop after harvesting.
- ◇ **Filter strips, grassed waterways, and sediment control basins** decreased the annual soil erosion by 0.11 tons per acres and increased the soil carbon score by 0.03 based on modeling assessments in 2019.

*"Soil health helps with water holding capacity and it also helps for drainage. It's building up nutrients in the soil, so you have to use less pesticides and herbicides."*

## Moving into the Future

Gregory plans to continue using conservation practices and improving the soil health on his farm. He also predicts that precision planting that improves the accuracy of seeding and nutrient or pesticide application will help reduce waste and add efficiencies in the coming years.

*"I don't think -- I know we are making the soils better."*

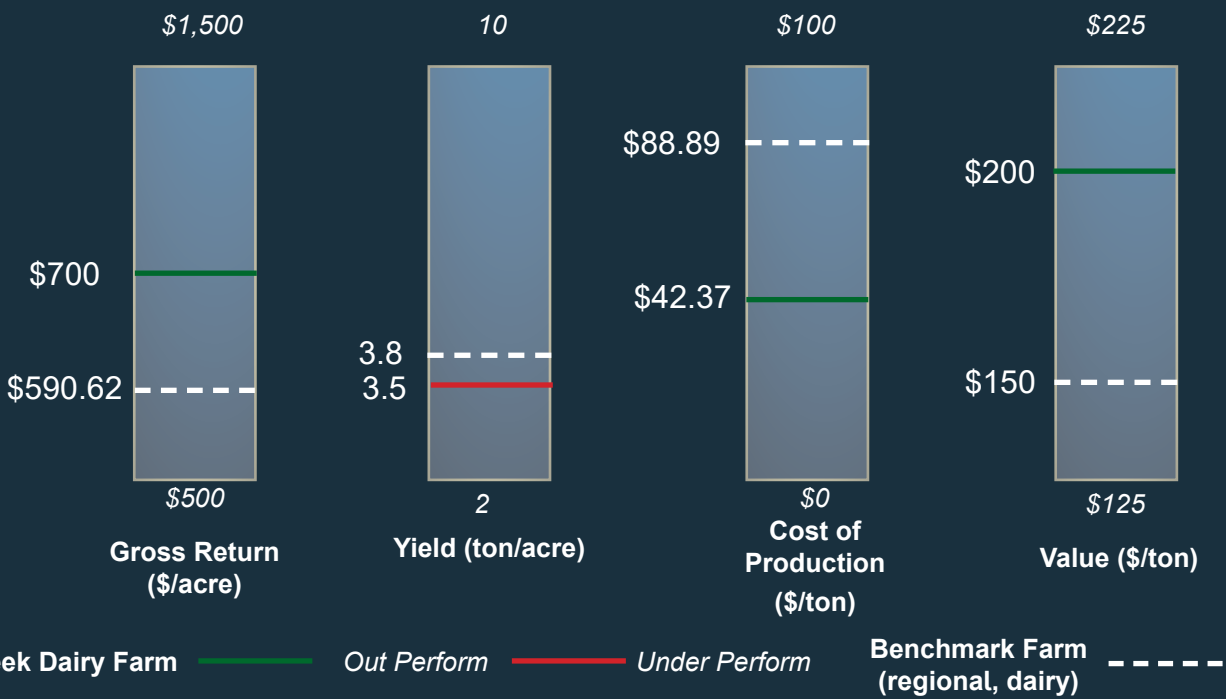


## Main Takeaways:

- ◇ Gregory estimates that he spends about the same amount of money each season but gets more benefits using manure rather than conventional fertilizers.
- ◇ He recommends farmers new to conservation take a chance with 10 acres and talk to neighbors who are already testing out these practices.

# 2019 Alfalfa Results

## Financial



## Summary Stats:



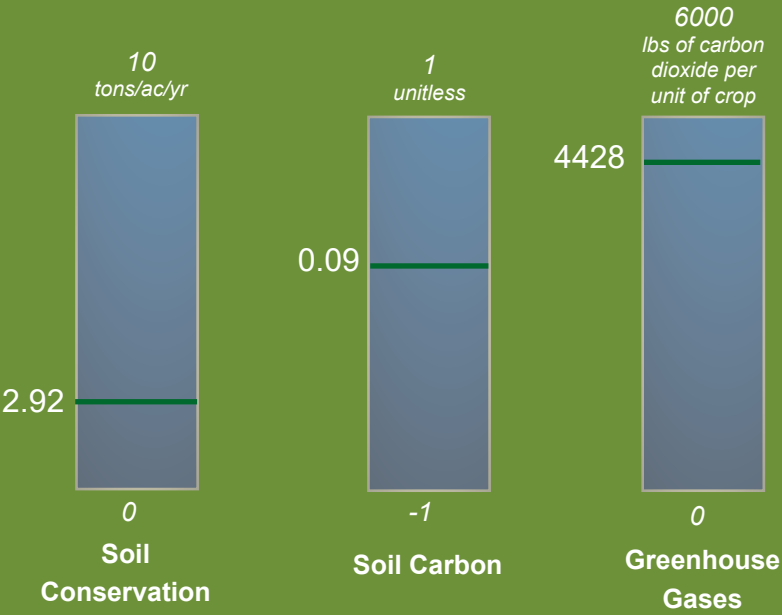
Acres: 205  
Fields: 6

## Sustainability



Field to Market

Mill Creek Dairy Farm  
Out Perform  
Under Perform  
Benchmark Farm (state)



**Note:** Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.  
**Note:** Not all crops have a benchmark value for environmental metrics.  
**Note:** For more information on metrics on this page, turn to the How to Read Scorecards page.



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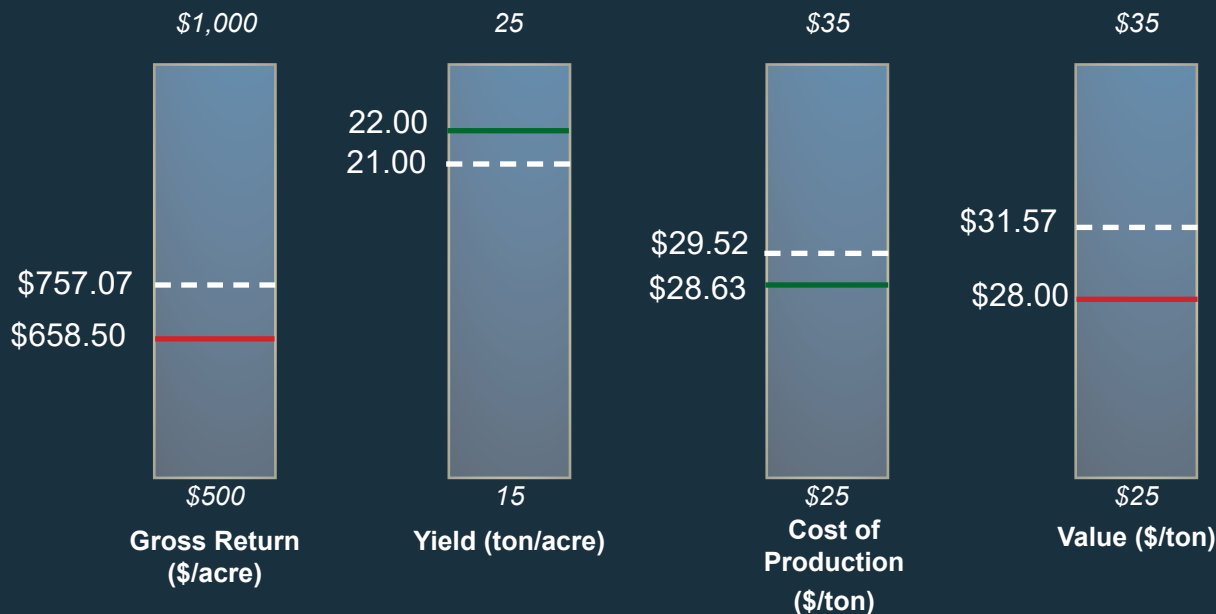
Mill Creek Dairy Farm  
Out Perform  
Under Perform

Certification Eligibility Cut-off (8.5)



# 2019 Corn Silage Results

## Financial



Mill Creek Dairy Farm — Out Perform — Under Perform — Benchmark Farm (regional, dairy)

## Summary Stats:

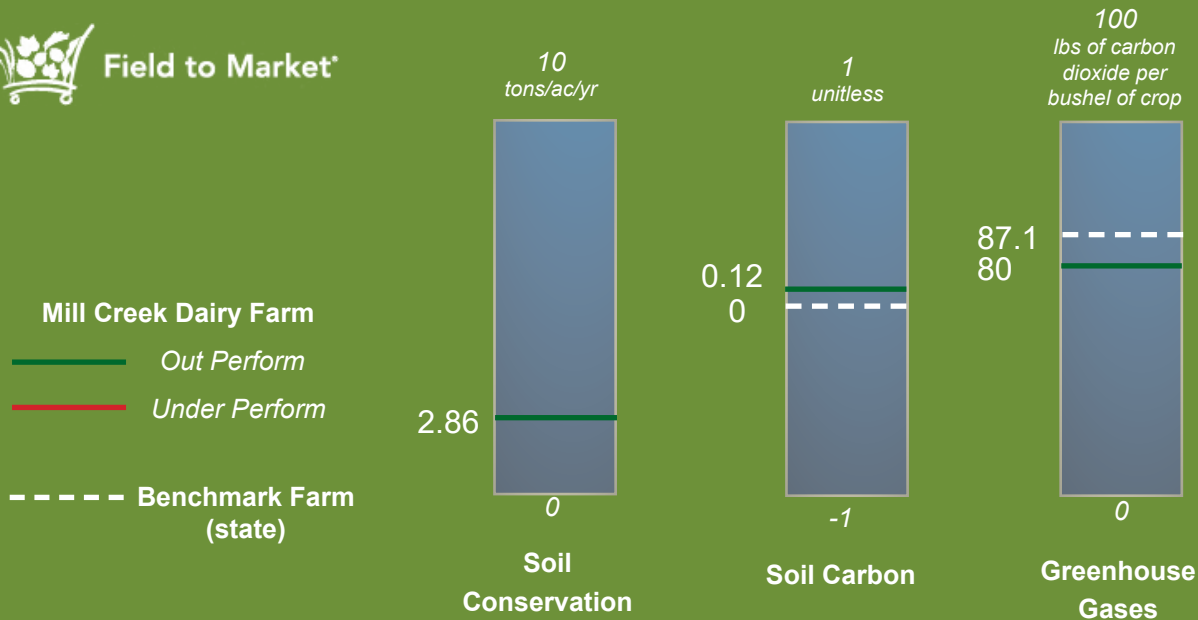


Acres: 196  
Fields: 12

## Sustainability



### Field to Market\*

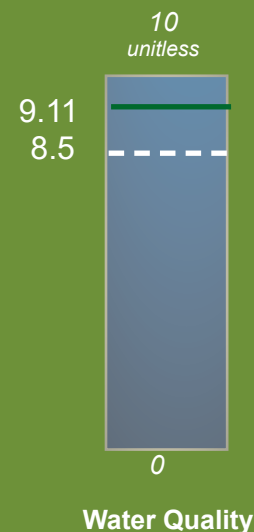


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### Mill Creek Dairy Farm

— Out Perform  
— Under Perform

--- Certification Eligibility Cut-off (8.5)



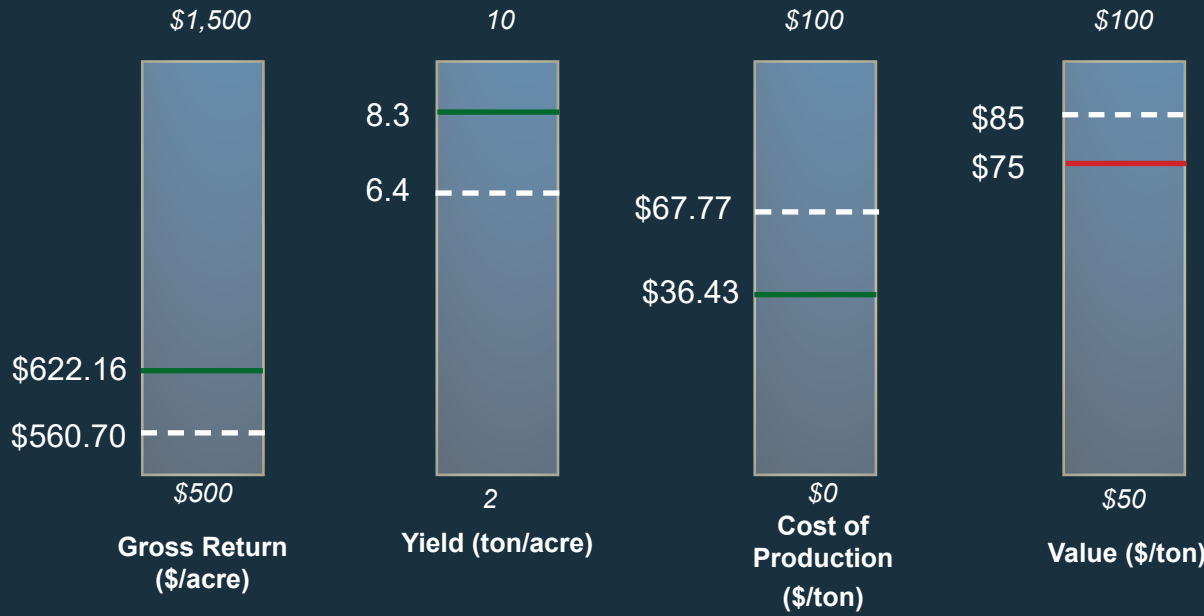
Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



# 2020 Alfalfa Results

## Financial



Mill Creek Dairy Farm — Out Perform — Under Perform — — — — Benchmark Farm (regional, dairy)

## Summary Stats:



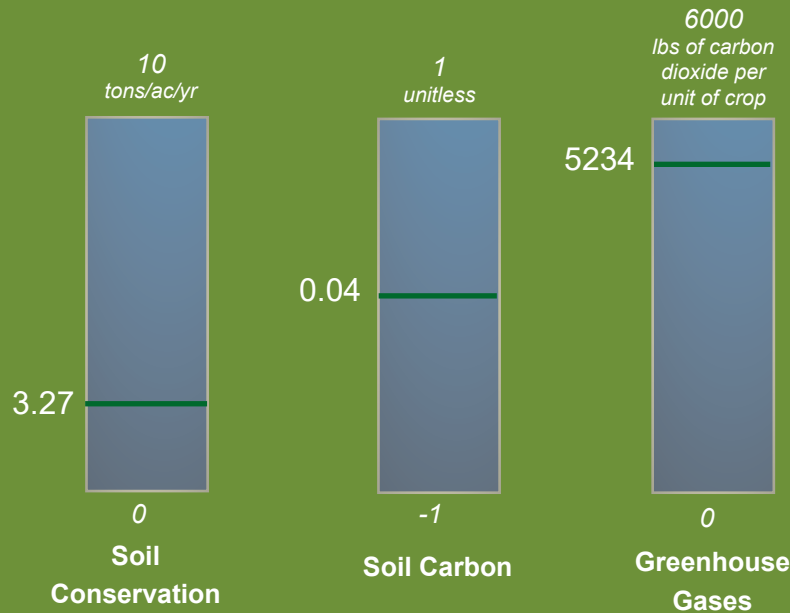
Acres: 183  
Fields: 10

## Sustainability



Field to Market

Mill Creek Dairy Farm  
— Out Perform  
— Under Perform  
— — — — Benchmark Farm (state)



Note: Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.

Note: Not all crops have a benchmark value for environmental metrics.

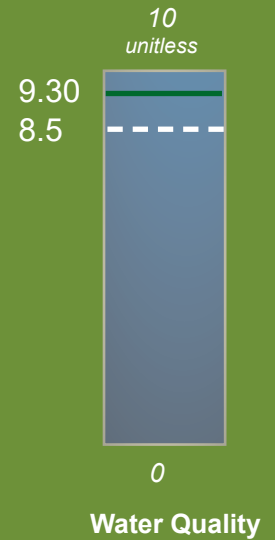
Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



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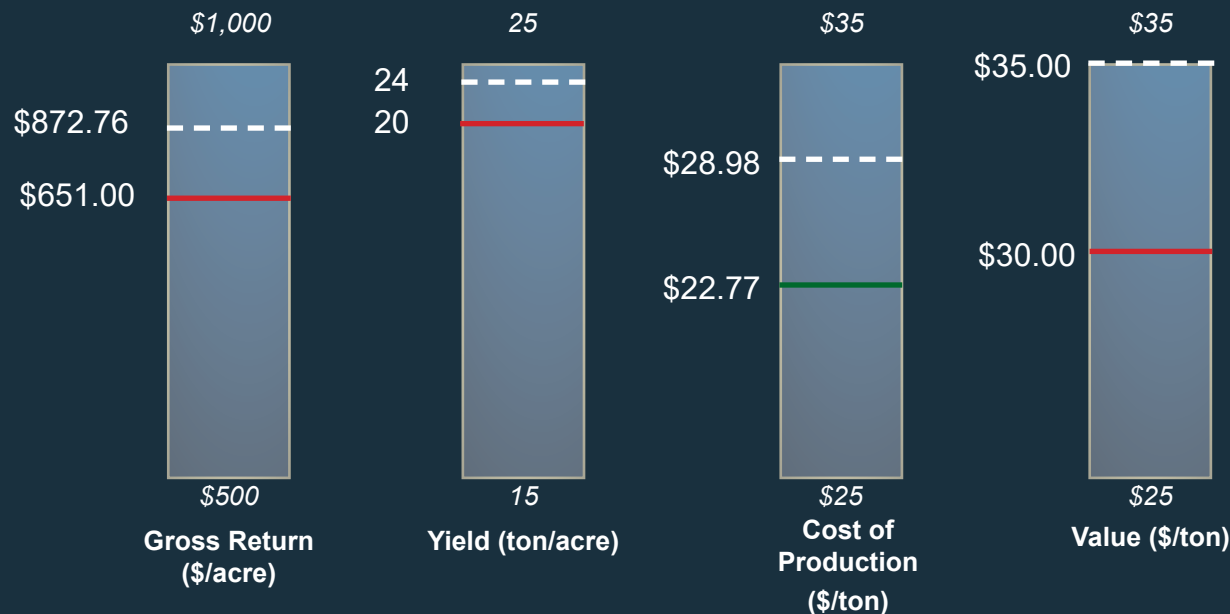
Mill Creek Dairy Farm  
— Out Perform  
— Under Perform

— — — — Certification Eligibility Cut-off (8.5)



# 2020 Corn Silage Results

## Financial



Mill Creek Dairy Farm — Out Perform — Under Perform — Benchmark Farm (regional, dairy)

## Summary Stats:

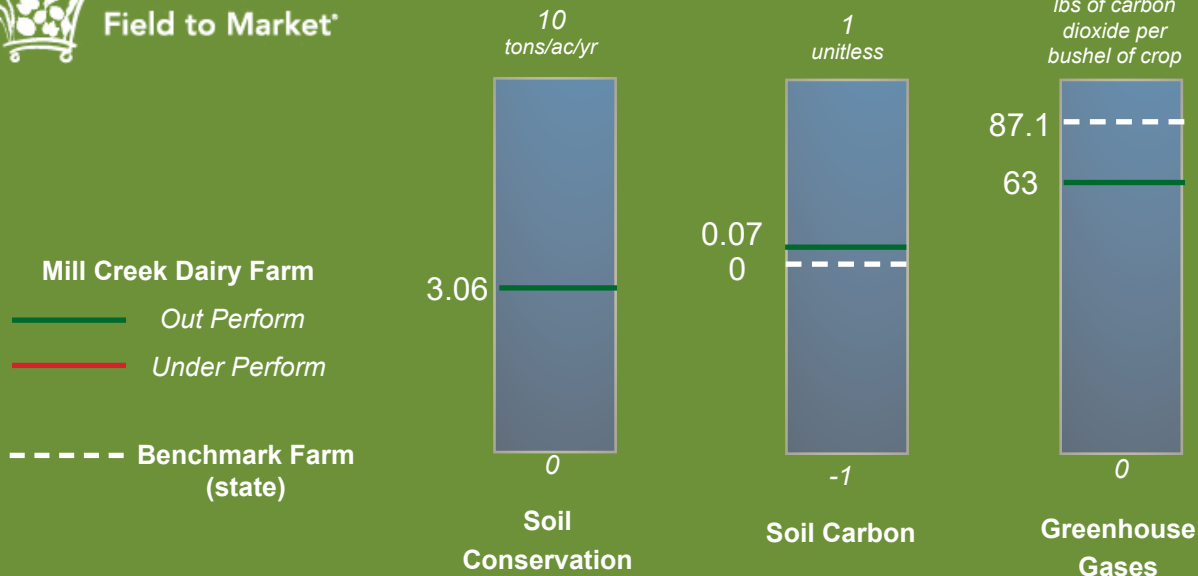


Acres: 217  
Fields: 8

## Sustainability



### Field to Market\*

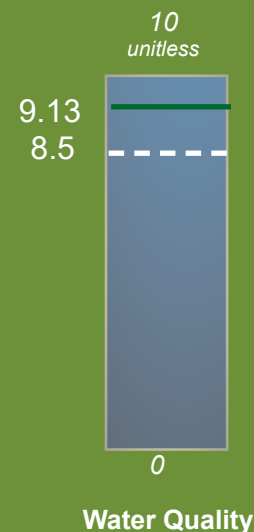


mn DEPARTMENT OF AGRICULTURE

### Mill Creek Dairy Farm

— Out Perform  
— Under Perform

— Certification Eligibility Cut-off (8.5)



Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# Schlangen Family Farm





# Schlangen Family Farm



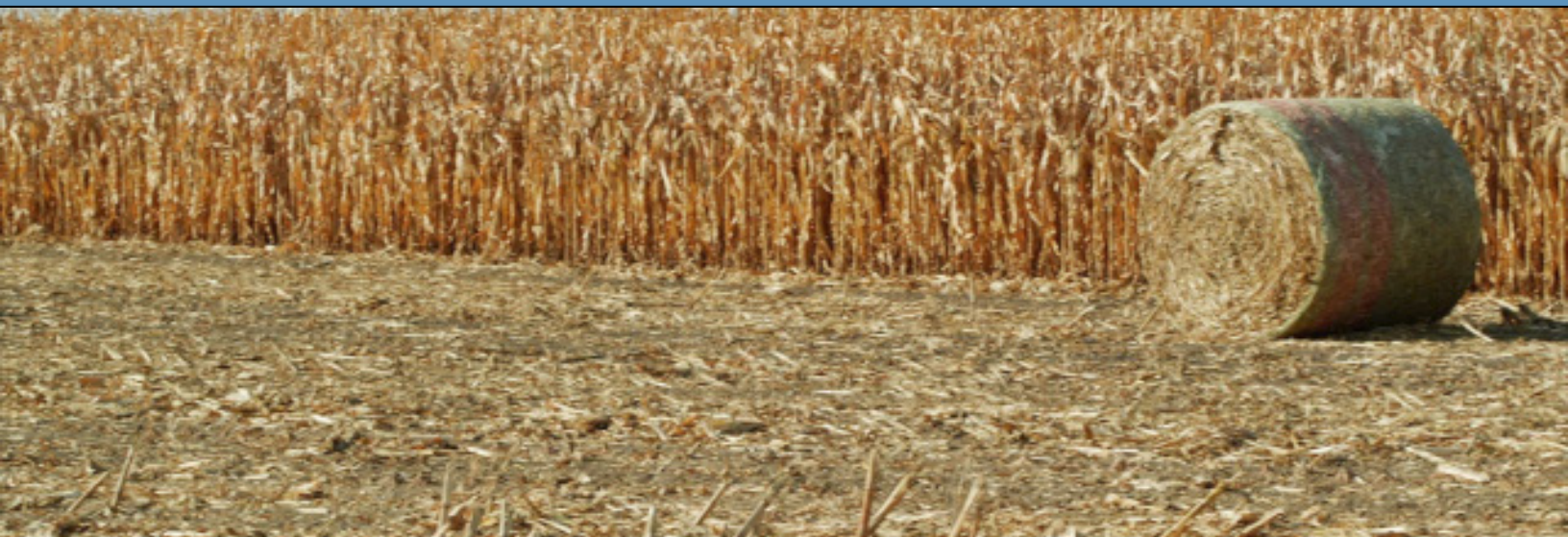
## Farm Description

Steve Schlangen is a dairy farmer who milks 65 cows and farms 200 acres. He grows corn, soybeans, alfalfa, and barley.

## Conservation Story

Conservation is important to Schlangen for two reasons: improved water quality and assurance the farm will be more productive and profitable for the next generation. He started his conservation journey rotating crops and applying manure as fertilizer. He also participated in a Natural Resources Conservation Service program to plant buffer strips to reduce runoff. Since then, Schlangen has participated in new conservation programs and is motivated to provide early feedback to program developers so the programs work well as they scale up. Through this process he has found sustainable practices that increase his farm's productivity and profits.

*"We raise our family on this farm, and we want to make sure the water is safe to drink, that the water going downstream is as clean as possible. We try to do practices to improve all that."*



# Practice Impacts

## Buffer Strips



- ◇ **Buffer strips:** When Schlangen added buffer strips, he found they improved the water and also provided hay for cattle feed.
- ◇ **Nutrient management:** Schlangen uses grid sampling to understand how nutrients are dispersed so he can apply nutrients only where they are needed.
- ◇ **Stacking slab:** Schlangen recently completed a stacking slab, mostly for solid manure storage but with some liquid storage capacity. He is looking forward to having capacity to store enough manure for a full season and injecting the nutrients into the soil in the fall.

*“There is always room for improvement in terms of soil health and taking care of water, and all these things can benefit your bottom line.”*

## Moving into the Future

Schlangen continues to explore new conservation practices. He planted cover crops for the first time this past fall and is interested to see how they affect his operation. He believes that continuously improving the impact of his farm is part of his responsibility to the environment and the next generation.

*“It doesn’t matter if you are a farmer or a producer or if you are living somewhere else, I think we all have responsibilities to the environment for the next generation.”*



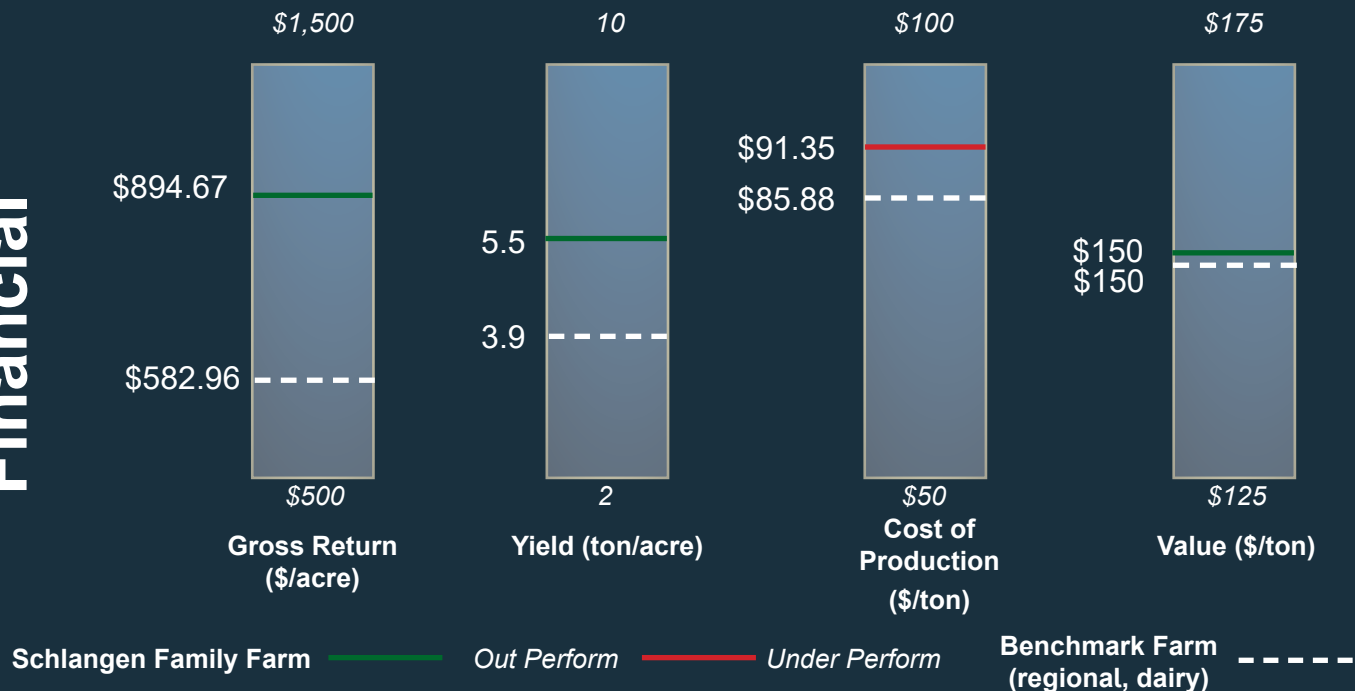
## Main Takeaways:

- ◇ Schlangen recommends other farmers talk to people that they know and trust and learn from their experiences implementing conservation practices.
- ◇ Schlangen believes farming is about being open-minded and finding continuous improvement. Test new practices that you think will work for you and then adjust over time.



# 2019 Alfalfa Results

## Financial



## Summary Stats:



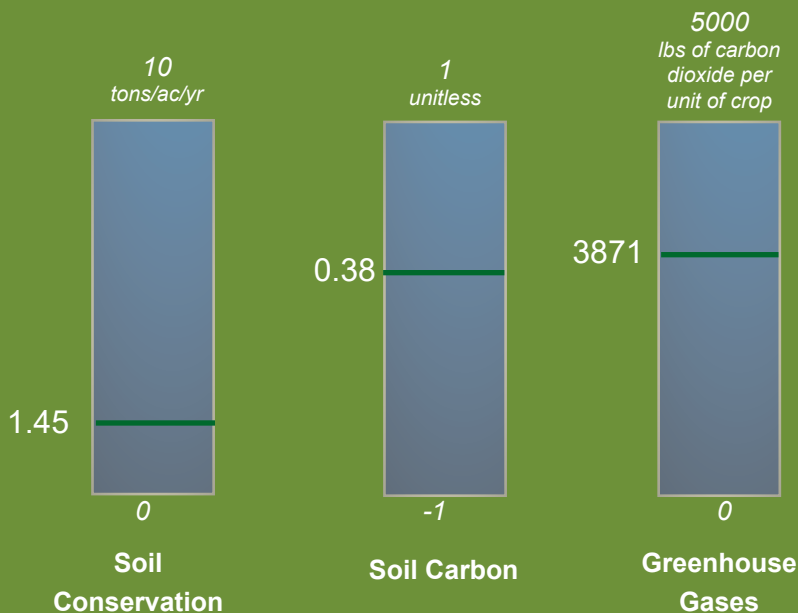
Acres: 76  
Fields: 4

## Sustainability



Field to Market

Schlangen Family Farm  
Out Perform  
Under Perform  
Benchmark Farm (state)



Note: Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.

Note: Not all crops have a benchmark value for environmental metrics.

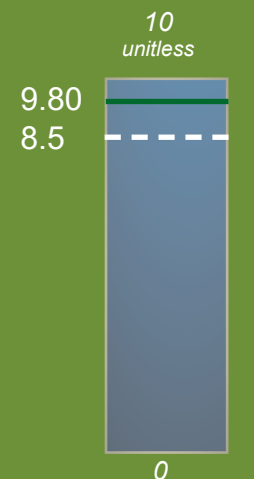
Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



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Schlangen Family Farm  
Out Perform  
Under Perform

Certification Eligibility Cut-off (8.5)



Water Quality



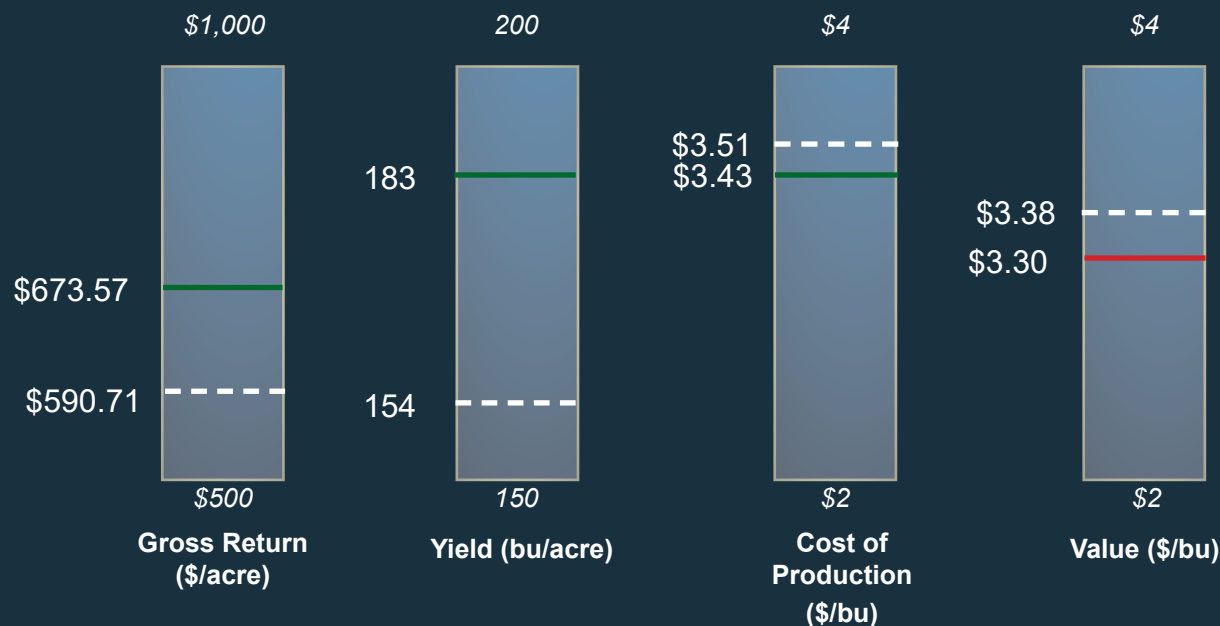
# 2019 Corn Results

## Financial

### Summary Stats:



Acres: 37  
Fields: 2



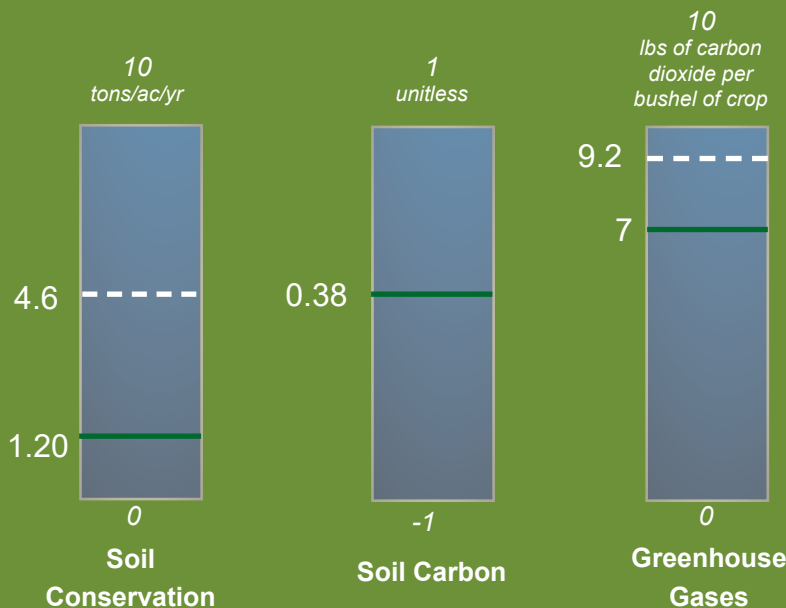
Schlengen Family Farm — Out Perform — Under Perform — Benchmark Farm (regional, dairy) - - - -

## Sustainability



Field to Market\*

Schlengen Family Farm  
— Out Perform  
— Under Perform  
- - - - Benchmark Farm (state)



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Schlengen Family Farm  
— Out Perform  
— Under Perform

- - - - Certification Eligibility Cut-off (8.5)

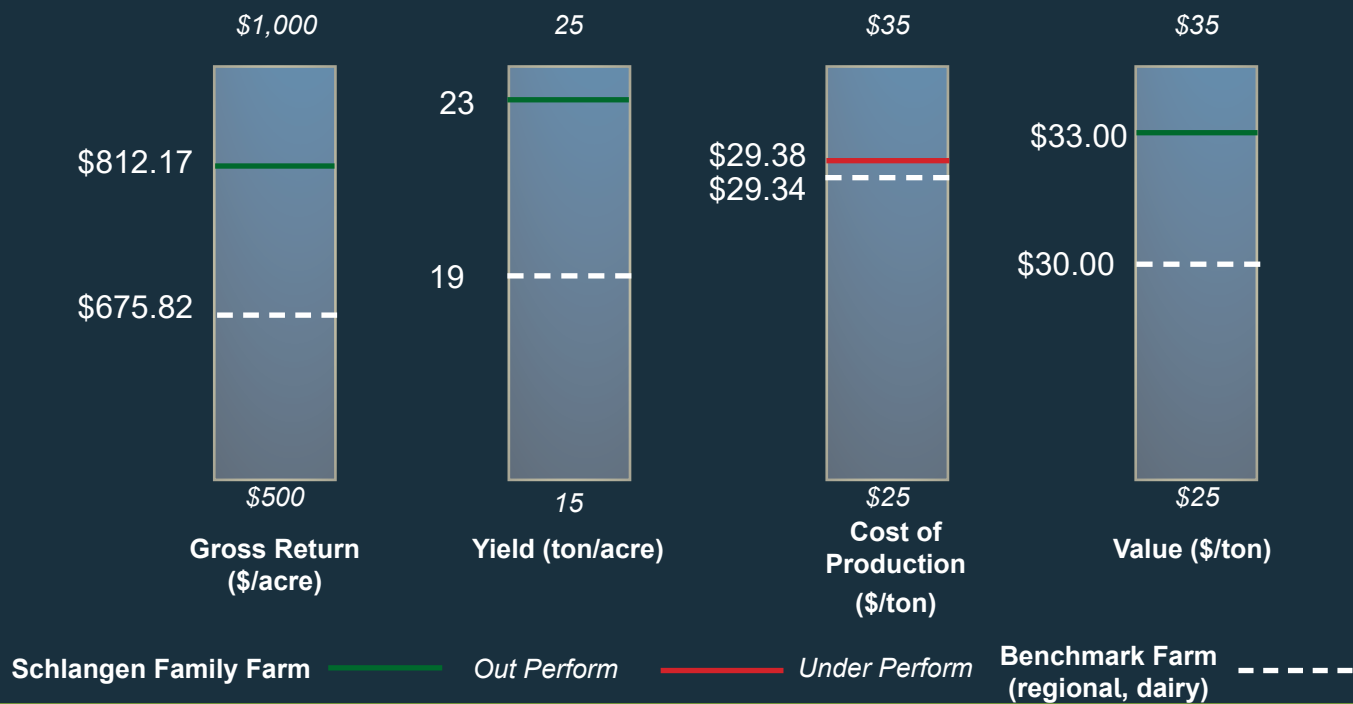


Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# 2019 Corn Silage Results

## Financial



## Summary Stats:

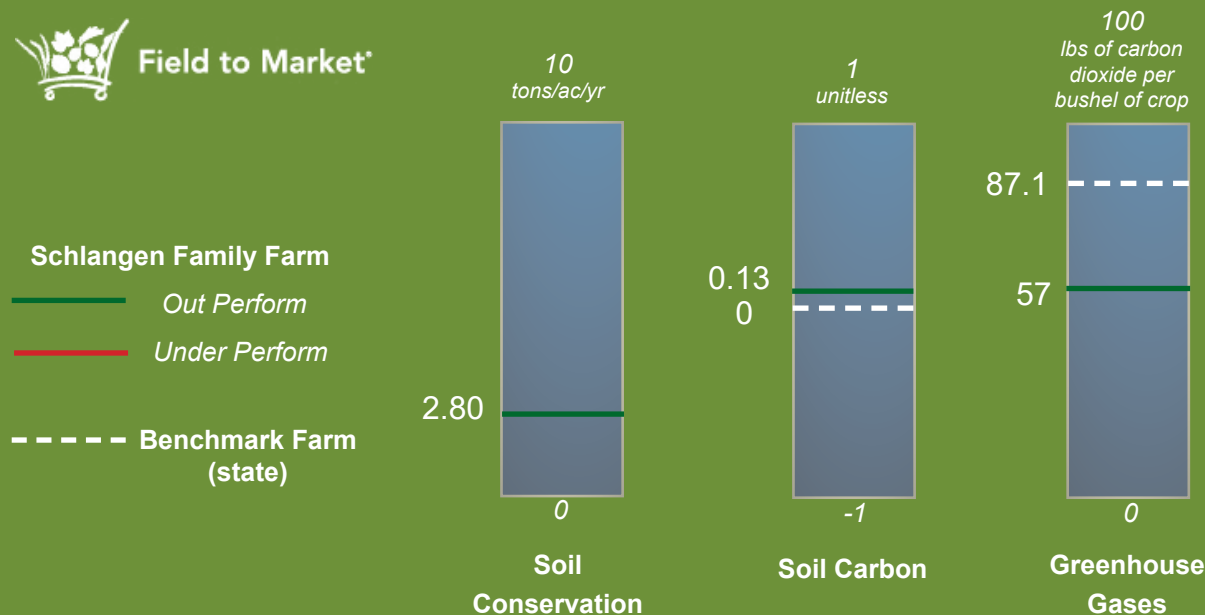


Acres: 64  
Fields: 3

## Sustainability



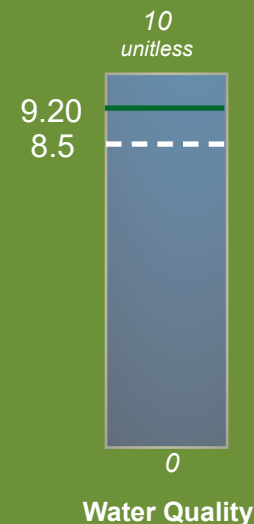
### Field to Market\*



### Schlengen Family Farm

Out Perform (green line)  
Under Perform (red line)

Certification Eligibility Cut-off (8.5)

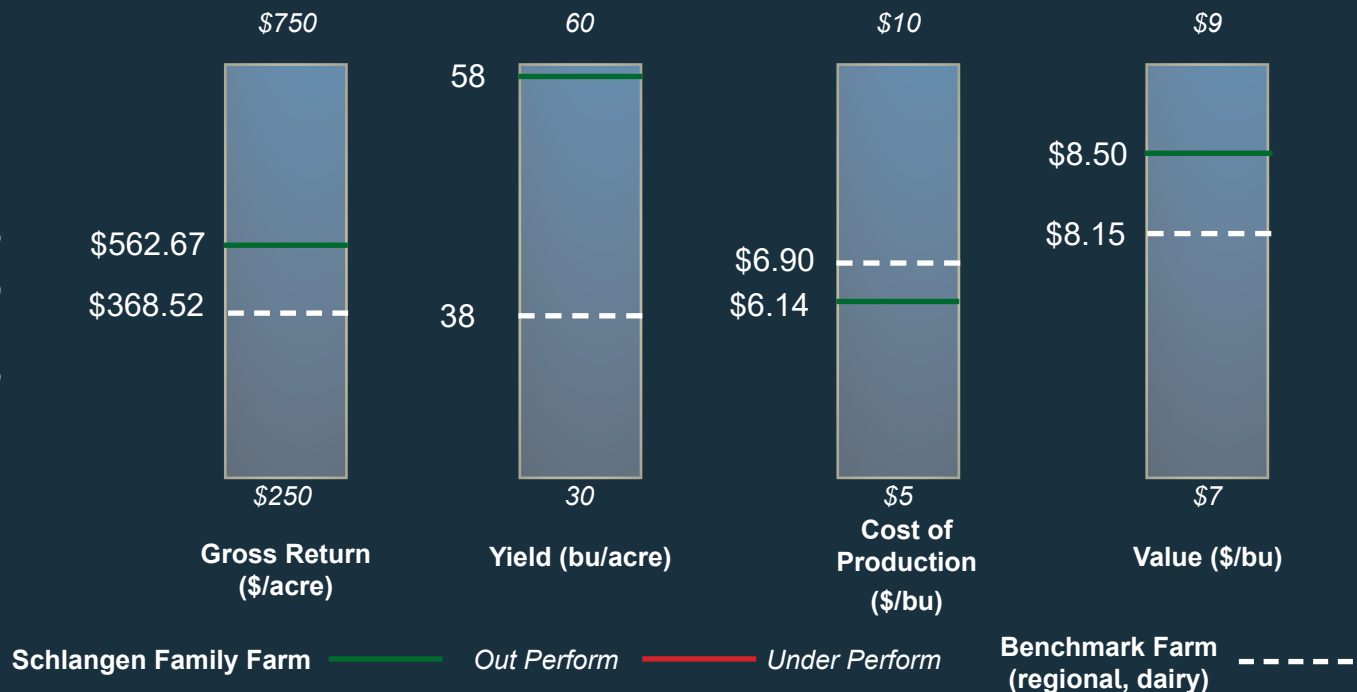


Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# 2019 Soybean Results

## Financial



## Summary Stats:

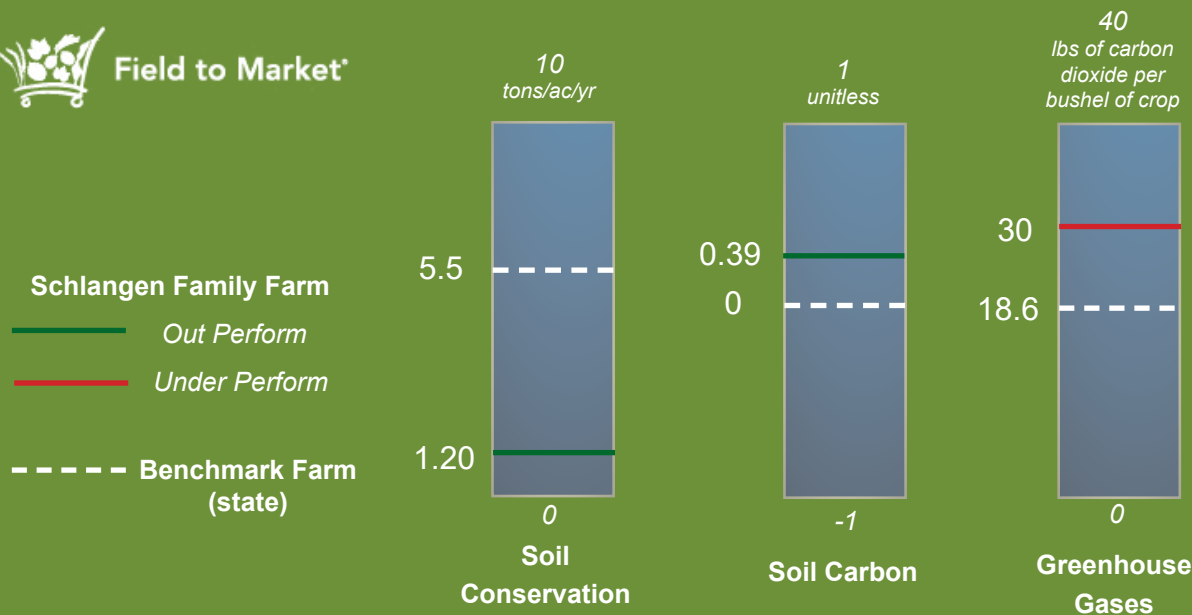


Acres: 24  
Fields: 1

## Sustainability



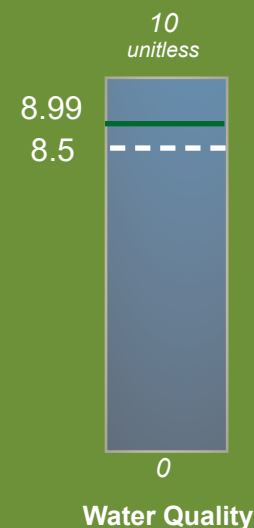
### Field to Market\*



### Schlengen Family Farm

— Out Perform   
— Under Perform

--- Certification Eligibility Cut-off (8.5)

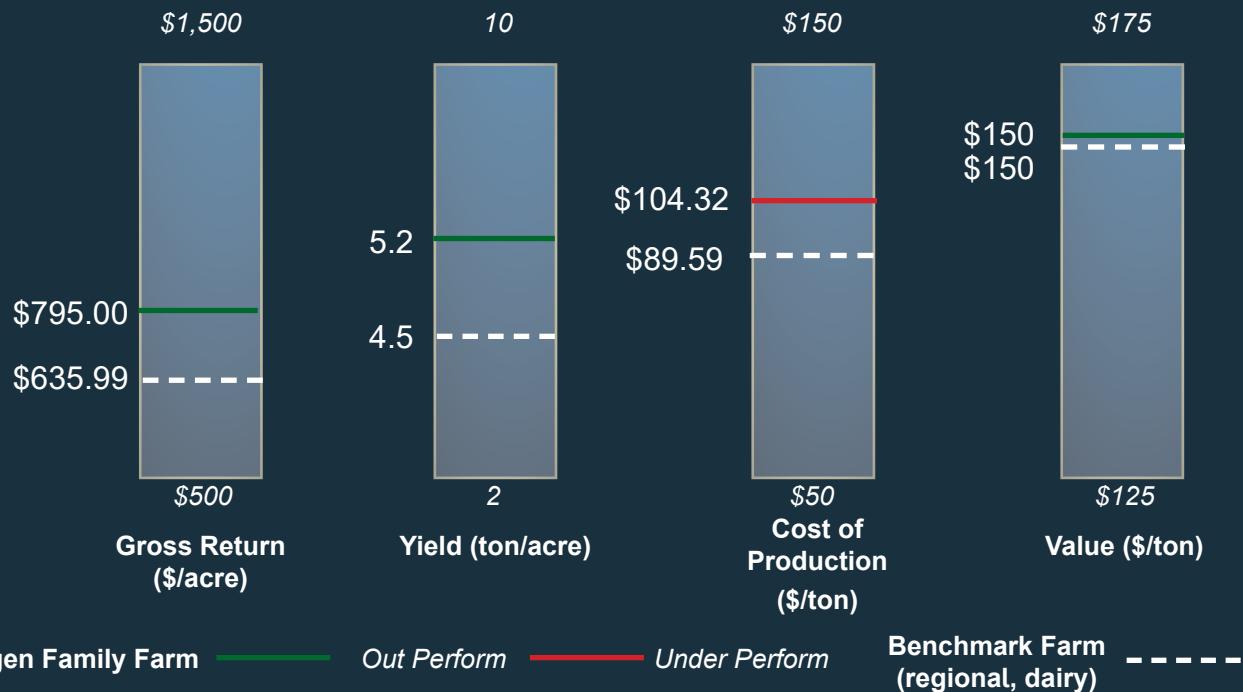


*Note: For more information on metrics on this page, turn to the How to Read Scorecards page.*



# 2020 Alfalfa Results

## Financial



## Summary Stats:



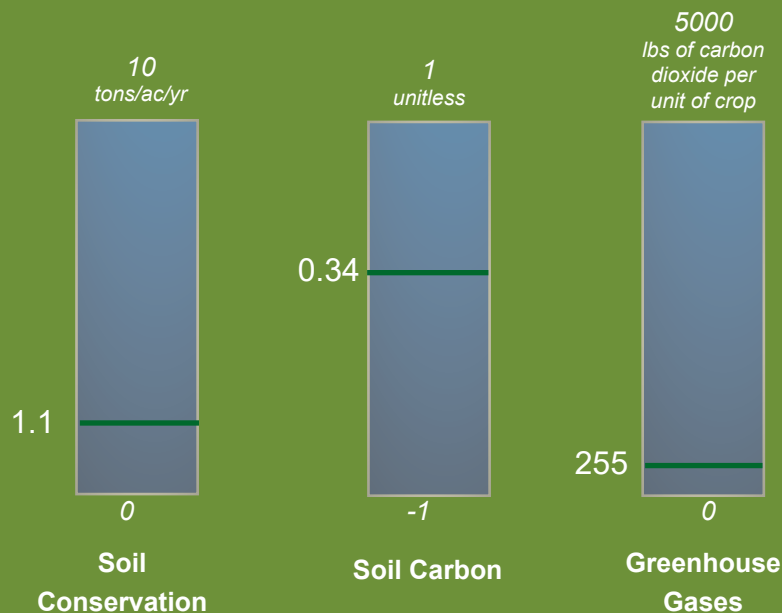
Acres: 82  
Fields: 4

## Sustainability



Field to Market

Schlangen Family Farm  
Out Perform  
Under Perform  
Benchmark Farm (state)



Note: Alfalfa erosion values were predicted to occur largely by wind erosion per the Fieldprint Platform.

Note: Not all crops have a benchmark value for environmental metrics.

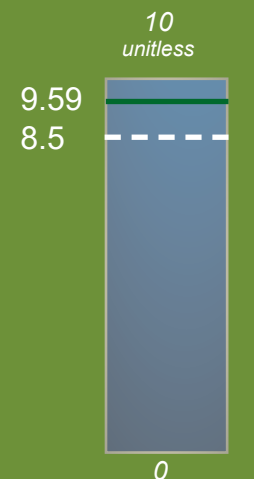
Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



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Schlangen Family Farm  
Out Perform  
Under Perform

Certification Eligibility Cut-off (8.5)



Water Quality

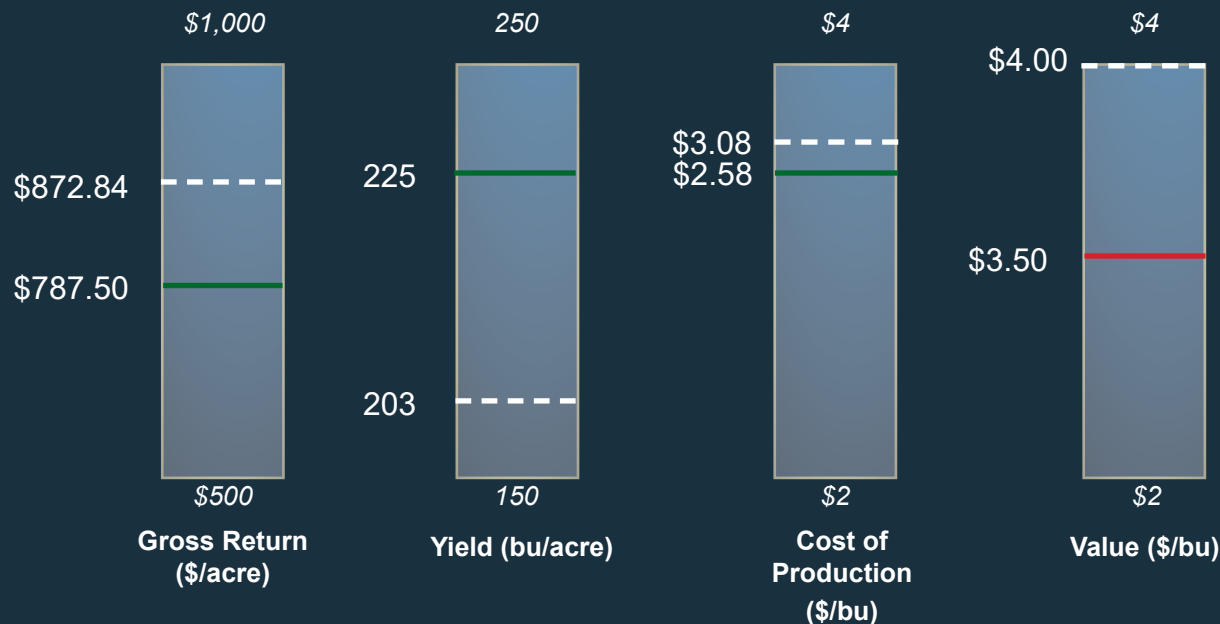
# 2020 Corn Results

## Financial

### Summary Stats:



Acres: 38  
Fields: 2



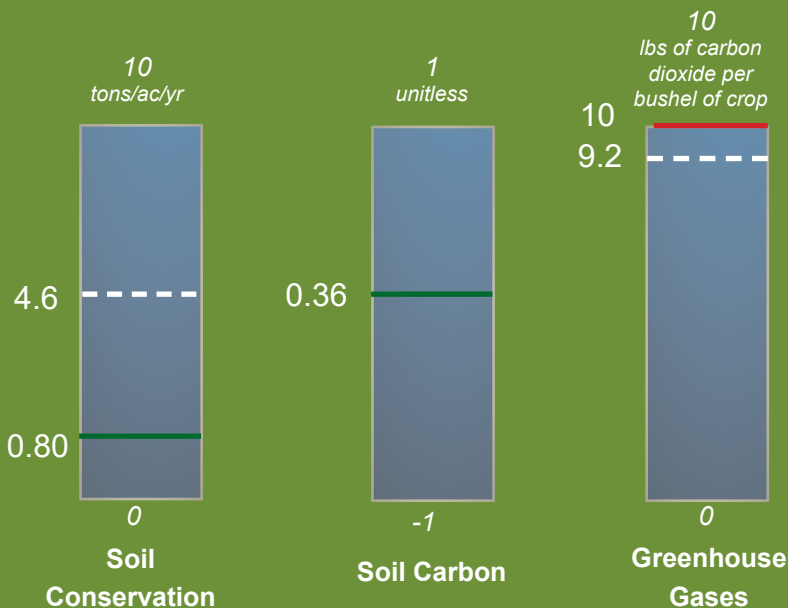
Schlengen Family Farm — Out Perform — Under Perform — Benchmark Farm (regional, dairy)

## Sustainability



### Field to Market\*

Schlengen Family Farm  
— Out Perform  
— Under Perform  
--- Benchmark Farm (state)



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Schlengen Family Farm  
— Out Perform  
— Under Perform

--- Certification Eligibility Cut-off (8.5)

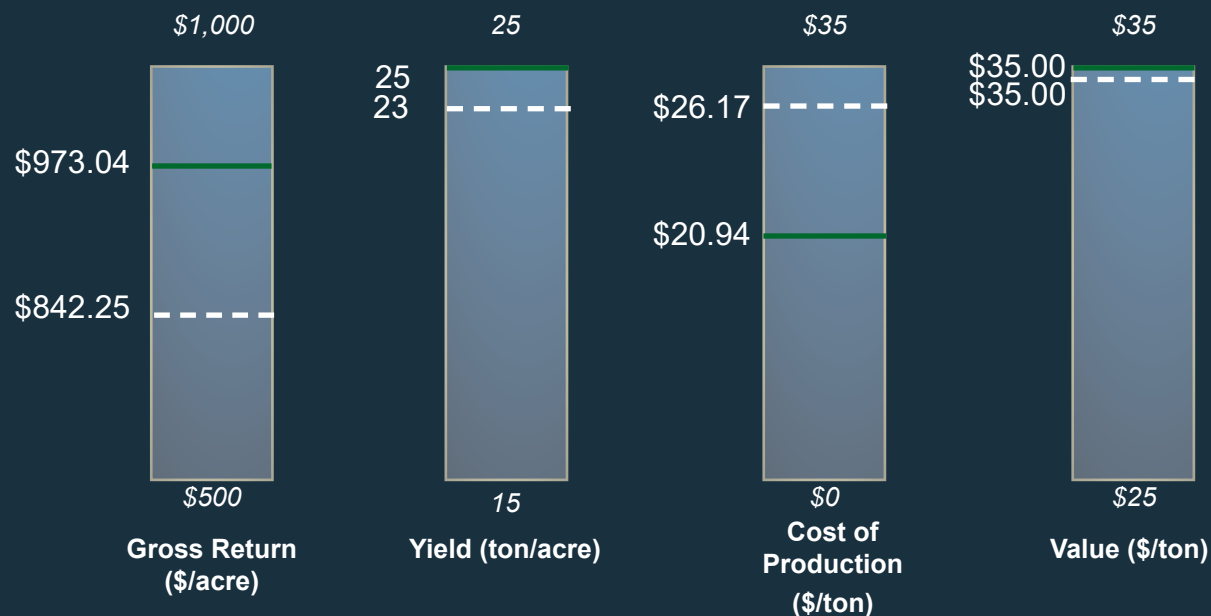


Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# 2020 Corn Silage Results

## Financial



Schlangen Family Farm — Out Perform — Under Perform — Benchmark Farm (regional, dairy)

## Summary Stats:



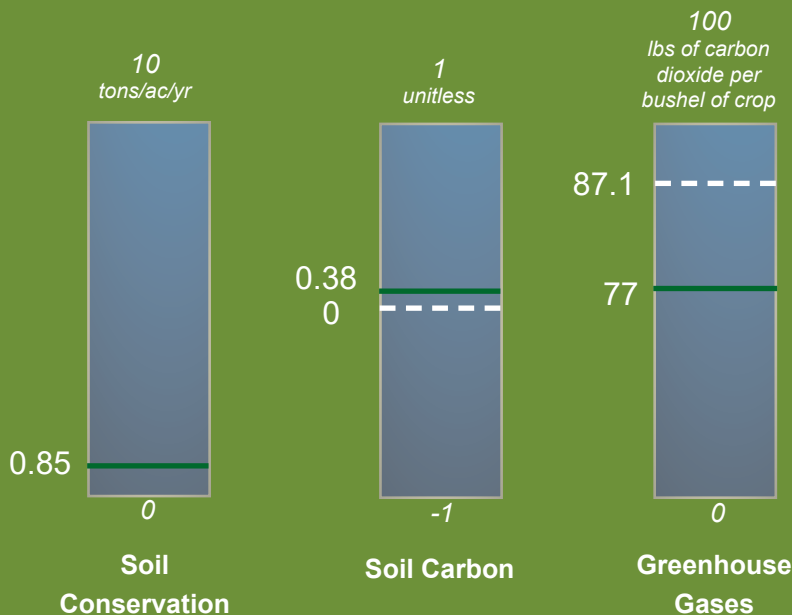
Acres: 40  
Fields: 3

## Sustainability



Field to Market

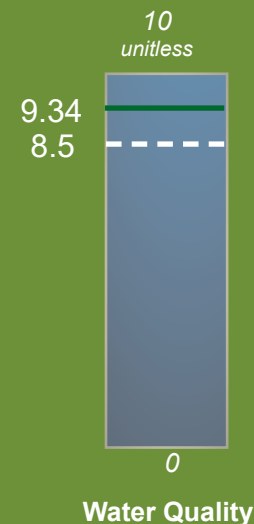
Schlangen Family Farm  
— Out Perform  
— Under Perform  
--- Benchmark Farm (state)



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Schlangen Family Farm  
— Out Perform  
— Under Perform

--- Certification Eligibility Cut-off (8.5)

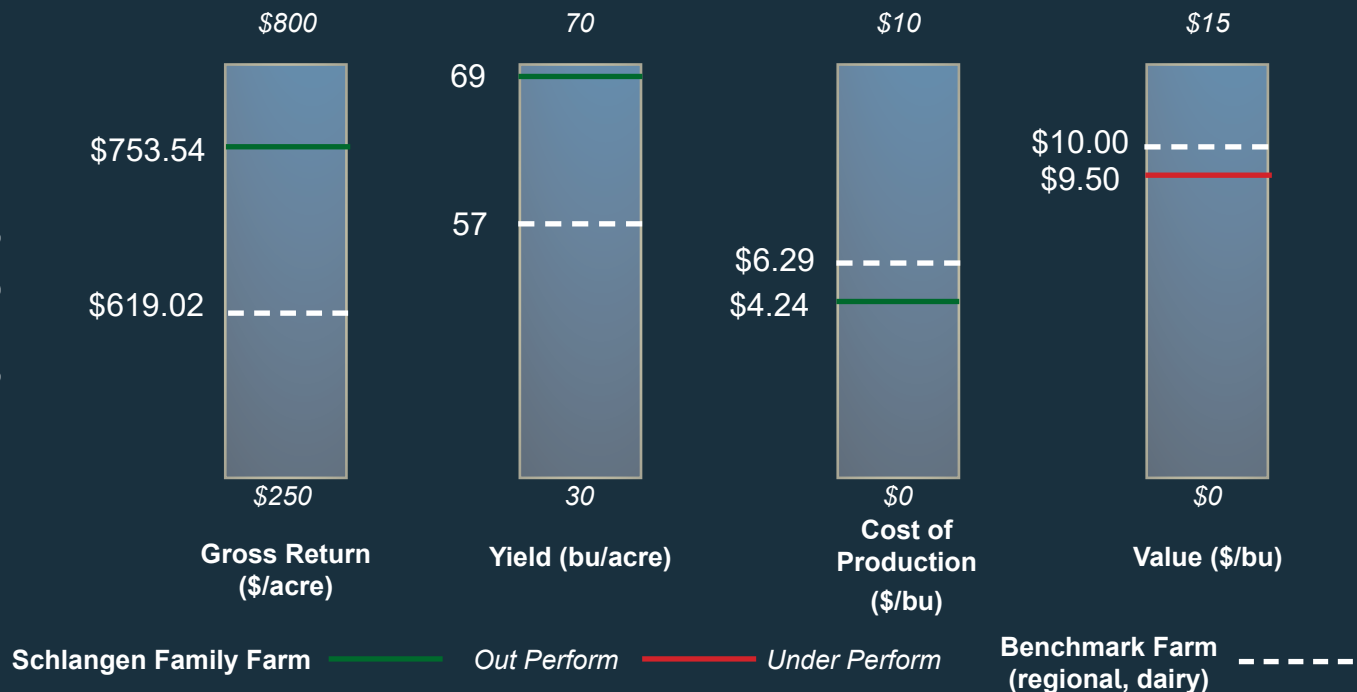


Note: Not all crops have a benchmark value for environmental metrics.

Note: For more information on metrics on this page, turn to the How to Read Scorecards page.

# 2020 Soybean Results

## Financial



## Summary Stats:

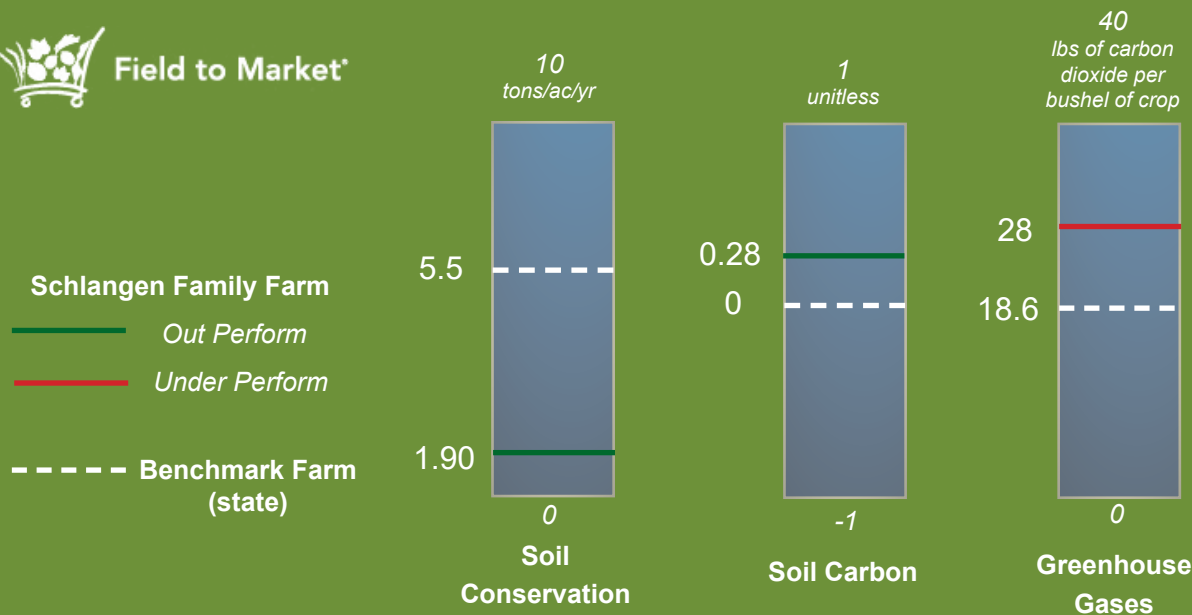


Acres: 23  
Fields: 1

## Sustainability

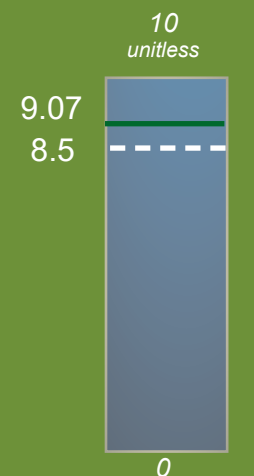


### Field to Market\*



Schlangen Family Farm  
Out Perform  
Under Perform

Certification Eligibility Cut-off (8.5)



Note: For more information on metrics on this page, turn to the How to Read Scorecards page.



## Project Summary

The farmers featured in the 2019-2020 report had, on average, **greater environmental and financial performance compared to regional benchmarks, specific to their crop enterprises.** Averaged across each of the four major crop enterprises in this report, farmers had higher gross return and crop yield, with lower production costs. Further, farmers built soil carbon and had less soil erosion than regional benchmarks. Due to the limited sample size and number of years, these numbers should be considered initial findings. Our partnership hopes to continue to expand the study in years to come.\*

### Sustainability

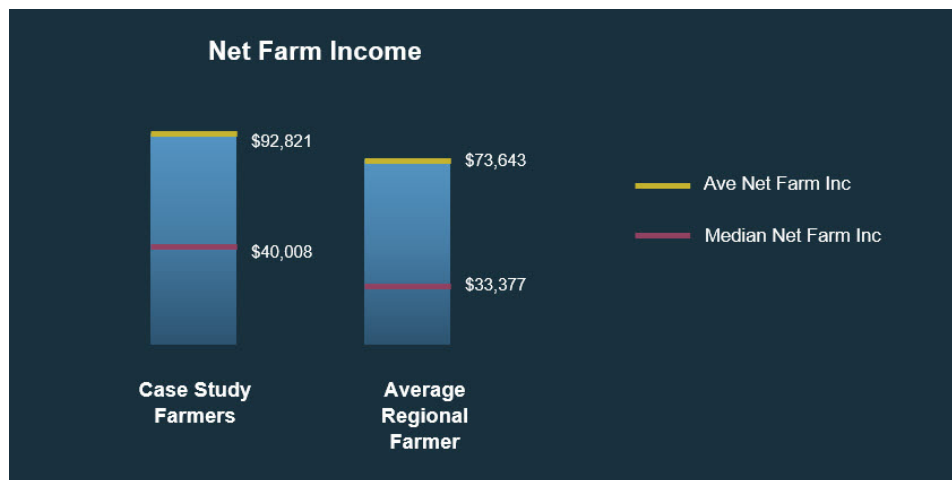


### Financial



\*Note that all calculations were done for crop enterprises for which benchmarks existed, and for which we had data. These are averages for 2019 and 2020.

A broader study conducted by [AgCentric](#) shows early indications that farmers adopting conservation had a higher net income than other regional farmers. The figure below, taken from data in the AgCentric study, indicated that farms certified through the Minnesota Agricultural Water Quality Certification Program (labeled Case Study Farmers below) had an average net farm income that was 26% higher and median net farm income that was 20% higher than other regional farms.



**Thank you to the study farmers for their participation!**

## Project Partners

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