9-way cover crop mix (Ifft Yorkshire Farms, IL)

The Economic Benefits of Soil Health

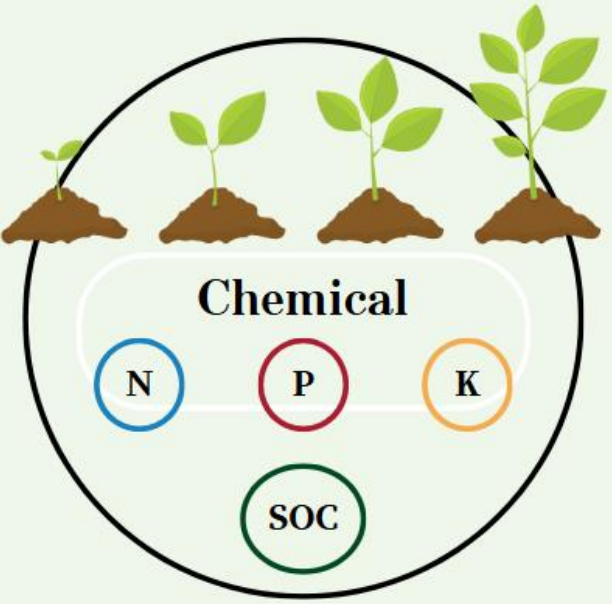
Michelle Perez & Chellie Maples

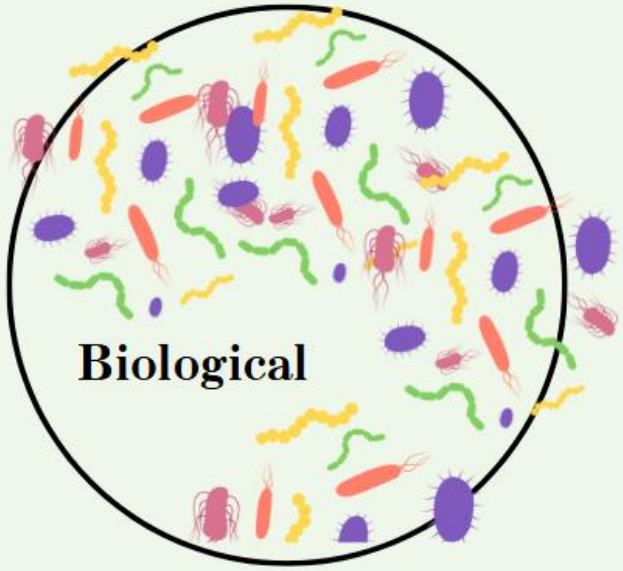
April 23, 2025

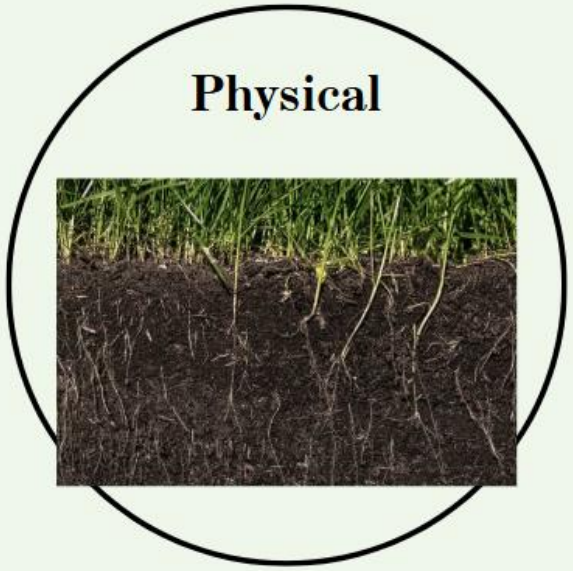
Saving America's Working Lands Conference

Dallas, TX

Soil Health Practice Research and Information







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Soil Health Stewards:
Promoting Soil Health on Protected Agricultural Lands

National Agricultural Land Network
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Farmers' Guides to Soil Health Economics

Soil Health Research For Everyone!

Row Crop Editions

Beef Cattle Grazing Editions

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Key Takeaways for Intensive Grazing Management

1. **Potential long-term increased profitability:**[2,6,7,8,15] Intens
grazing may result in increased profitability in the long-ter
especially for larger operations. Intensive grazing allows
producers to increase forage utilization at higher stocking
densities without major impacts on cattle performance.
2. **Increased short-term costs:**[6,7,15,17] Costs may increase
with intensive grazing management practices. Producers
considering intensifying their rotation need to consider the
high upfront costs of labor fencing and water. Producers
that already have some of that infrastructure can expect
to see profitability quicker. Rotational grazing may also
reduce the need for supplemental forages due to an extende
grazing season.
3. **Larger operations may benefit:**[2,8,15] Larger operations ma
be able to spread costs further reducing costs per head. Lar
operations may also be able to utilize more paddocks increa
stocking density and increase pounds of beef produced
per acre.
4. **Low impact on cattle gains:**[1,4,11] Research shows conventi
grazing may result in equal or increased cattle weight gains
in the short run when compared to intensive grazing. Whe
stocking density and rotation frequency are properly mana
however producers may implement intensive grazing
with little impact on cattle weight gains. Improved forage
availability through intensive grazing may result in more
pounds of beef produced per acre.

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4. **Low impact on cattle gains:**[1,4,11] Research shows conventional grazing may result in equal or increased cattle weight gains in the short run when compared to intensive grazing. When stocking density and rotation frequency are properly managed however producers may implement intensive grazing with little impact on cattle weight gains. Improved forage availability through intensive grazing may result in more pounds of beef produced per acre.

References

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/publications/farmers-guide-to-soil-health-economics

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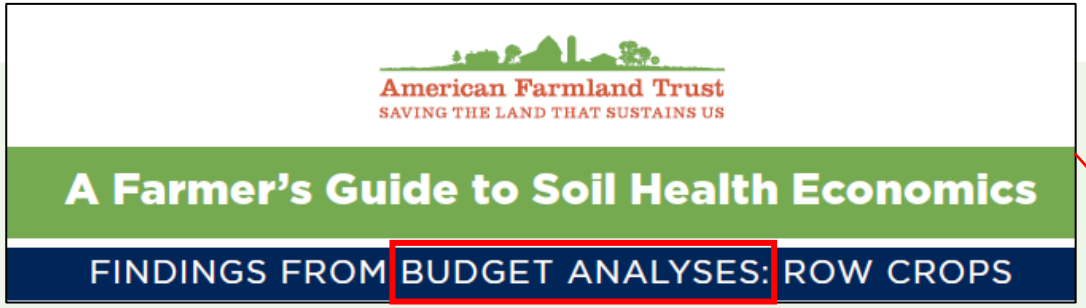
r's Guide to Grazing: Economic Considerations for Beef Producers. American Farmland

Three Row Crop Farmers' Guides



- Different info conveyed through each analysis
- Soil health practices:
  - Reduced tillage & NT
  - Nutrient management
  - Cover crops
  - Crop rotation

Budget Analyses

Locations	Findings	Source
IL, MO, & IA	Cover crop adoption: **-$22**/ to **+$19**/ac change in net income	National Association of Conservation Districts & Datu (2017)
IA, IL, IN, MI, MN, NE, OH, SD & TN	**+$52**/ac corn, **+$45**/ac soybean income increase **+$31**/ac corn, **+$29**/ac soybean yield revenue increase	SHI (2021)
IA, IN, MN, MO, & WI	**Higher** net returns under No-Till relative to conventional tillage (**$377**/ vs. $324/ac corn; **$251**/ vs. $216/ac soybean) **Reduced** costs under conservation till vs. conventional tillage (**-$44**/ac corn, **-$94**/ac soybean)	Bowman et al. (2021)
IA, KS, & OH	Cover crop and conservation till adoption: **Net cost of production was down**, driven by fuel, labor and equipment	Monast et al. (2018)

1. Long-term investment
2. Incentives matter
3. Increased yield Decreased costs

Research Trials

Locations	Findings	Source
MO	*up to* **1.5 bu**/ac corn yield increase, **18 bu**/ac soybean yield increase	Cai et al. (2019)
ME (Maine	No till: >5 years to significantly improve soil quality in corn fields; **reduced** production costs by **$50**/ac	Jemison et al. (2019)
NY	Shallower tillage **increased** profits by **$75**/ac (36 in vs. 18 in)	Cox et al. (2009)
IA	No till & strip till yields were competitive with conventional tillage in well drained soils; Corn tillage systems responded differently based on soil and climate.	Al-Kaisi et al. (2015)

1. Location matters
2. Economies of scale
3. No immediate impact

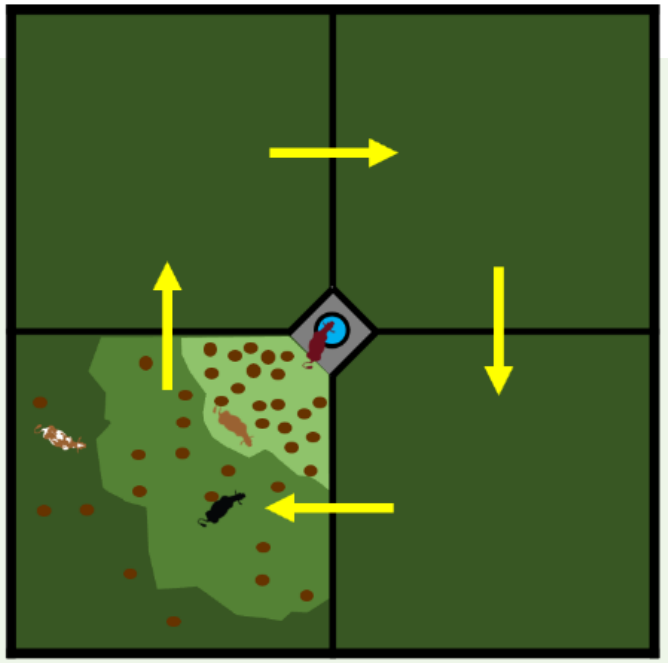
National Surveys

Findings	Source
0.5% corn yield increase, **3.6%** soybean yield increase, 4.2% wheat yield increase	SARE (2023) (*n*=745)
Cover cropping & incentives: **72%** never received incentives **29%** of those receiving incentives did so for 3-4 years **67.5%** plan to continue cover cropping after incentives stop	SARE (2023) (*n*=745)
Yield & net revenue changes take time: Corn yield: **-$31** (Y1) → **+$18** (Y5) Soybean Yield: **-$23** (Y1) → **+$10** (Y5)	Myers et al. (2019)

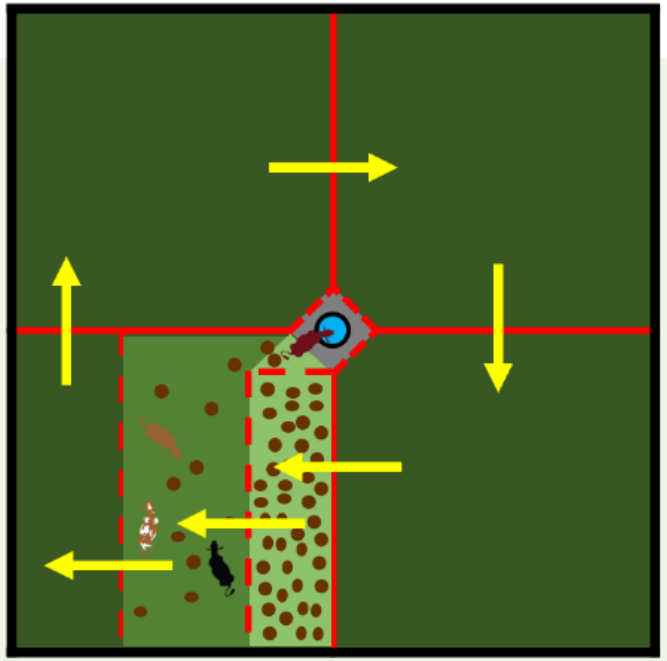
1. Combine practices
2. Experience matters
3. Long-term investment

Farmers' Guides to Grazing: Clarifying Terminology

Conventional (Continuous) Grazing



Simple Rotational Grazing

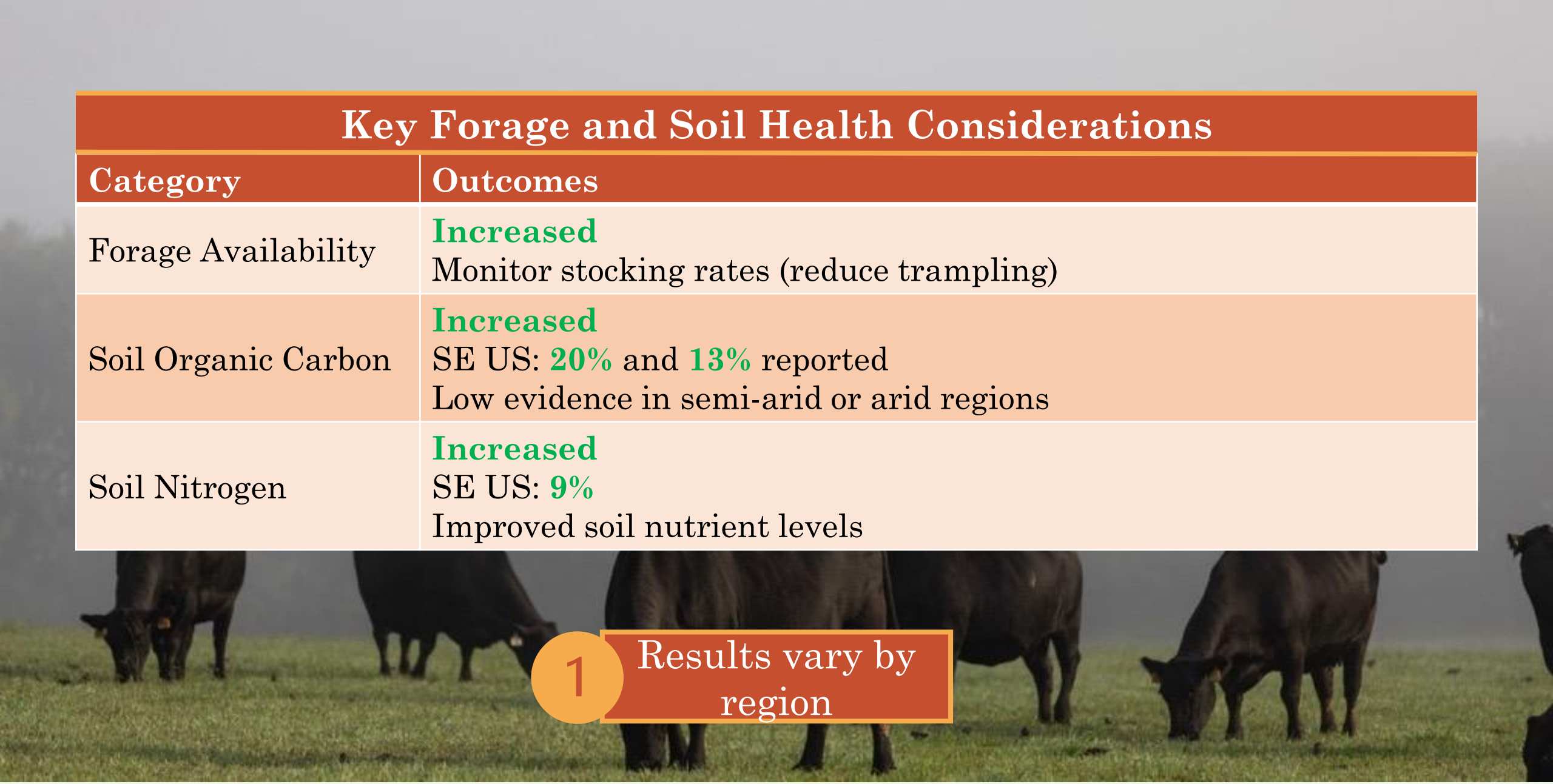


Adaptive Multi-Paddock, Mob

Key Economic Outcomes

Category	Outcomes
Expenses	**Increased**: Labor cost nearly **doubled** Fencing = **70-80%** of total cost increase **Reduced** supplemental forage & feed costs
Net Returns	**Increased**: Long-term investment **Increased** Lbs of beef/acre Less pronounced on smaller farms (economies of scale helps)
Cattle Weight Gain	**Unchanged, maybe better**: Monitor stocking densities and rotation frequencies

1. Increased short term cost
2. Economies of scale



Key Forage and Soil Health Considerations

Category	Outcomes
Forage Availability	**Increased** Monitor stocking rates (reduce trampling)
Soil Organic Carbon	**Increased** SE US: **20%** and **13%** reported Low evidence in semi-arid or arid regions
Soil Nitrogen	**Increased** SE US: **9%** Improved soil nutrient levels

1 Results vary by region

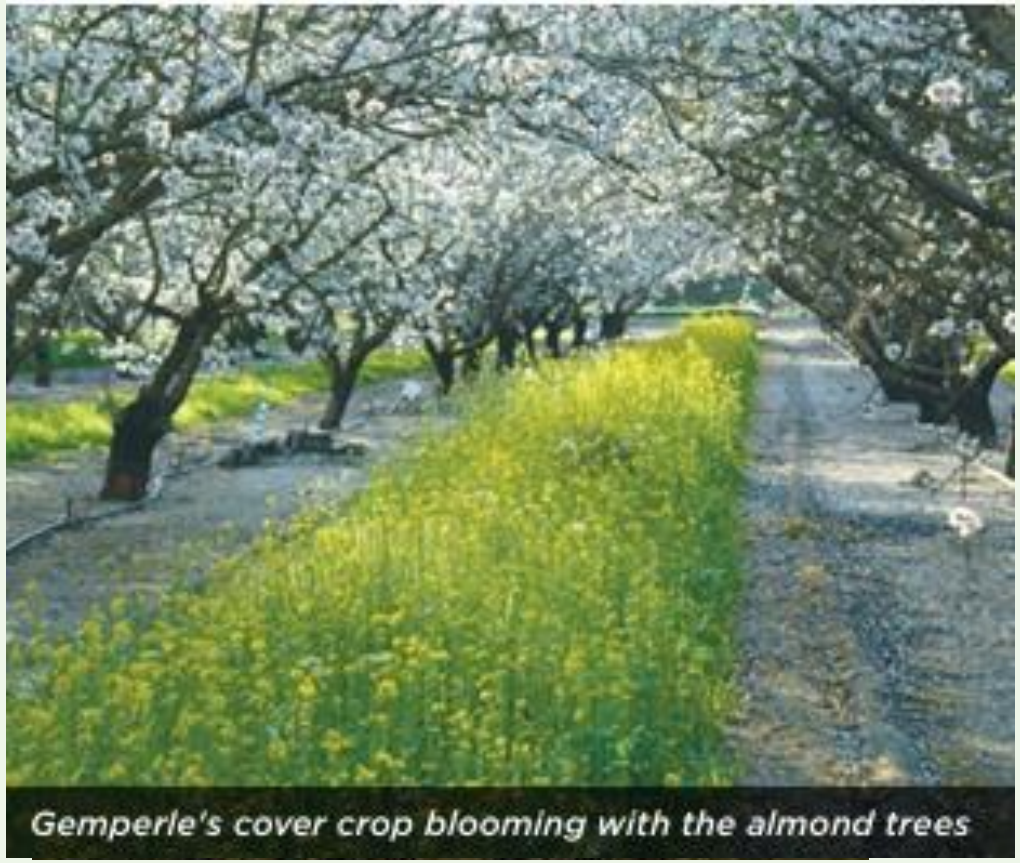
Seasonal Practice Considerations

Category	Outcomes
Soil Health	***Patch-Burn Grazing***: **increased** nitrogen content **1-2 fold** (short-grass steppe); burned areas contained **more crude protein** (ND) ***Bale Grazing***: **higher crude protein** and **phosphorus** (**34%** higher); soil density **21%** greater
Expenses	***Patch-Burn Grazing***: **Increased +$2.40**/ac; **reduced** supplemental feed by **40%** →**decreased** feeding costs by **$20**/head ***Bale Grazing***: **reduced** feed cost by **$0.37**/head/day (21%)
Cattle Weight Gain	***Patch-Burn Grazing***: gain at least equal ***Bale Grazing***: **Higher .11** kg/day

1. Less consensus
2. Extended grazing season

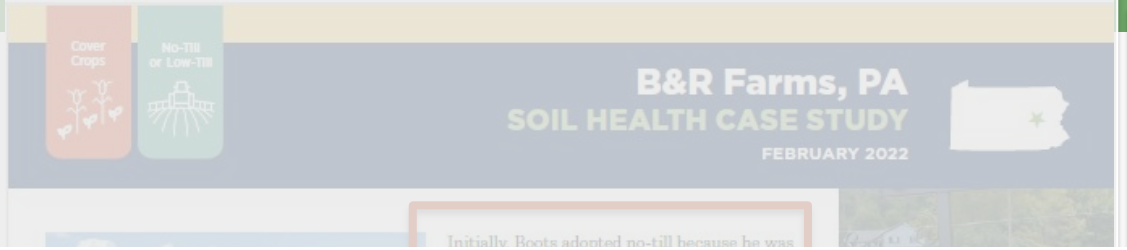
Soil Health Economic Case Studies

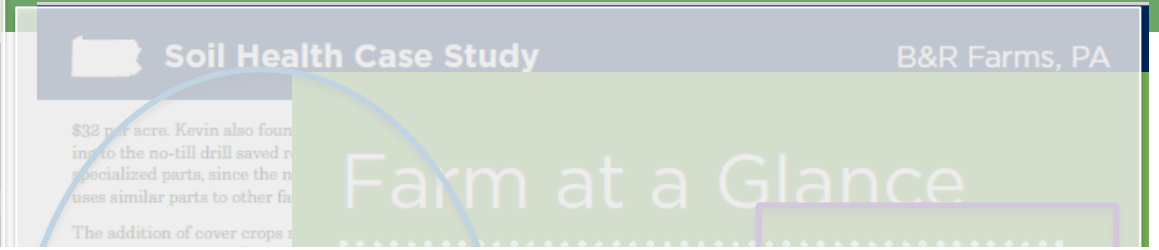
Individual Success Stories!



Gemperle's cover crop blooming with the almond trees

- 26 case studies featuring "soil health successful" farmers
- 11 states: CA, ID, IL, KY, MD, NY, OH, OK, PA, VA, WI
- Row crops: corn, soybean, wheat, hay, canola, etc.
- Almonds
- Criteria: Growers have between 4 & 15 years of positive experiences





ECONOMIC EFFECTS OF SOIL HEALTH PRACTICES FOR B&R FARMS (2021)

Positive Effects

Increase in Income

ITEM	PER ACRE	ACRES	TOTAL
Increased corn and soybean yields (by 10%) due to no-till and cover crops	$44	300	$13,283
Total Increased Income			**$13,283**

Decrease in Cost

ITEM	PER ACRE	ACRES	TOTAL
Machinery cost savings from reductions in multiple passes due to no-till	$32	308[5]	$9,948
Cost savings due to interchangeable equipment parts			$500
Total Decreased Cost			**$10,448**
Annual Total Increased Net Income			**$23,731**
Total Acres in this Study Area			**360**
Annual Per Acre Increased Net Income			**$66**

Negative Effects

Decrease in Income

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

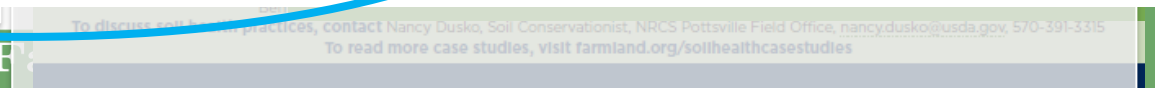
Increase in Cost

ITEM	PER ACRE	ACRES	TOTAL
Cover crop costs	$54	300	$16,153
Cover crops learning activities (4 hr/yr)			$105
No-till learning activities (16 hr/yr)			$419
Total Increased Cost			**$16,676**
Annual Total Decreased Net Income			**$16,676**
Total Acres in this Study Area			**360**
Annual Per Acre Decreased Net Income			**$46**

Annual Change In Total Net Income = $7,055

Annual Change In Per Acre Net Income = $20

Return on Investment =42%



B&R Farms, PA Case Study

B&R Farms, PA

- **Schuylkill County, PA**
- **Farm Size:** 424 acres
- **Study area**: 360 acres (150 corn, 150 soybean, 60 hay)
- **Crops Grown:** corn, soybeans, hay, certified rye, U-pick strawberries, spring greenhouse
- **Soil Health Practices included in case study:**
  - **2008 – No-till** on all 360 acres
  - **2018 – Rye cover crop** after soybeans
  - **2019 – Rye cover crop** after corn
- **Conservation easement**
  - All owned land (117 acres) is protected
  - State, county, and federal (Farm and Ranch Lands Protection Program - FRPP) funding
  - To ensure next generation can make a living farming the land. Soil health practices ensure land will provide for the next generation

Annual Change In Total Net Income = $7,055

Annual Change In Per Acre Net Income = $20

ROI = 42%

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B&R Farms' Increases in Net Income

Positive Effects			
Increase in Income			
ITEM	**PER ACRE**	**ACRES**	**TOTAL**
Increased corn and soybean yields (by 10%) due to no-till and cover crops	$44	300	$13,283
Total Increased Income			**$13,283**
Decrease in Cost			
ITEM	**PER ACRE**	**ACRES**	**TOTAL**
Machinery cost savings from reductions in multiple passes due to no-till	$32	308[5]	$9,948
Cost savings due to interchangeable equipment parts			$500
Total Decreased Cost			**$10,448**
Annual Total Increased Net Income			**$23,731**
Total Acres in this Study Area			**360**
Annual Per Acre Increased Net Income			**$66**

- **Increase in Income**:
  - 10% increase in both corn and soybeans yields
- **Decrease in Cost:**
  - Fewer planting passes
    - Hay: 5→1
    - Soybeans: 4→1
    - Corn: 3→1
  - New drill allows for consolidation of parts with existing machinery

B&R Farms' Decreases in Net Income

Decreased Income:

- None identified

Increased Costs:

- Rye after corn is cheaper ($41/ac) compared to soybean ($67/ac) because the rye seed is broadcast vs drilled
- ~50% saving in rye seed costs because they grow their own seeds
- 16 hr/yr spent researching tillage and 4 hr/yr spent researching cover crops

Negative Effects			
Decrease in Income			
ITEM	PER ACRE	ACRES	TOTAL
None identified			$0
Total Decreased Income			**$0**
Increase in Cost			
ITEM	PER ACRE	ACRES	TOTAL
Cover crop costs	$54	300	$16,153
Cover crops learning activities (4 hr/yr)			$105
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Total Increased Cost			**$16,676**
		Annual Total Decreased Net Income	**$16,676**
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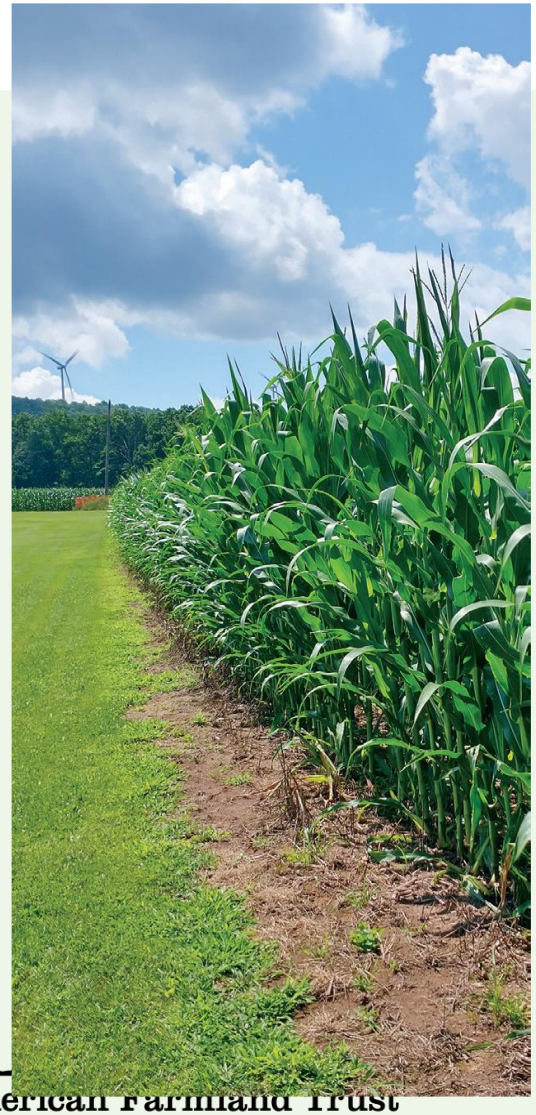
		Annual Per Acre Decreased Net Income	**$46**

B&R Farms' Environmental Benefits Results



Observed Benefits

- Witness less soil running off their fields thanks to no-till and cover crops.
- Less compact and more fertile soil.
- In dry years, grateful for increased soil moisture due to soil health practices.
- Summer 2018 torrential rains washed out many fields across central PA leading to crop loss; B&R still had a crop to harvest!

Modeled Benefits

- **NTT results**: a 7-acre field N, P, & sediment reduced by 85, 96, 99% respectively
- **COMET results**: Same field total GHG emissions reduced by 200%, taking **one** car off the road

B&R Farms' Soil Health Practices Net Returns

Annual Total Increased Net Income	$23,731
Total Acres In this Study Area	360
Annual Per Acre Increased Net Income	$66

Annual Total Decreased Net Income	$16,676
Total Acres In this Study Area	360
Annual Per Acre Decreased Net Income	$46

Annual Change In Total Net Income = $7,055

Annual Change In Per Acre Net Income = $20

Return on Investment = 42%

B&R Farms, PA Case Study: Highlights

Highlights: B&R Farms, PA Case Study

- **Soil health practices:** no-till, cover crops
- **Crops:** (150 corn, 150 soybean, 60 hay)
- **Study Area:** 360 acres
- By switching to no-till and adding a rye cover crop, corn and soybean yields increased by **10%** (farmer-estimated)
- Adopting to no-till saves **$32 per acre** in reduced machinery and labor costs
- The increase in net income from no-till and cover crops outweighs the increased net costs, leading to an increase total net income of **$20 per acre, leading to a 42% ROI**

- **Annual SH Benefits:** $23,731
- **Annual SH Costs:** $16,676
- **Annual SH PROFITS: $7,055 or $20/ac**

All in 2020 dollars

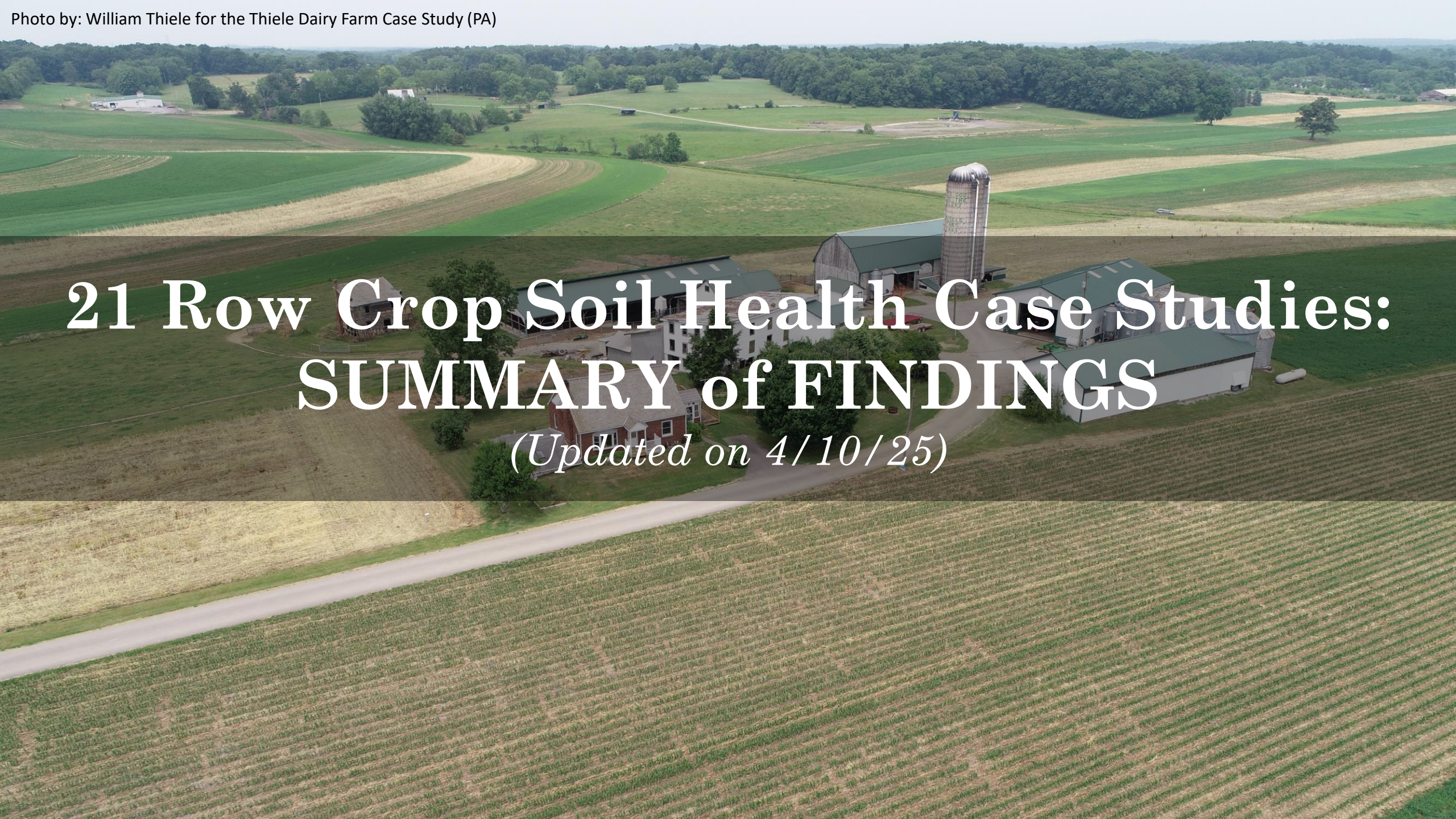


Photo by: William Thiele for the Thiele Dairy Farm Case Study (PA)

21 Row Crop Soil Health Case Studies: SUMMARY of FINDINGS

(Updated on 4/10/25)

Yield & Income Benefits of Soil Health Practices Across 21 "Soil Health Successful" Row Crop Farms

- **Improved Yield:**
  - 18 reported yield increases
  - 3 farms reported *no* yield change
- **Annual Change in Net Income:**
  - All 21 farms reported **increases in income**
  - Range: $**2** to $**209**/ac/yr
- **Return on Investment:**
  - All 21 farms reported positive ROI
  - Range: **7**% to **345**%

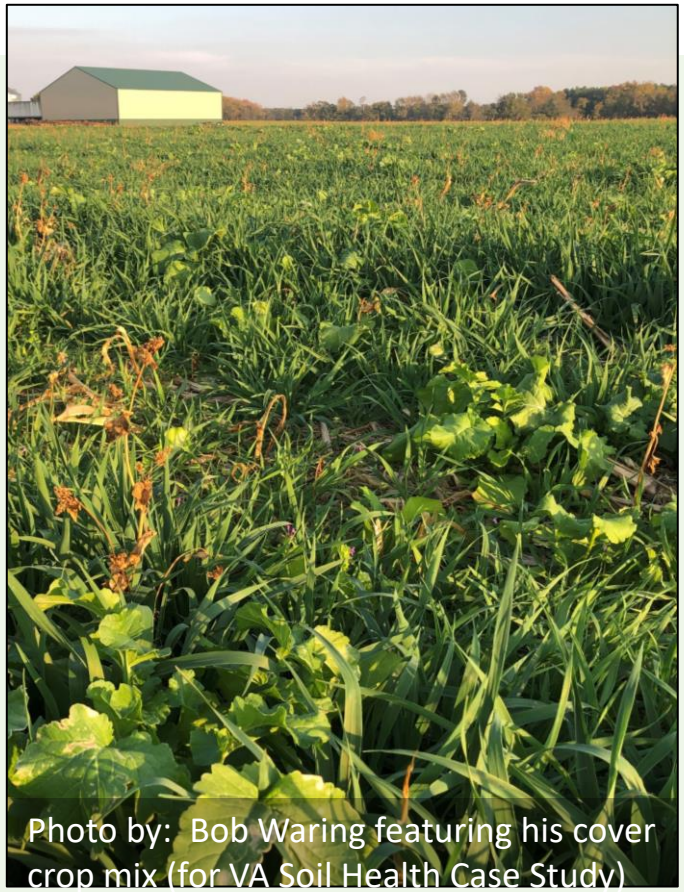


Photo by: Bob Waring featuring his cover crop mix (for VA Soil Health Case Study)

***Note:** *All values are in 2023 dollars.*

Input Benefits & Costs of Soil Health Practices Across 21 Row Crop Farms

Photo by: Kevin Keenan of a triticale cover crop on New York dairy farm, HaR-Go (featured in AFT case study)

- **Changes to Fertilizer Costs:**
  - 13 farms reduced costs by $**9** to $**84**/ac/yr
  - 5 farms increased costs by $**9** to $**82**/ac/yr
  - 3 farms saw *no change* in costs
- **Changes to Machinery, Fuel, and Labor Costs due to Change in Tillage:**
  - 15 farms reduced costs by $**17** to $**92**/ac/yr
  - 6 farms reported *no change* in costs

****Note:** All values are in 2023 dollars.*

Input Benefits & Costs of Soil Health Practices Across 21 Row Crop Farms

- **Pesticide Usage: (Herbicide, Insecticide, & Fungicide)**
  - 8 farms reduced costs by $4 to $**36**/ac/yr
  - 3 farms increased costs by $**6** to $**29**/ac/yr
  - 10 farms reported *no change* in cost
- **Learning Costs:**
  - Ranged from 8 to 160 hr/yr and $**243** to $**5,923**/yr
  - This range does not include an outlier case that reported 530 hr/yr

Photo by Jim Ifft featuring his herbicide termination of rye cover crop (featured in Ifft Yorkshires Farm (IL) case study)

****Note:** *All values are in 2023 dollars.*

Environmental Benefits of Soil Health Practices Across All 21 Row Crop Farms

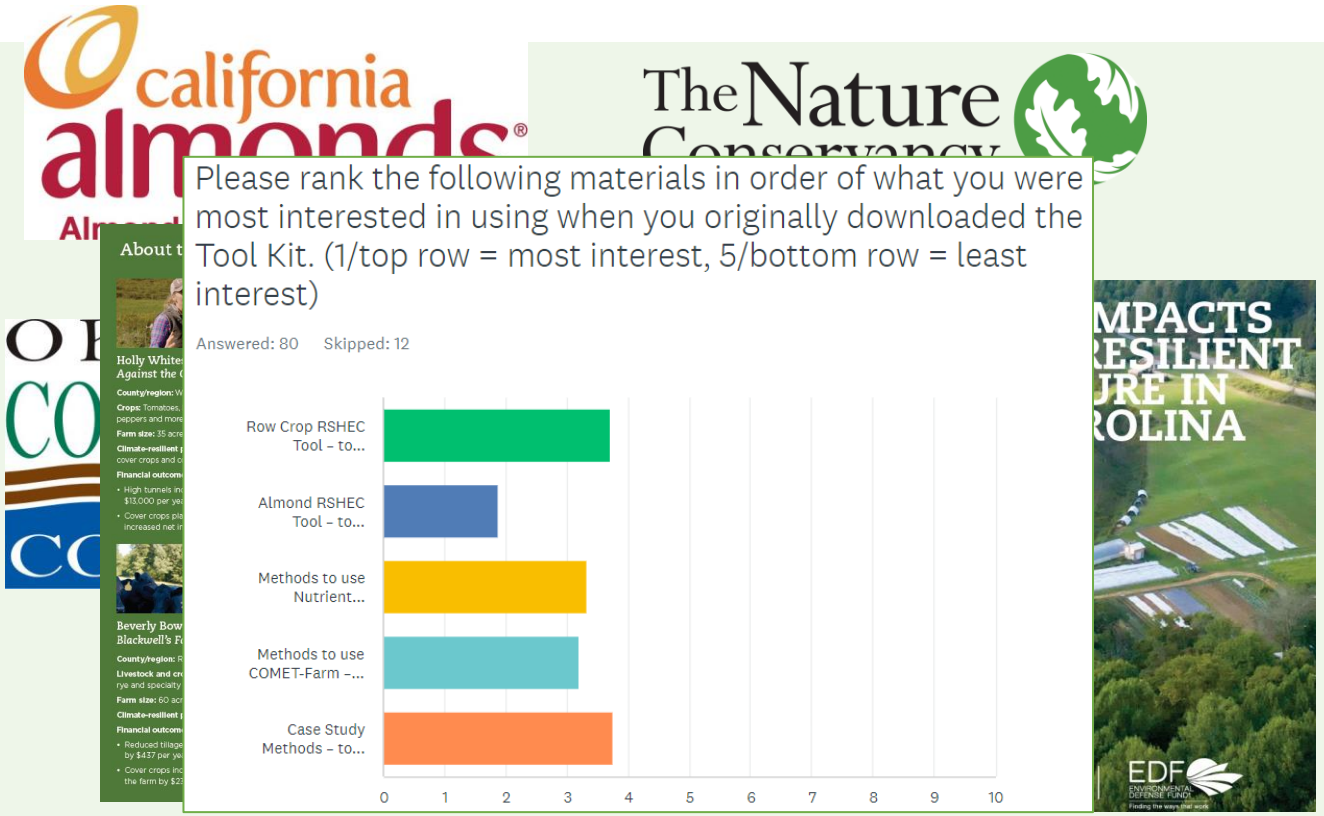
Water Quality Improvement:

- Nearly every row crop farmer mentioned *observing* reduced soil and water runoff from their fields due to the adoption of cover crops and/or reduced or no-till
- On selected fields for 14 row crop farms, NTT estimated reductions in:
  - N losses ranging from **22**% to **85**%
  - P losses ranging from **10**% to **96**%
  - Sediment losses ranging from **11**% to **99**%

- **Climate Improvement**:
  - On selected fields of 10 row crop farmers, COMET-Farm estimated total GHG emissions were reduced from **35**% to **560**%.
  - On selected fields of 4 other row crop farmers, COMET-Planner estimated a reduction of **21** to **302** tons CO_2e/yr.

Users of our R-SHEC Tool & Tool Kit

- Almond Board of California
- Oklahoma Conservation Commission
- The Nature Conservancy & Pennsylvania No-till Alliance co-branded and disseminate our ID & PA case studies
- Environmental Defense Fund modified RSHEC Tool to produce 3 soil health economic case studies
- Survey of downloaders of AFT Soil Health Case Study Tool Kit:
  - 91 respondents and 58 said they used the Tool Kit in some way



Other Soil Health Educational Resources

- NACD Soil Health Champions Network
- NACD & Datu Case Studies
- Soil Health Institute's Summary of Economics of Soil Health Systems on 30 US Farms
- Soil Health Institute's Economics of Soil Health Systems in Midwest Corn and Soy
- U. of Minnesota Extension Soil Health Case Studies
- USDA Northeast Climate Hub Soil Health Economic projects page

National Association of Conservation Districts

USDA

10th ANNIVERSARY SOIL HEALTH INSTITUTE

UNIVERSITY OF MINNESOTA EXTENSION

Photo by: William Thiele for the Thiele Dairy Farm Case Study (PA)

Download the Soil Health Case Study Tool Kit to use the R-SHEC Tool &/or develop case studies

https://farmland.org/soil-health-case-studies-methods/

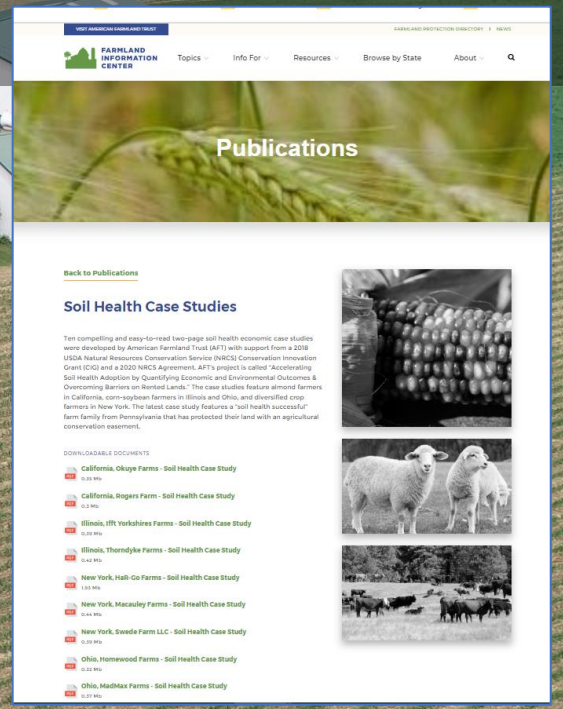
Keyword search:

"AFT Tool Kit"

"AFT RSHEC Tool"

"AFT soil health case studies"

"AFT economic case studies"



https://farmlandinfo.org/publications/soil-health-case-studies/

American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

Soil Health Stewards:
Promoting Soil Health on Protected Agricultural Lands

National Agricultural Land Network
A PROJECT OF AMERICAN FARMLAND TRUST

Develop key working relationships & study your outreach & education materials

Before you begin, reach out to your local conservation professionals so you can:

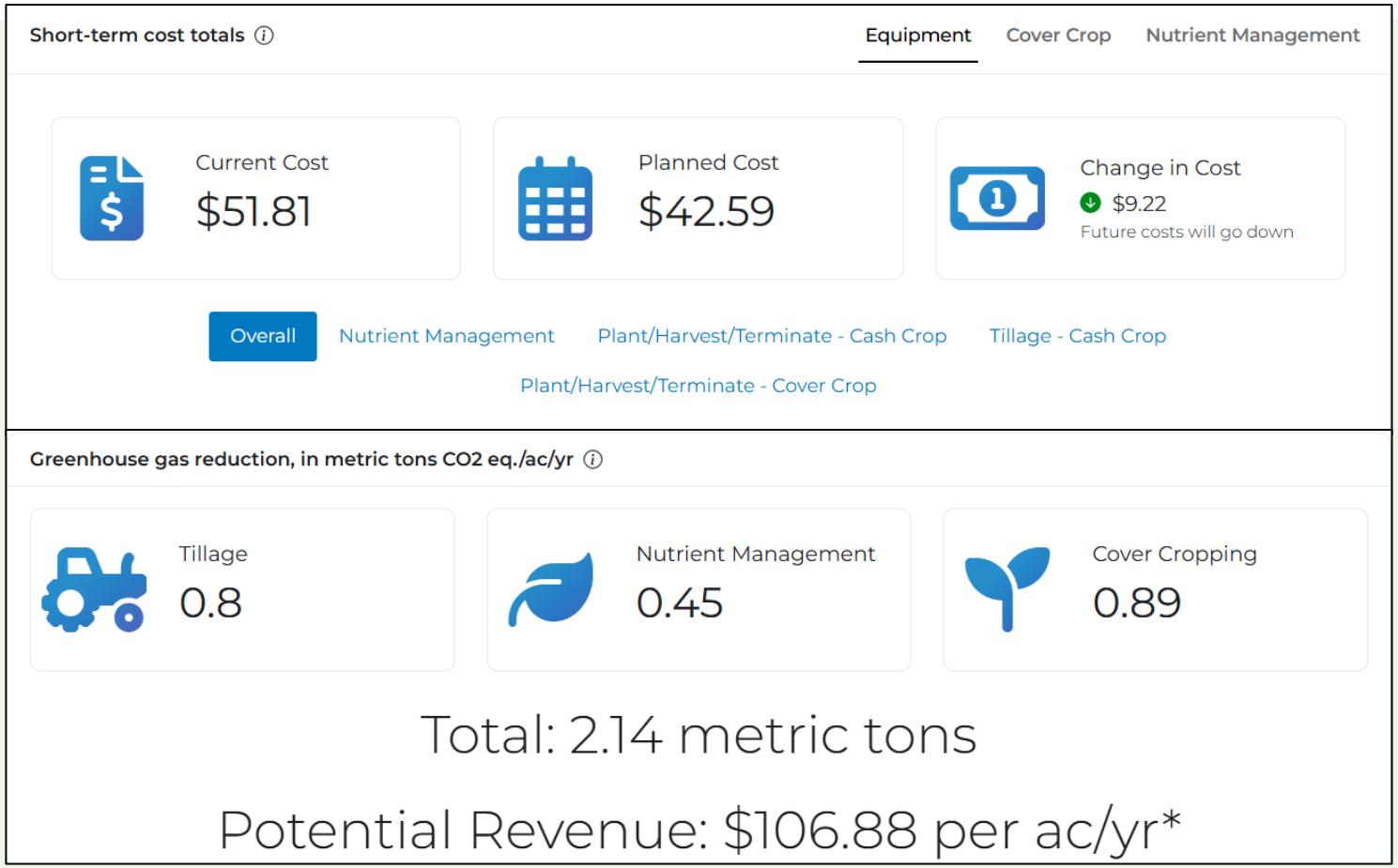
- Establish a working relationship with them
- Introduce them to your landowners & farmers to provide technical and financial assistance
- Share the economic case studies, factsheets, & ppts with them
- Encourage them to develop local case studies using the R-SHEC Tool Kit

Before you talk to FRPP farmers / landowners:

- Print AFT-NRCS case studies
- Print the power point slides to use as handouts:
  - Key AFT Case Study slides
  - Key “Amassing the Evidence" slides
  - Any other relevant resources AFT or others provided

Predictive Soil Health Economic Calculator (P-SHEC)

- **Goal:** Provide unique & value-added information to help farmers make more informed decisions on soil health practice adoption
- The tool will help farmers, conservation planners, & ag advisors predict the potential year 1 and cumulative 10-year costs & benefits from adopting SH practices



Let's collaborate!

More Case Study Materials

Email us to receive PowerPoint slide decks for each case study for use:
(a) one-on-one with farmers
(b) presenting at workshops, etc.

Produce a Case Study

Do you know a producer that would make a great case study? Let us know and let's figure out how to make it happen!

Pilot P-SHEC

Join us at the Demo Table to use Tool.
Share your feedback to make the tool better before public release!

ANYTHING ELSE

?????

Thank you!

Dr. Chellie Maples
Ag Economist
CMaples@Farmland.org

Dr. Michelle Perez
Water Initiative Director
MPerez@Farmland.org

BONUS SLIDES

Photo by: Abigal Brewer, featuring Tim Lyden walking his fields (featured in OH Lyden Farms Case Study)

5 Midwestern Soil Health Case Studies: Summary of Findings

(Updated September 2023)

5 Midwest Case Studies: Crops Grown & Soil Health Practices Analyzed

General Info		Crops			Practices			
Farm	State	Corn & Soybeans	Wheat	Hay	Strip -Till	No -Till	Cover Crops	Nutrient Management
Lyden Farms	OH	x	x	x		x	x	x
Homewood Farms	OH	x			x		x	x
MadMax Farms	OH	x				x	x	x
Ifft Farms	IL	x					x	x
Thorndike Farms	IL	x			x	x	x	x

5 Midwest Case Studies: Partial Budget Analysis Results Summarized

Variable	Results
Yield Change	Increased $14-151/ac/yr
Fertilize Costs	4 out of 5 farmers decreased costs
Tillage Costs	4 farmers decreased costs
Learning Costs	80-160 hrs each year
Net Income Change	Increased $23-$70/ac/yr

(Note: Green shading is a positive economic effect; Red shading is a negative economic effect.)

5 Midwest Case Studies: Environmental Analysis Results Summarized

Farm	State	Nutrient Tracking Tool Results			COMET Tool Results	
		N change	P Change	Sediment Change	GHG Change	Reduced Cars
Lyden Farms*	OH	79%	83%	97%	-	47
Homewood Farms	OH	35%	84%	99%	55%	7.5
MadMax Farms	OH	58%	74%	88%	494%	17
Ifft Farms	IL	23%	33%	37%	35%	8
Thorndyke Farms	IL	45%	89%	76%	192%	14

*Lyden Farm COMET results based on COMET-Planner (other farms' results from COMET-Farm)