

Outcomes Estimation Tools Training Webinar Series

**Featuring:
NRCs Cover Crop
Economics Tool**

**August 2, 2023
Noon to 1:30 pm eastern**

Michelle Perez, PhD **Aysha Tapp Ross**
Water Initiative Water & Soil
Director Health Scientist

Kinzie Reiss
Ag Conservation
Innovations Program &
Communications
Manager

Agenda



- Welcome, Poll (5 min)
- NRCS Cover Crops Economics Tool Presentation (35 min)
- NRCS Cover Crops Economics Tool Demonstration (35 min)
- Q&A (15 min)



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American Farmland Trust

Zoom Webinar Reminders

- Use Q&A Box - last 15 minutes (Vote up!)
- Use Zoom Direct Message feature to Kinzie if having technical difficulties
- Email with resources to follow each webinar
- Recordings posted on the webinar series site the following Monday
- Evaluation survey in the Chat Box



Time for 3 polls!

Tools in 2023 Trainings*

May 3: Webinar Launch & PCOC (recording)

June 7: Model My Watershed (recording)

July 12: Nutrient Tracking Tool (NTT) (recording)

August 2: NRCS Cover Crop Economics Tool (economic)

September 6: FieldPrint Platform (climate & water quality)

➔ October 4: EPA PLET (water quality)

November 1: PTMApp Web Tool (water quality)

➔ December 6: AFT Retrospective-Soil Health Economics (R-SHEC) Tool (economic)

Tools in 2024 Trainings*

January 10: SIPES Method/SIDMA Tool (social)

February 7: Fast-GHG (climate)

March 6: Cool Farm Tool (climate)

April 3: Cropping Systems Calculator (economic)

May 1: COMET-Farm & COMET-Planner (climate)

June 5: CAST Tool (water quality)

July 3: TBD

*Subject to change



United States
Department of
Agriculture



NRCS Cover Crops Economic Tool
Outcomes Estimation Tools Training Webinar Series
American Farmland Trust – August 2, 2023

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Bryon Kirwan USDA/NRCS

Central National
Agriculture Economist



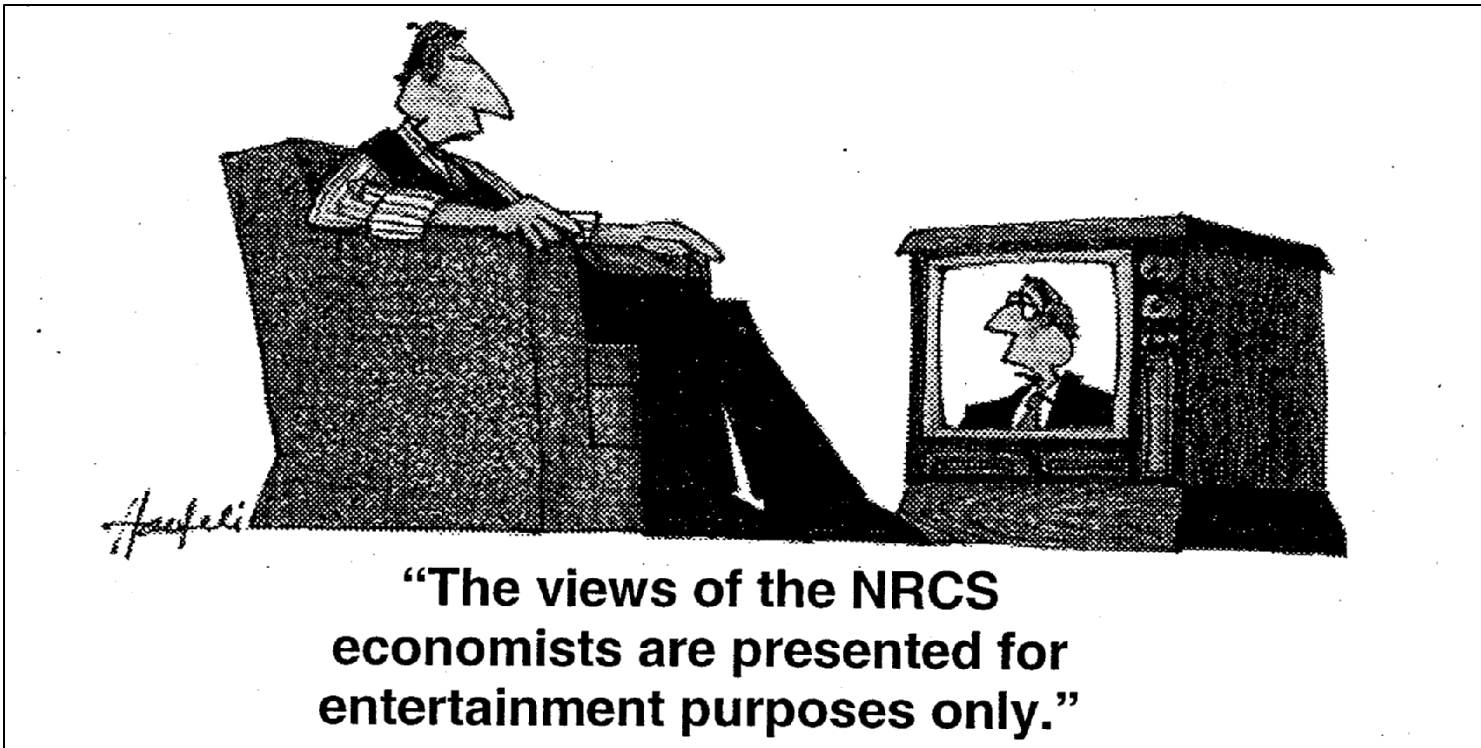
- BS, MS, MBA
- Multi Agency Experience
- Married 40 years
- 4th Generation Farmer
- Happy Motorcyclist

Thank you, Lauren!

- Lauren Cartwright, co-developer of the Cover Crop Decision Support Tool
- Provided great insights; Lauren's background in environmental science
- Excel programmer extraordinaire!



An important note...



Snap Shot of Features	Cover Crop Economics Tool
Scale & level of specificity	Farm level designed to measure the economic effect of cover crops on the individual farm and crop rotation. Tool is not geo-specific.
Outcomes	Economic and Financial evaluations of adding cover crop(s) to an existing crop rotation, focusing on those attributes which can be measured and monetized (\$/ac costs and benefits).
Conservation practices	Type of cover crop is only differentiated by cost of seed, planting type, termination type. Effects of cover crops on tillage, nutrient management, or herbicides can be evaluated.
Land uses & production systems	Land uses: Cropland & grazing land. Production systems: All commodity row crops & grazing livestock; has applicability in vegetable crops.
States & territories	CONUS only: Tool was extensively beta tested across the continental United States; Will beta-test it in AK, HI, and US territories.
How much time, data, & skills needed to generate an outcome estimate	Information needed on the common costs of production on an individual farm, the yields on the farm, utilization of livestock or not, and expected costs of cover crop seed, planting, & termination costs. Data runs are possible in 30 minutes or less with assembly of aforementioned data.

Strengths, Limitations, & Trade Offs of NRCS Cover Crop Economic Tool – Is this the Right Tool for You?

Strengths

- **Built for answering** “what if scenarios” for economic analysis – Application is farm-scale
- Could be used within a county or watershed-scale project to answer farmer questions about the costs & benefits of cover crops; which may get them to adopt
- **User friendly interface** – Download to excel is needed.
- **Used by many including universities**
- **National coverage** – Available in CONUS

Limitations

- Does not provide a county or watershed-scale project-level economic evaluation
- Not geographically-site specific; a generalized tool
- Focuses only on benefits & costs that accrue to producer &/or landowner; does not consider positive & negative externalities
- **Moderate data intensity** – Producer can easily override pre-loaded datasets to fit their operation

Tool Background

- Began work in 2012
- First released in 2014
- Has had 3 updates: v3.1; Last in 2018
- Emphasis on science and published literature for development
- Tool considers short run and long run effects
- Tool includes a literature and citations tab
- It all started to try and answer questions

Cover Crop - Cash Crop 1
Enter cash crop name (e.g. corn, soybeans, wheat):
soybean

Yield Units (e.g. bu, cwt, ton): bu
Baseline Yield (unit/ac): 45
Value of Crop 1 (\$/unit): \$10.00

Costs

Cover Crop Establishment and Management

*Refers to the cover crop that precedes cash crop 1 if applicable
(Use Text Box Below to enter description of cover crop utilized)*

cereal rye - if able to plant before Oct 1 use air fertilizer applicator, after Oct 1 use drill

Enter cover crop(s), rates and costs
(opens a window to enter 1 to 10 species and automatically enters the calculated seed cost below)

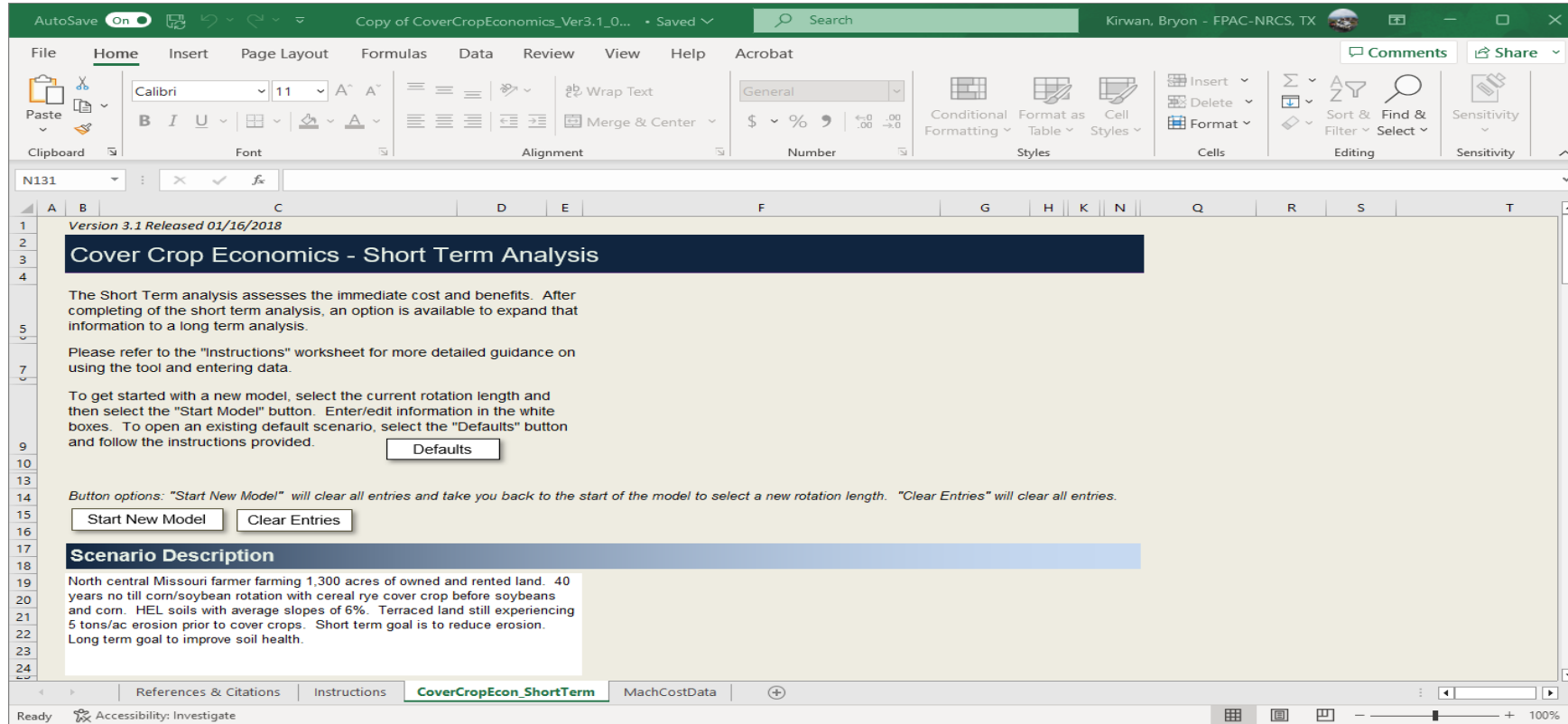
Calculated Seed Cost (\$/ac)	\$7.50
Planting Cost (\$/ac)	\$20.00
Termination cost (\$/ac) <input type="button" value="Calculate"/>	\$0.00
Increased management costs (\$/ac)	\$0.00
Total Costs Cover Crop Est. & Mgt. (\$/ac)	\$27.50

Widely utilized

- Agency CC Economic Tool
- Used in work by several Land Grant Universities
 - University of Illinois
 - Iowa State University
 - University of Minnesota
- Served as the basis for the AFT Retrospective Soil Health Economic Calculator (R-SHEC) & Predictive-SHEC Tools
- Numerous presentations and demonstrations
- Unknown number of citations

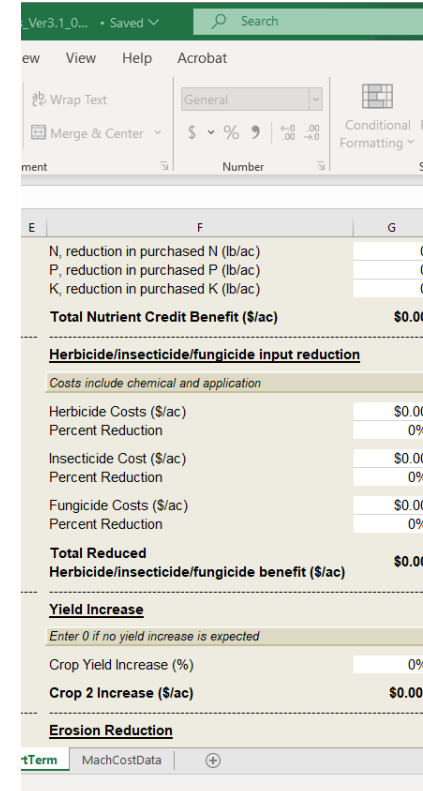


Tool Overview



What the tool is

- Excel-based
- Partial budget framework: “What changes?”
- User input based on operation
- Tool assesses profitability and affordability (economic analysis and financial analysis)
- Designed to be easy to use & able to run “what if’s” for comparison
- Focus on the costs and benefits realized by the producer/owner
- Focus on the benefits that can be easily measured and monetized



E	F	G
	N, reduction in purchased N (lb/ac)	0
	P, reduction in purchased P (lb/ac)	0
	K, reduction in purchased K (lb/ac)	0
	Total Nutrient Credit Benefit (\$/ac)	\$0.00
Herbicide/insecticide/fungicide input reduction		
<i>Costs include chemical and application</i>		
	Herbicide Costs (\$/ac)	\$0.00
	Percent Reduction	0%
	Insecticide Cost (\$/ac)	\$0.00
	Percent Reduction	0%
	Fungicide Costs (\$/ac)	\$0.00
	Percent Reduction	0%
	Total Reduced Herbicide/insecticide/fungicide benefit (\$/ac)	\$0.00
Yield Increase		
<i>Enter 0 if no yield increase is expected</i>		
	Crop Yield Increase (%)	0%
	Crop 2 Increase (\$/ac)	\$0.00
Erosion Reduction		
tTerm MachCostData +		

Time Matters



Short Term = immediate impact of adding cover crops to rotation

Long Term = Continued long term utilization of cover crops may lead to additional economic benefits over 10, 20, 30 years

What the tool is not

- The tool does not focus on externalities (e.g., changes in soil health; water quality changes)
- The tool does not look at policy and taxes
- Caution for cover crop promotion is warranted if using in arid the West due to moisture concerns



Thank you to Paul Mitchell, UWI

USDA United States Department of Agriculture

Soil Health Practices as a Farm Investment

- There are immediate costs, risk and uncertain long-term benefits
- The investment does not have a guaranteed payoff
- Find long-term users to show benefits, to inspire and maintain long-term investments by farmers

Money

Costs

Benefits

How Much?

How Big?

Time

How Long?

Source: adapted from [Meta-Economics-of-Cover-Crops2.pdf](#), Midwest Cover Crops Council

NRCS | SHD | Social & Economic Considerations | v2.0

Slide 10
4:43 PM

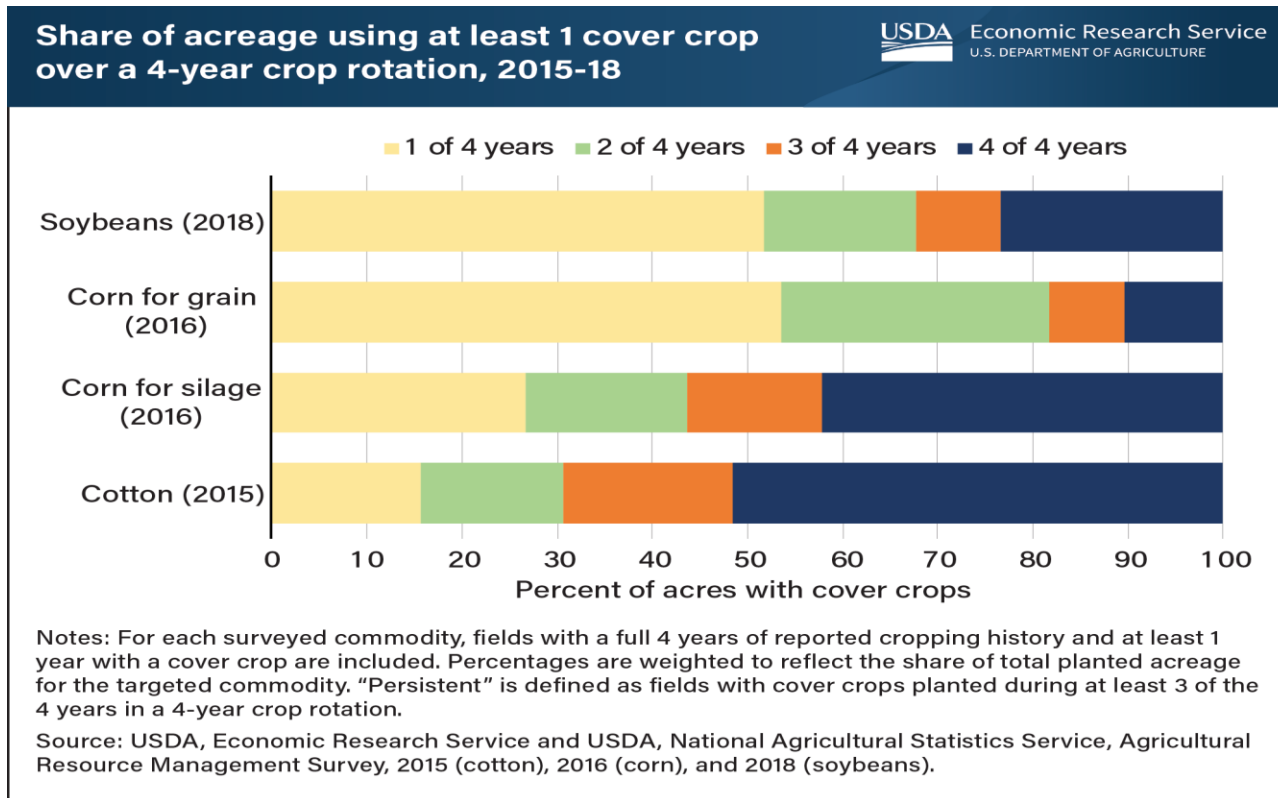
Structure of the tool

The tool is laid out in a logical order:

- Begin with costs
- Follow with benefits
- Look at results in short run
- Look at results over a long run



Costs



Establishment and Management Costs

Seeding Rate (lb/ac) * Seed Cost (\$/lb)
+ Planting Cost (\$/ac)
+ Termination Cost (\$/ac)
+ Increased Management Cost (\$/ac)



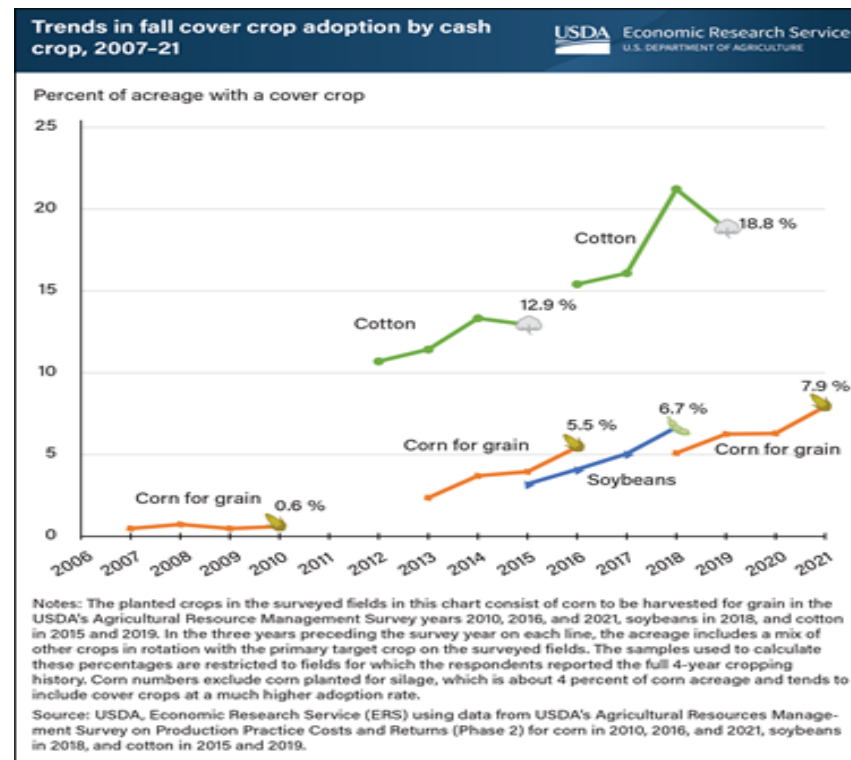
Yield effects?

If negative, they are a cost; if positive a benefit filled in later

Any miscellaneous costs to include

Whether this this affordable/profitable depends on the benefits...

Benefits





One benefit of cover crops: Having a living, growing crop in the soil at all times results in reduced erosion

The value of reducing soil erosion on farm may be captured in the value of lost fertility and/or the value of erosion repair



Grazing and Baling



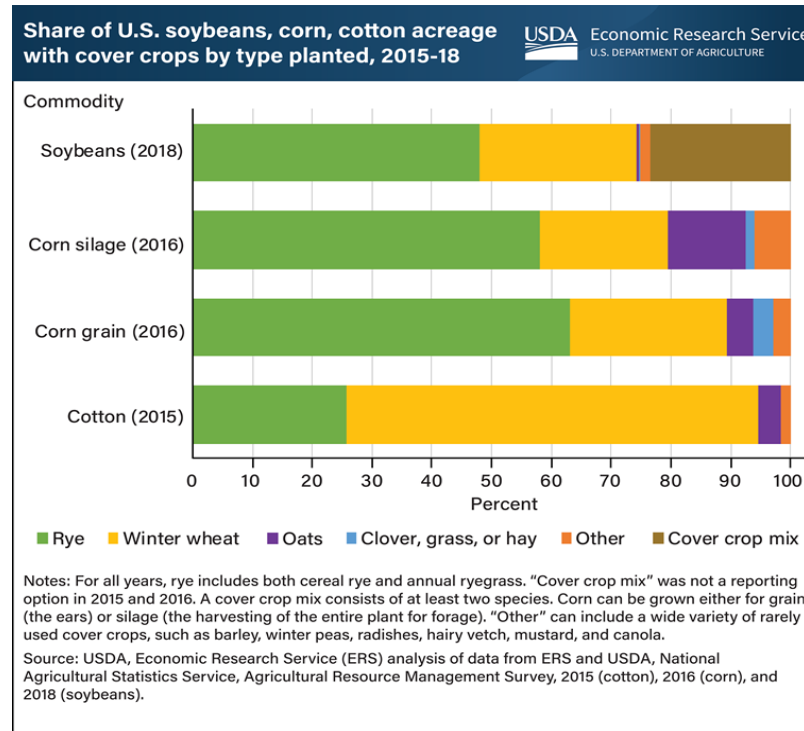
- **Baling** - Potential for harvesting cover crop growth as haylage or baleage

- **Grazing**

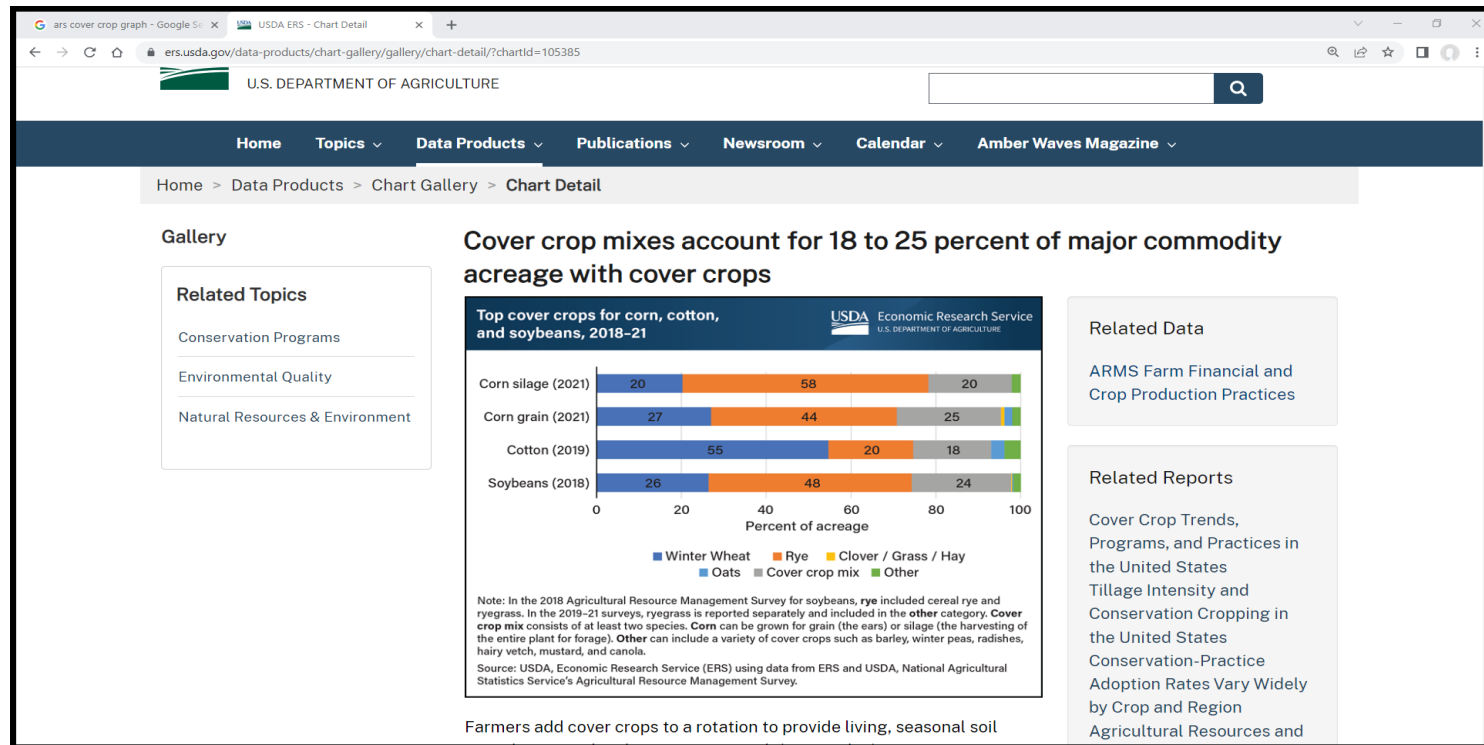
- Integrating grazing and crop production
- Interseeding cover crops into existing pasture to boost production
- Extend grazing into winter
- An alternative to hay feeding over winter, or increasing stocker returns

Other potential benefits

- Yield Increase
- Reduced herbicide use
- Lower equipment costs
- Other



Demo via powerpoint



The screenshot shows a web browser displaying the USDA ERS website. The main content area features a chart titled "Cover crop mixes account for 18 to 25 percent of major commodity acreage with cover crops". The chart is a stacked bar chart showing the percentage of acreage for four commodities: Corn silage (2021), Corn grain (2021), Cotton (2019), and Soybeans (2018). The categories are Winter Wheat, Rye, Clover / Grass / Hay, Oats, Cover crop mix, and Other.

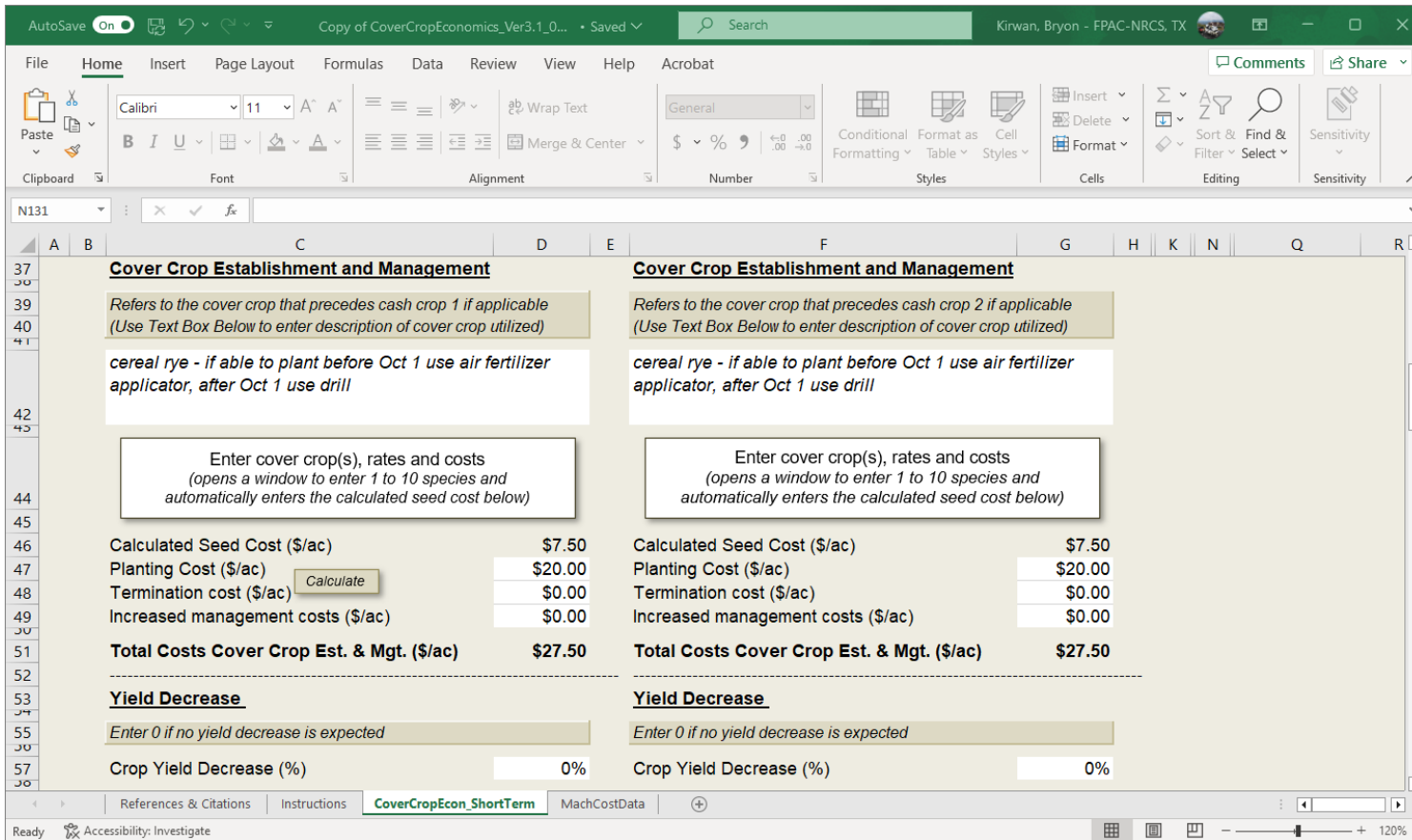
Commodity	Winter Wheat	Rye	Clover / Grass / Hay	Oats	Cover crop mix	Other
Corn silage (2021)	20	58	20	0	0	0
Corn grain (2021)	27	44	25	0	0	0
Cotton (2019)	55	20	18	0	0	0
Soybeans (2018)	26	48	24	0	0	0

Note: In the 2018 Agricultural Resource Management Survey for soybeans, rye included cereal rye and ryegrass. In the 2019-21 surveys, ryegrass is reported separately and included in the other category. Cover crop mix consists of at least two species. Corn can be grown for grain (the ears) or silage (the harvesting of the entire plant for forage). Other can include a variety of cover crops such as barley, winter peas, radishes, hairy vetch, mustard, and canola.

Source: USDA, Economic Research Service (ERS) using data from ERS and USDA, National Agricultural Statistics Service's Agricultural Resource Management Survey.

Farmers add cover crops to a rotation to provide living, seasonal soil

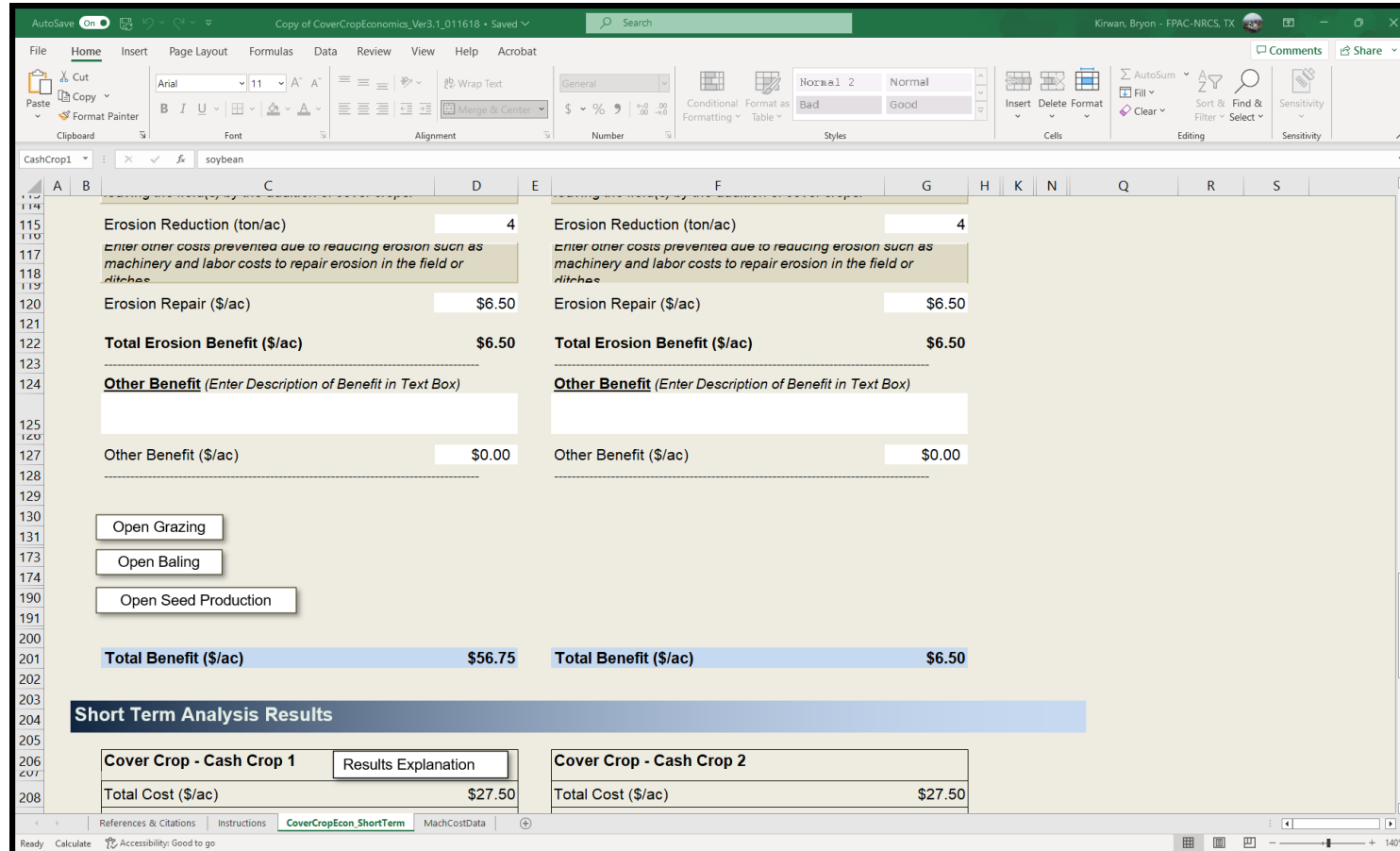
Data Entry



The screenshot shows an Excel spreadsheet with two columns of data entry for cover crop establishment and management. The spreadsheet is titled "Copy of CoverCropEconomics_Ver3.1_0..." and is open in Microsoft Excel. The ribbon shows the "Home" tab with various formatting options. The spreadsheet content is as follows:

	C	D	E	F	G
37	Cover Crop Establishment and Management		Cover Crop Establishment and Management		
39	Refers to the cover crop that precedes cash crop 1 if applicable (Use Text Box Below to enter description of cover crop utilized)		Refers to the cover crop that precedes cash crop 2 if applicable (Use Text Box Below to enter description of cover crop utilized)		
40	cereal rye - if able to plant before Oct 1 use air fertilizer applicator, after Oct 1 use drill		cereal rye - if able to plant before Oct 1 use air fertilizer applicator, after Oct 1 use drill		
42	Enter cover crop(s), rates and costs (opens a window to enter 1 to 10 species and automatically enters the calculated seed cost below)		Enter cover crop(s), rates and costs (opens a window to enter 1 to 10 species and automatically enters the calculated seed cost below)		
44					
45					
46	Calculated Seed Cost (\$/ac)	\$7.50	Calculated Seed Cost (\$/ac)	\$7.50	
47	Planting Cost (\$/ac)	\$20.00	Planting Cost (\$/ac)	\$20.00	
48	Termination cost (\$/ac)	\$0.00	Termination cost (\$/ac)	\$0.00	
49	Increased management costs (\$/ac)	\$0.00	Increased management costs (\$/ac)	\$0.00	
51	Total Costs Cover Crop Est. & Mgt. (\$/ac)	\$27.50	Total Costs Cover Crop Est. & Mgt. (\$/ac)	\$27.50	
52	-----		-----		
53	Yield Decrease		Yield Decrease		
55	Enter 0 if no yield decrease is expected		Enter 0 if no yield decrease is expected		
57	Crop Yield Decrease (%)	0%	Crop Yield Decrease (%)	0%	

Options in addition to crops

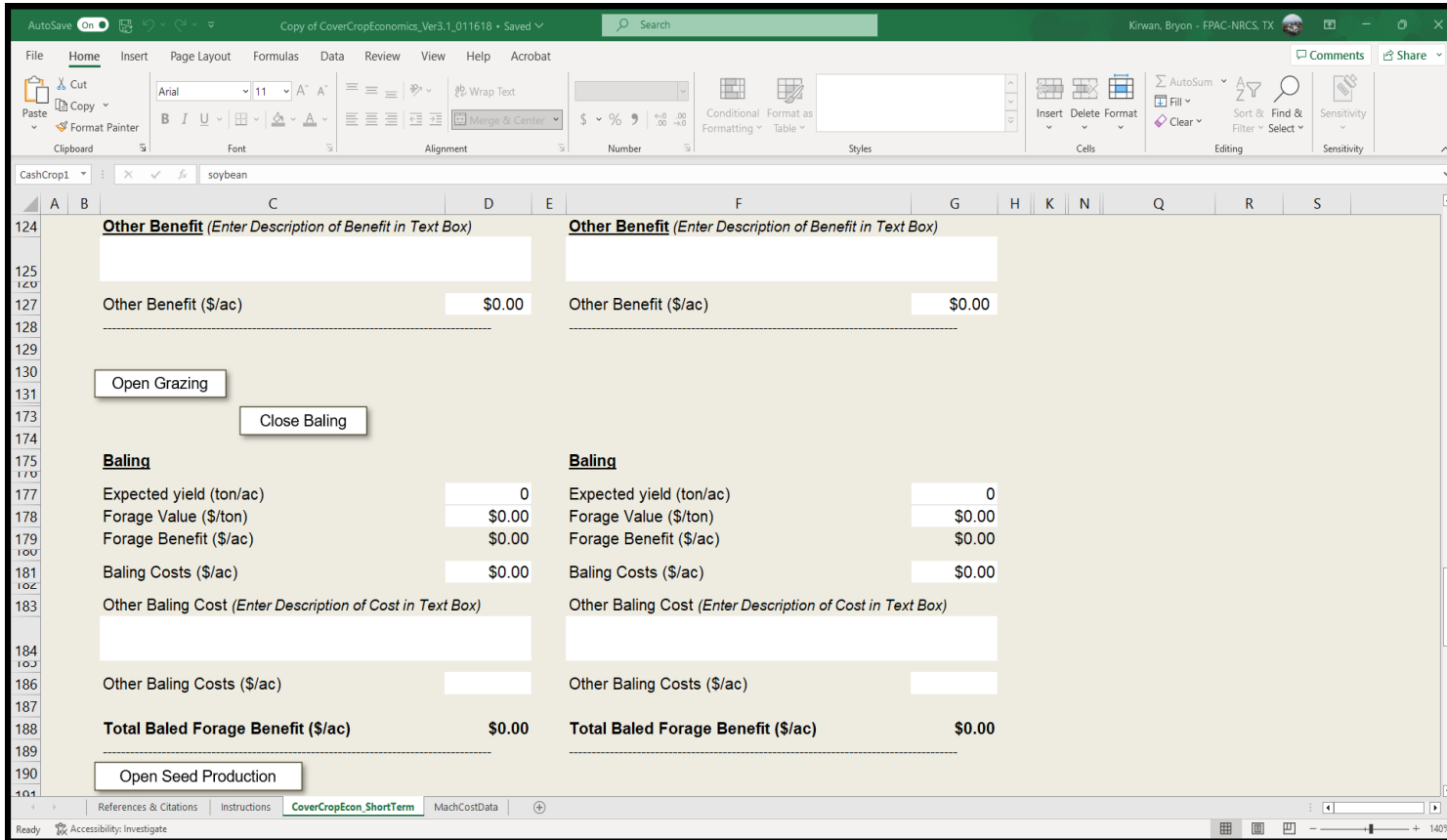


Option	Value
Erosion Reduction (ton/ac)	4
Erosion Repair (\$/ac)	\$6.50
Total Erosion Benefit (\$/ac)	\$6.50
Other Benefit (\$/ac)	\$0.00
Total Benefit (\$/ac)	\$56.75
Total Cost (\$/ac)	\$27.50

Short Term Analysis Results

Cover Crop - Cash Crop 1	Results Explanation	Cover Crop - Cash Crop 2
Total Cost (\$/ac)	\$27.50	Total Cost (\$/ac)
		\$27.50

Pop out box for baling



The screenshot shows an Excel spreadsheet with a 'Baling' section. The spreadsheet is titled 'Copy of CoverCropEconomics_Ver3.1.011618 - Saved'. The 'Baling' section is located in the lower half of the spreadsheet, starting at row 175. It contains two columns of data, with the right column currently showing zero values. The 'Baling' section includes the following rows:

Row	Column 1	Column 2
175	Baling	Baling
177	Expected yield (ton/ac)	0
178	Forage Value (\$/ton)	\$0.00
179	Forage Benefit (\$/ac)	\$0.00
181	Baling Costs (\$/ac)	\$0.00
183	Other Baling Cost (Enter Description of Cost in Text Box)	
186	Other Baling Costs (\$/ac)	
188	Total Baled Forage Benefit (\$/ac)	\$0.00

Buttons are present in the spreadsheet:

- 'Open Grazing' button at row 130, column C.
- 'Close Baling' button at row 173, column D.
- 'Open Seed Production' button at row 190, column C.

Short Term Analysis

Short Term Analysis Results

Cover Crop - Cash Crop 1	Results Explanation
Total Cost (\$/ac)	\$27.50
Total Benefit (\$/ac)	\$56.75
Net Benefit (\$/ac)	\$29.25

Cover Crop - Cash Crop 2	
Total Cost (\$/ac)	\$27.50
Total Benefit (\$/ac)	\$6.50
Net Benefit (\$/ac)	-\$21.00

Average Annual Rotation Net Benefit (\$/ac)	\$4.13
---	--------

Average Annual Rotation Net Benefit calculates the average annual net benefit over the rotation length. Calculation removes up front grazing infrastructure costs if included in the model.

Continue to Long Term Analysis

Comparing net effect of cover crop use on a 2-crop rotation

Timeframe importance

The long term analysis assumes the continued utilization of cover crops modeled in the short term analysis, and also captures additional benefits that may be realized over time with the continued use of cover crops in rotation. Refer to the "Instructions" worksheet and "References and Citations" worksheet for more information and guidance on entering the long term variables.

General Information

The lifespan refers to the length of time being analyzed and assumes a continued use of cover crop in the farming rotation, based on the information entered into the Short Term Analysis.

Analysis Lifespan (years) - up to 50 years	30
Discount Rate	3%
Current Soil Organic Matter (SOM) (%)	2
Estimate of years of mgmt change to increase SOM 1%	10
Estimate of maximum potential SOM (%)	6

30
3%
2
10
6



The Analysis Lifespan (years) must be greater than the Estimate of years of mgt change to increase SOM 1% in order for the long term analysis results to begin capturing the long term benefits.

Determine lifespan of analysis

Results of Long-term Analysis

Analysis Results

**Profitability versus Affordability:
(Economic versus Financial Analysis)**

The Economic Analysis Results compares the amortized costs and benefits and answers the question: Is this management change profitable over the lifespan of the analysis? The answer is yes if the Net Benefits (\$/ac/yr) is positive. The Net Benefits equals the total amortized benefits minus total amortized costs. If the Economic Analysis Net Benefits result is negative, then this is not a good investment overall economically.

The Financial Analysis Results answers the question: Is this management change affordable? Depending on the variables in the model, on a year to year basis there may be a negative net benefit, especially in the first few years of utilizing cover crops in the rotation until the longer term soil benefits are realized. In a partial budget frameworks, such as this analysis, a short term negative net benefit indicates the cost of the investment in the soil in order to benefit from the long term benefits of improved soil health. The producer can use this analysis to determine if he/she can afford this investment, or use the model to assess alternative to make the investment more affordable for the operation.

Economic Analysis Results:

Summary:	
Analysis Lifespan (years)	30
Short Term Benefits (\$/ac/yr)	\$32.08
Long Term Benefits (\$/ac/yr)	\$16.52
Total Costs (\$/ac/yr)	\$27.54
Total Benefits (\$/ac/yr)	\$48.60
Net Benefits (\$/ac/yr)	\$21.06

Financial Analysis Results:

Year	Costs (\$/ac)	Benefits (\$/ac)	Net Benefit (\$/ac)	Avg Annual Rotation Net Benefit (\$/ac)
1	\$27.50	\$56.75	\$29.25	\$4.13
2	\$27.50	\$6.50	-\$21.00	\$4.13
3	\$27.50	\$56.75	\$29.25	\$4.13
4	\$27.50	\$6.50	-\$21.00	\$4.13
5	\$27.50	\$56.75	\$29.25	\$4.13
6	\$27.50	\$6.50	-\$21.00	\$4.13
7	\$27.50	\$56.75	\$29.25	\$4.13
8	\$27.50	\$6.50	-\$21.00	\$4.13
9	\$27.50	\$56.75	\$29.25	\$4.13
10	\$27.50	\$6.50	-\$21.00	\$4.13
11	\$27.50	\$77.25	\$49.75	\$24.63
12	\$27.50	\$27.00	-\$0.50	\$24.63

Menu Options:

View Graphs

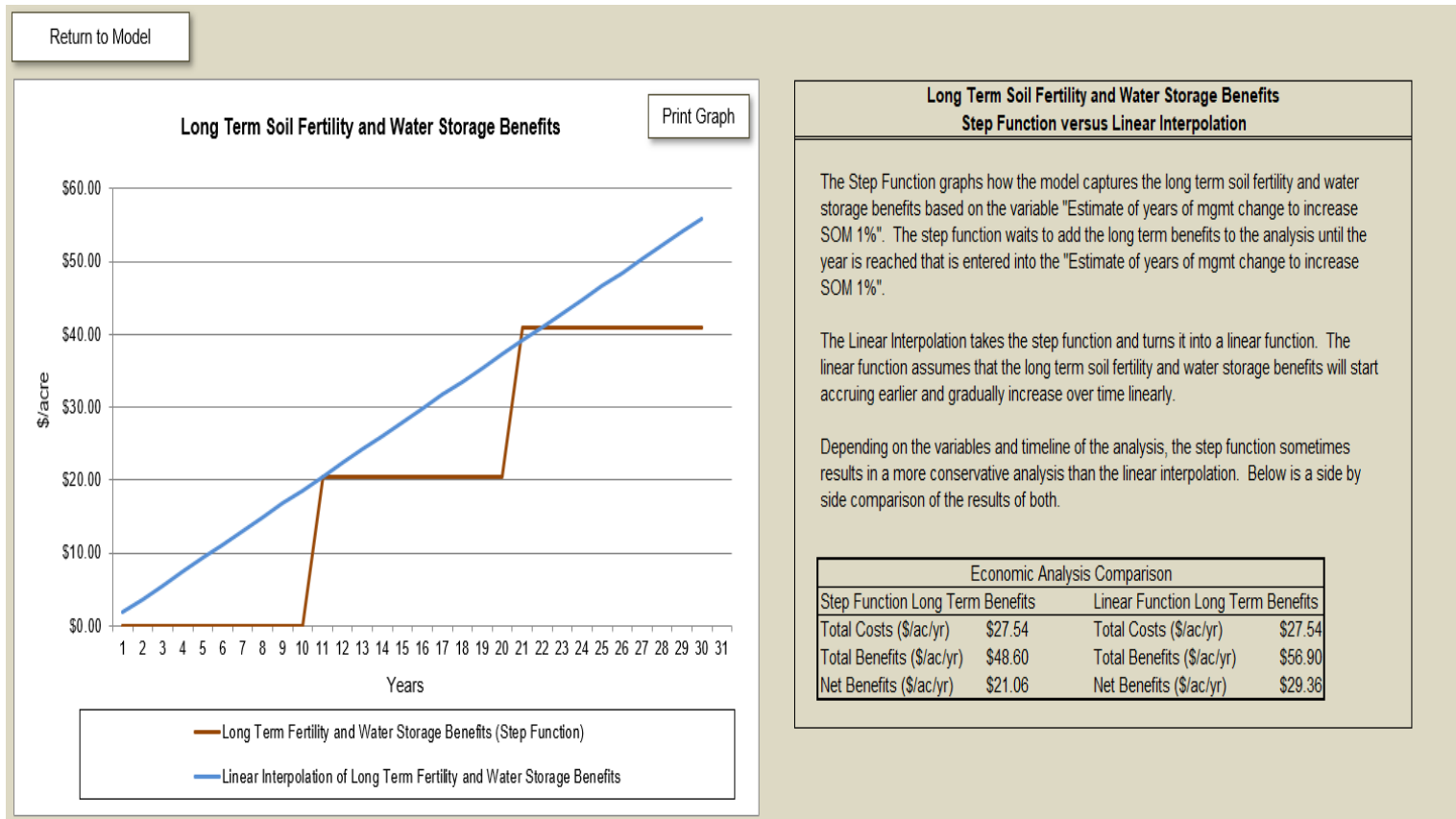
View Print Summary

Save Model

Manage Default Scenarios

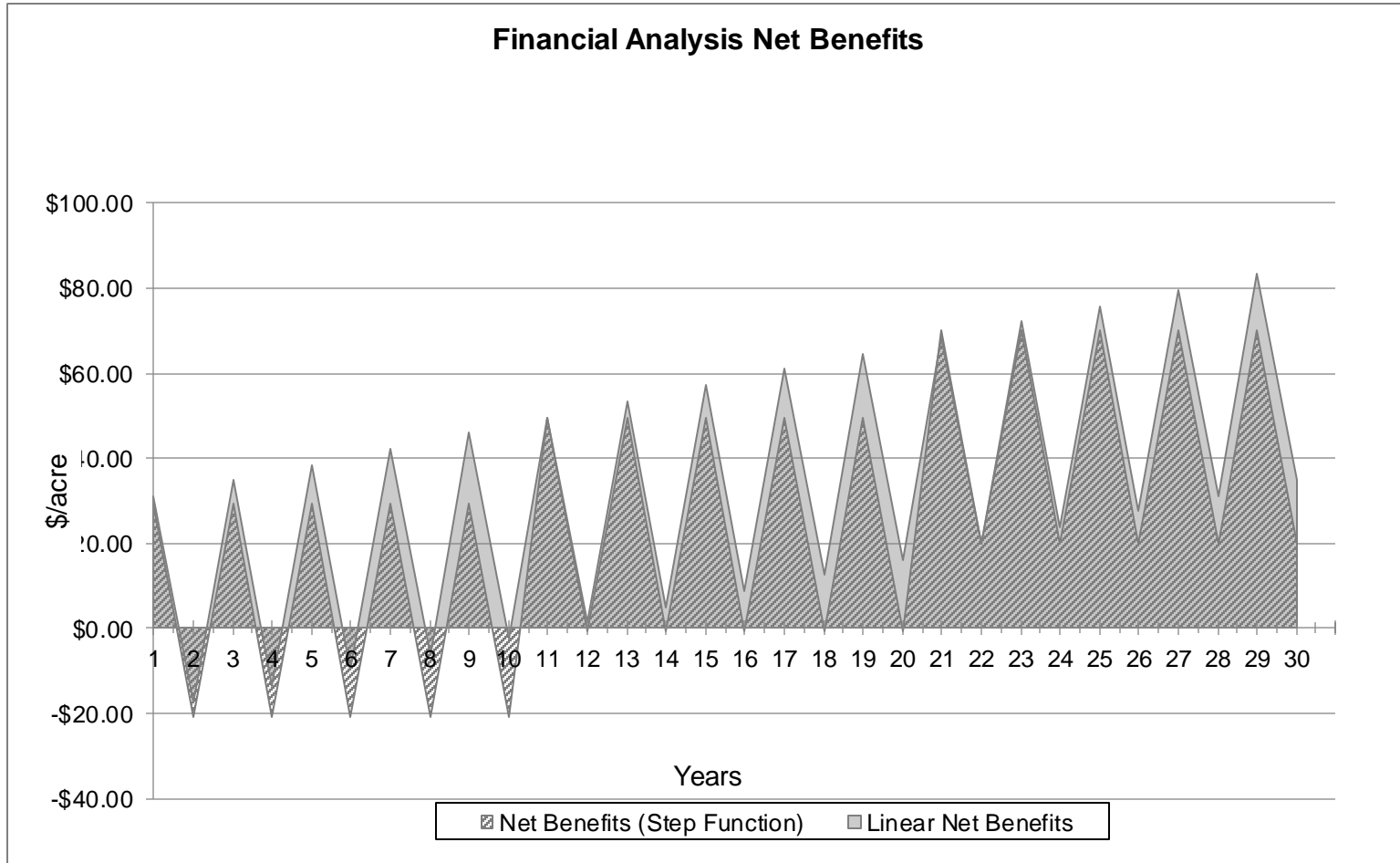
Return to Short Term Analysis

Graphical Results



Expected response rate is likely somewhere in between the linear & step-function graphs

Sample long term financial analysis from the Tool: Potential financial impact over a long horizon



Take Home Messages...

- Assessing the costs and benefits of adding cover crops into a farming operation is an important part of the decision-making process
- Focus on what changes
- The costs and benefits are highly variable by operation and cover crops selected





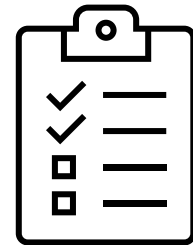
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Next steps in our outcomes estimation journey

- Join September 6 for the FieldPrint Platform Tool
- Fill out the 6-question (2-min) online evaluation survey
- Schedule a free “coaching” session with us
 - Email atappross@farmland.org, RE: Coaching Request
- Order a free print copy of the OET Guide
 - Keyword: “AFT outcomes tools”



*Please keep in touch:
outcomestools@farmland.org*