

ECONOMICS of Soil Health Systems

Duck Creek Watershed of Oklahoma



FARM SIZE

3,000 acres
Pasture:
500 acres
100 brood cows in
cow-calf operation



CROPS GROWN

Soybean and grain
sorghum



SOIL TEXTURE

Loam



SOIL HEALTH MANAGEMENT SYSTEM

No-till production
Cover crops
Soils amended with
poultry litter



NET INCOME INCREASE

Soybean
\$1.33/acre
Grain sorghum
\$18.51/acre

INTRODUCTION

The Rick Jeans farm in the Duck Creek Watershed of Oklahoma increased profitability by decreasing production costs and adding grazing value with a soil health management system (SHMS) of no-till production and cover crops. The farm has practiced no-till production for approximately 30 years and planted cover crops for seven years.

Benefits of the SHMS reported by the farmer:



→ IMPROVED WATER INFILTRATION

→ DECREASED EROSION

→ IMPROVED SOIL BIOLOGY

ADDITIONAL INFORMATION ON THE FARM IS AVAILABLE IN A REPORT AND VIDEO PRESENTATION AT WWW.NACDNET.ORG/SOIL-HEALTH-ECONOMICS.

METHODS

The Soil Health Institute conducted an interview to obtain production information for evaluating economics of the soil health system based on partial budget analysis. In this approach, the benefits and costs of a soil health system are assessed by calculating changes in revenue and expenses before and after adoption of that system. The change in net farm income associated with adopting a SHMS is calculated as shown below and presented in Table 1.



Net change in farm income = Benefits - Costs, where:
Benefits = Reduced Expenses + Additional Revenue
Costs = Additional Expenses + Reduced Revenue

A DETAILED DESCRIPTION OF THE METHODOLOGY FOR PARTIAL BUDGET ANALYSIS CAN BE FOUND AT [HTTPS://SOILHEALTHINSTITUTE.ORG/ECONOMICS](https://soilhealthinstitute.org/economics).

FINDINGS

Initial Management System and Reduced Expenses

- The initial management system was conventional tillage production.
- Post-plant weed management was exclusively with herbicide in conventional tillage.
- Field activities and inputs for wheat were not changed due to adoption of no-till practices.
- Two disc field trips and one operation with a field cultivator were eliminated before planting both soybean and grain sorghum.
- One post-plant herbicide application was eliminated for soybean.
- Total reduced expenses were \$55.94/acre for soybean and \$33.93/acre for grain sorghum.

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Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till with cover crops planted before grain sorghum.
- Cover crops were planted between two consecutive years of grain sorghum production.
- The \$20.00/acre seed mix included wheat, oat, triticale, barley, radish, soybean, and turnip.
- Cover crops were drilled with a no-till air seeder after grain sorghum harvest.
- Cattle grazed on cover crops between consecutive years of grain sorghum production.
- Grain sorghum was planted without termination of the grazed cover crop.
- Cattle grazed on post-harvest grain sorghum stubble in years before soybean was planted.
- A pre-plant herbicide spray and a post-plant herbicide spray were added for soybean.
- Total additional expenses were \$54.61/acre for soybean and \$42.92/acre for grain sorghum.

Soil Health Management System Impact on Farm Income

- Reduced expenses were \$1.33/acre greater than additional expenses for soybean.
- Reduced expenses were \$8.99/acre less than additional expenses for grain sorghum.
- Grazing of cover crops valued as \$27.50/acre was based on available grazing days.
- The SHMS was implemented without reductions in soybean or grain sorghum yields.
- **Net farm income increased \$1.33/acre for soybean and \$18.51/acre for grain sorghum.**

Table 1. Partial Budget¹ Analysis, 30 Years with a Soil Health Management System on a 3,000-Acre Farm, \$ per Acre per Year (2019 Dollars).

Expense Category	Soybean		Grain Sorghum	
	BENEFITS	COSTS	BENEFITS	COSTS
	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	0.00	0.00	20.00
Fertilizer & Amendments	0.00	0.00	0.00	0.00
Pesticides	18.00	34.50	0.00	0.00
Fuel & Electricity	4.82	1.65	4.51	2.41
Labor & Services	10.34	6.31	9.21	7.59
Equipment Ownership	22.78	12.15	20.21	12.92
Total Expense Change	55.94	54.61	33.93	42.92
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield bu./acre	0.00	0.00	0.00	0.00
Price Received, ² \$/bu.	10.00	10.00	3.90	3.90
Grazing	00.00	00.00	27.50	0.00
Revenue Change	00.00	0.00	27.50	0.00
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
Total Change	55.94	54.61	61.43	42.92
Change in Net Farm Income	1.33		18.51	

¹ Expenses and expected yields based on farmer reported production practices. (<https://soilhealthinstitute.org/economics/>)

² Commodity prices applied to yields based on long-term average prices. Irwin, S. "IFES 2018: The New, New Era of Grain Prices?" Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 11, 2019.