ECONOMICS of Soil Health Systems

Salmon Falls Watershed of Idaho

FARM SIZE
3,800 crop acres

CROPS GROWN
- Corn 1,500 acres
- Dry Bean 500 acres
- Alfalfa 500 acres
- Wheat 1,000 acres
- All irrigated

SOIL TEXTURE
Silt loam

SOIL HEALTH MANAGEMENT SYSTEM
- No-till production
- Cover crops
- Wheat-corn-dry bean rotation
- Local manure for some nutrients
- Monitoring of soil nutrient levels

NET INCOME CHANGE
- Corn $114.09/acre
- Dry Bean -$6.45/acre

INTRODUCTION
The Lance Griff farm in the Salmon Falls Watershed of Idaho increased profitability for corn and dry bean by decreasing average farm production costs and increasing corn yield with a soil health management system (SHMS) of no-till production and cover crops. No-till production and cover crops were initiated in 2013 and increased incrementally.

Benefits of the SHMS reported by the farmer:
- IMPROVED WATER INFILTRATION
- REDUCED IRRIGATION WATER REQUIREMENTS
- LESS SOIL COMPACITION
- DECREASED PEST PRESSURE FROM INSECTS
- INCREASED SOIL ORGANIC MATTER

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 in 2020 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.

FINDINGS

Initial Management System and Reduced Expenses
- The initial management system was conventional tillage production.
- Wheat production was not changed by adoption of no-till practices.
- Four tillage operations were eliminated before planting both corn and dry bean.
- Two tillage operations were eliminated after planting dry bean.
- Nitrogen was reduced 80 lbs./acre applied as UAN 32% during fertigation of corn.
- Irrigation reductions were four applications for corn and two applications for dry bean.
- An insecticide spray for aphids was eliminated for corn.
- Total reduced expenses were $101.98/acre for corn and $62.51/acre for dry bean.
Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till production with cover crops before planting corn.
- In addition to volunteer wheat from a previous winter wheat crop, cover crops consisting of radish and turnip were drilled after harvest of the previous crop.
- Cover crop seed costs were $25.00/acre, and custom application was $18.00/acre.
- Cover crops were terminated with herbicide before planting corn.
- Dry bean additional herbicide expenses were $52.03/acre.
- Post-harvest expenses due to increased corn yield were hauling, drying, and check-off fee.
- Total additional expenses were $84.49/acre for corn and $68.96/acre for dry bean.

Soil Health Management System Impact on Farm Income

- Reduced expenses were $17.49/acre greater than additional expenses for corn.
- Reduced expenses were $6.45/acre less than additional expenses for dry bean.
- Yield increased 23 bu./acre, and additional revenue was $96.60/acre for corn.
- The SHMS was implemented without a reduction in dry bean yield.
- Net farm income increased $83.96/acre for corn and dry bean in a 75%-25% rotation.

Table 1. Partial Budget\(^1\) Analysis, 6 Years with a Soil Health Management System on a 3,800-Acre Farm, $ per Acre per Year (2019 Dollars).

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Corn BENEFITS</th>
<th>Corn COSTS</th>
<th>Dry Bean BENEFITS</th>
<th>Dry Bean COSTS</th>
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<tbody>
<tr>
<td></td>
<td>REDUCED EXPENSE</td>
<td>ADDITIONAL EXPENSE</td>
<td>REDUCED EXPENSE</td>
<td>ADDITIONAL EXPENSE</td>
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<tr>
<td>Seed</td>
<td>0.00</td>
<td>25.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Fertilizer &amp; Amendments</td>
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<td>Pesticides</td>
<td>4.68</td>
<td>10.64</td>
<td>0.00</td>
<td>52.03</td>
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<tr>
<td>Fuel &amp; Electricity</td>
<td>12.27</td>
<td>1.34</td>
<td>11.26</td>
<td>1.34</td>
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<tr>
<td>Labor &amp; Services</td>
<td>16.87</td>
<td>24.06</td>
<td>16.77</td>
<td>6.02</td>
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<td>Post-harvest Expenses</td>
<td>0.00</td>
<td>13.88</td>
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<tr>
<td>Equipment Ownership</td>
<td>30.57</td>
<td>9.57</td>
<td>34.48</td>
<td>9.57</td>
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<tr>
<td><strong>Total Expense Change</strong></td>
<td><strong>101.98</strong></td>
<td><strong>84.49</strong></td>
<td><strong>62.51</strong></td>
<td><strong>68.96</strong></td>
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<table>
<thead>
<tr>
<th></th>
<th>ADDITIONAL REVENUE</th>
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<th>ADDITIONAL REVENUE</th>
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<tr>
<td>Yield, bu./acre</td>
<td>23.00</td>
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<td>0.00</td>
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<td>Price Received,(^2) $/bu.</td>
<td>4.20</td>
<td>52.03</td>
<td>1.34</td>
<td>1.34</td>
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<tr>
<td><strong>Revenue Change</strong></td>
<td><strong>96.60</strong></td>
<td><strong>84.49</strong></td>
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<td><strong>68.96</strong></td>
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<table>
<thead>
<tr>
<th></th>
<th>TOTAL BENEFITS</th>
<th>TOTAL COSTS</th>
<th>TOTAL BENEFITS</th>
<th>TOTAL COSTS</th>
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</thead>
<tbody>
<tr>
<td><strong>Total Change</strong></td>
<td><strong>198.58</strong></td>
<td><strong>84.49</strong></td>
<td><strong>62.51</strong></td>
<td><strong>68.96</strong></td>
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<tr>
<td><strong>Change in Net Farm Income</strong></td>
<td><strong>114.09</strong></td>
<td><strong>-6.45</strong></td>
<td><strong>-6.45</strong></td>
<td><strong>-6.45</strong></td>
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</tbody>
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\(^1\) Expenses and expected yields based on farmer reported production practices. ([https://soilhealthinstitute.org/economics/](https://soilhealthinstitute.org/economics/))