2009 Cost of Producing Alfalfa Hay Under Center Pivot Irrigation in the Columbia Basin of Washington State
Cover photo: Marlin E. Rice, Iowa State University
INTRODUCTION

The enterprise budgets presented in this publication are based on alfalfa produced on irrigated land in the Bureau of Reclamation’s Columbia Basin Project. The project area is in the Big Bend of the Columbia River in south central Washington. Since rainfall ranges from 6 to 10 inches annually here, crops depend on irrigation water pumped from behind the Grand Coulee Dam. Irrigation water availability coupled with a growing season of 150 to 200 days make it possible to grow numerous crops.

Alfalfa hay is one of the most important agricultural crops grown in the Columbia Basin. The combined irrigated production of Adams, Benton, Franklin, Grant, and Yakima counties in 2006 totaled 1.6 million tons valued at greater than $205 million, 51.5% of Washington State’s total production of alfalfa hay.\(^2\)

The goal of this study was to develop enterprise budgets for production of both 1-ton and 80-lb (2-tie) alfalfa bales under two different assumptions: harvesting operations performed by custom operators and harvesting operations performed by owner-operators. The specific objectives include:

1. Describe production practices representative of well-managed alfalfa enterprises grown under center pivot irrigation systems within the Columbia Basin from Stratford south to the Tri-Cities.

2. Provide estimates of capital requirements, production costs, and returns.

3. Present procedures for analyzing the potential profitability of growing alfalfa hay for current and prospective producers.

BUDGET ASSUMPTIONS

The following assumptions were made in developing the alfalfa enterprise budgets:

1. Alfalfa is grown under one or more 125-acre center pivot irrigation systems.

2. The land rental rate is $400/acre. (Rental rates can be changed in the accompanying spreadsheet budget.)

3. The landowner furnishes the center pivot irrigation system while the operator pays an irrigation charge of $45 per acre and annual repairs of $25 per acre per year. The operator also pays an irrigation power charge of approximately $48 per acre for pumping out of the irrigation canal. (Power costs are higher for those producers pumping from deep wells.)

4. Labor for irrigation takes 0.85 hours per acre per year.

5. All labor costs are $20.00/hour. (This value can be changed in the accompanying spreadsheet.)

6. The annual yield is 8 tons per acre and there are four cuttings of hay per year.

7. Hay prices received at the farm are $200/ton for large 1-ton bales and $220/ton for the smaller (2-tie) bales. (These prices can be changed in the accompanying spreadsheet. Breakeven prices at differing yield levels and breakeven yields at differing

\(^1\)Authorship is equally shared among the four authors, all formerly or currently at Washington State University: Herbert Hinman (retired) was an Extension Economist; John Kugler (retired) was an agronomy educator for Grant and Adams counties; Kate Painter was an analyst for the Center for Sustaining Agriculture and Natural Resources; and Phil Petersen is an agronomy educator for Franklin County.

\(^2\)2007 Washington Agricultural Statistics.
price levels are presented at the end of each enterprise budget.)

8. The interest rate is 7.5% for operating loans, machinery loans, and the use of equity capital. (The interest rate on operating loans and equity operating capital can be changed in the spreadsheet.)

9. After the establishment year, there are three more years of alfalfa production.

SOURCES OF INFORMATION AND BUDGET RESULTS

Columbia Basin producers considered representative of well-managed farms provided the data for this study. Local farm service agencies and farm suppliers provided service and material costs. Machinery costs for crop establishment and production were based on current purchase prices and current custom rates as of September 2008.

The budgets reported in this study are economic in that all opportunity costs are included. This means that interest is charged for both borrowed and equity-financed capital. In addition, labor and management charges are applied to unpaid operator labor and management. Since much of the land used for production is rented, typical cash rent in this growing region is used to determine the charges for land and use of the center pivot irrigation system. Even if growers were to produce a crop on land they own, the prevailing rental rate represents an opportunity cost or foregone return for not renting out the land and center pivot system.
Alfalfa can be produced by hiring a custom haying operator to cut, rake, swath, bale, and stack the hay. Alternatively, producers may perform all the haying operations themselves using their own equipment. Some producers contract only certain haying operations. These choices depend on the types of labor, management, and machinery available on each farm. The costs of producing alfalfa for the first two types of operations are presented here.

Producers may look at the results of this study and say that they can farm less expensively because they own their land, provide much of the labor, all the management, and pay little or no interest. However, if operators do not take fair compensation into consideration for their investments in the alfalfa production process, they are not getting an accurate assessment of its costs and profitability. Returns over and above the costs reported in an economic budget are considered profit, or compensation for taking the risk of producing alfalfa.

In order for producers to convert these economic budgets to financial budgets that reflect their actual cash costs of producing alfalfa, all opportunity costs need to be removed.

The budget information for alfalfa as described above is reported in the following set of 14 tables, for which summaries are provided directly below.

Table 1: Summary of Returns for Producing 2-Tie and 1-Ton Alfalfa Bales Under Different Management Scenarios ($/acre).
Table 1 presents a summary of all the enterprise budgets produced for this report, including the costs of establishment and production for small (2-tie) bales as well as large (1-ton) bales under custom haying and owner-operator management assumptions. Total revenue, variable and total costs, and returns over variable and total costs are listed under the given yield and price assumptions. Figure 1 presents a graphical summary of returns over variable and total costs for small and large bales under both management scenarios. However, it is important to note that the price and yield assumptions can be varied on the accompanying spreadsheet, and this will correspondingly update all of the subsequent calculations.

The results in Table 1 show that alfalfa producers who harvest their own crop(s) can realize a higher return for their production at $469 per acre for 2-tie bales and $308 per acre for 1-ton bales than operators who hire custom harvesters. Growers who hire others to swath, rake, bale, and stack their alfalfa will have lower net returns at $400 per acre for 2-tie bales and $234 per acre for 1-ton bales, a difference of $69 per acre for 2-tie bales and $74 for 1-ton bales.

The relatively large difference in net returns for 2-tie bales compared to 1-ton bales is mainly a result of the assumed price differential of $20 per ton, with 2-tie bales selling at $220 per ton and 1-ton bales selling for $200 per ton. Small bales typically sell for a premium to recreational horse owners and small ranches, but the market is larger for 1-ton bales because of the extensive quantities feedlots and large ranches require. Over four harvests, this price differential sums to $160 per acre.

There are also small differences in harvesting costs, both for custom operators and owner-operators. Under these yield and price assumptions, alfalfa enterprises conducting their own haying operations are covering all cash costs while receiving a 7.5% return on equity capital invested in the enterprise, $20/hour for operator labor, $50/acre for operator management, and $400/acre rent for land and center pivot irrigation. Their per-acre profit values represent returns for the risk of investing in the enterprise.

Table 2: Input Cost Assumptions for Producing Alfalfa Hay in the Columbia Basin in 2008. The input cost table lists prices for fuel, seed, fertilizers, pesticides, labor, land rent, and interest rates. These values can be changed on the accompanying spreadsheet, and all production cost tables and the summary table will reflect the new prices. This feature is especially useful given the recent volatility in the agricultural sector.
Tables 3, 5, 7, 9, and 11: Schedules of Operations for Establishing and Producing Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation. These five tables outline the farming operations for each of the enterprise budgets in Tables 4, 6, 8, 10, and 12. The timing, type of machinery, and specific materials or services are listed for each operation.

Tables 4, 6, 8, 10, and 12: Costs of Production for Establishing and Producing Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation. These five tables list all the variable and fixed costs by category for establishing (Table 4) and producing alfalfa for custom operations (Tables 6 and 8) and owner-operator operations (Tables 10 and 12) for both 2-tie (Tables 6 and 10) and 1-ton bales (Tables 8 and 12).

Tables 13 and 14: Machinery Complement Assumptions and Machinery Costs per Acre for Producing Alfalfa Hay in the Columbia Basin in 2008. The machinery complement is based on producer interviews of growers in this region. Machinery costs per acre were derived using the University of Idaho's Machinery Cost Analysis computer program. For further information on this program and details about the underlying calculations, click on “Help” in the program’s function bar at http://www.ag.uidaho.edu/aers/r_mach-cost_inst.htm. Except for the custom hire figures, the machine costs were used to develop the budgets in this report. Custom harvesting costs are based on information obtained from producers and custom operators in the area.

Figure 1. Returns over Variable and Total Costs for Producing 2-tie and 1-ton Alfalfa Bales Under Different Management Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Returns over TC</th>
<th>Returns over VC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Bales, Owner</td>
<td>$335</td>
<td>$992</td>
</tr>
<tr>
<td>Small Bales, Owner</td>
<td>$478</td>
<td>$1,139</td>
</tr>
<tr>
<td>Large Bales, Custom</td>
<td>$199</td>
<td>$771</td>
</tr>
<tr>
<td>Small Bales, Custom</td>
<td>$342</td>
<td>$914</td>
</tr>
</tbody>
</table>

$/acre

- Returns over TC
- Returns over VC
Table 1. Summary of Returns for Producing 2-tie and 1-ton Alfalfa Bales Under Different Management Scenarios

<table>
<thead>
<tr>
<th>By Crop:</th>
<th>Unit</th>
<th>Yield per acre</th>
<th>Price per unit</th>
<th>Revenue per acre ($/acre)</th>
<th>Total Cost (TC) ($/acre)</th>
<th>Returns over TC ($/acre)</th>
<th>Total Variable Costs (VC) ($/acre)</th>
<th>Returns over VC ($/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment Costs, Custom or Owner-Operator</td>
<td>ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (2-tie) Bale Production, Custom</td>
<td>ton</td>
<td>8</td>
<td>$220</td>
<td>$1,760</td>
<td>$1,418</td>
<td>$342</td>
<td>$846</td>
<td>$914</td>
</tr>
<tr>
<td>Large (1-ton) Bale Production, Custom</td>
<td>ton</td>
<td>8</td>
<td>$200</td>
<td>$1,600</td>
<td>$1,401</td>
<td>$199</td>
<td>$829</td>
<td>$771</td>
</tr>
<tr>
<td>Small (2-tie) Bale Production, Owner-Operator</td>
<td>ton</td>
<td>8</td>
<td>$220</td>
<td>$1,760</td>
<td>$1,282</td>
<td>$478</td>
<td>$621</td>
<td>$1,139</td>
</tr>
<tr>
<td>Large (1-ton) Bale Production, Owner-Operator</td>
<td>ton</td>
<td>8</td>
<td>$200</td>
<td>$1,600</td>
<td>$1,265</td>
<td>$335</td>
<td>$608</td>
<td>$992</td>
</tr>
</tbody>
</table>

1Price is for bulk delivery to farm.
2Includes all applicable state and federal taxes.

Table 2. Input Cost Assumptions for Producing Alfalfa in the Columbia Basin in 2009

<table>
<thead>
<tr>
<th></th>
<th>Unit</th>
<th>Price/unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-Road Diesel(^1)</td>
<td>gal</td>
<td>$2.00</td>
</tr>
<tr>
<td>Gas</td>
<td>gal</td>
<td>$2.25</td>
</tr>
<tr>
<td>Seed:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa seed</td>
<td>lb</td>
<td>$3.00</td>
</tr>
<tr>
<td>Fertilizer:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Nitrogen</td>
<td>lb</td>
<td>$0.49</td>
</tr>
<tr>
<td>Dry Phosphate</td>
<td>lb</td>
<td>$1.17</td>
</tr>
<tr>
<td>Potash</td>
<td>lb</td>
<td>$0.70</td>
</tr>
<tr>
<td>Dry Sulfur</td>
<td>lb</td>
<td>$0.38</td>
</tr>
<tr>
<td>Pesticides:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eptam 7E</td>
<td>qt</td>
<td>$9.29</td>
</tr>
<tr>
<td>Malathion 5EC</td>
<td>qt</td>
<td>$7.95</td>
</tr>
<tr>
<td>Sencor 4L</td>
<td>qt</td>
<td>$23.75</td>
</tr>
<tr>
<td>Gopher control</td>
<td>acre</td>
<td>$6.00</td>
</tr>
<tr>
<td>Labor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hourly machine labor(^2)</td>
<td>hour</td>
<td>$20.00</td>
</tr>
<tr>
<td>Land Cost:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash rent</td>
<td>hour</td>
<td>$400.00</td>
</tr>
<tr>
<td>Interest Rates:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating loan</td>
<td>percent</td>
<td>8.0%</td>
</tr>
<tr>
<td>Machinery loan</td>
<td>percent</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

\(^1\)Price is for bulk delivery to farm.
\(^2\)Includes all applicable state and federal taxes.
Table 3. Schedule of Operations for Establishing Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation

<table>
<thead>
<tr>
<th>Month</th>
<th>Operation</th>
<th>Tooling</th>
<th>Materials/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Irrigation</td>
<td>Center Pivot Leased with Land</td>
<td>$12 Power, $11.25 Water, $4.25 Labor, $6.25/Acre Repair (25% Annual Cost)</td>
</tr>
<tr>
<td>August</td>
<td>Disc &amp; Pack</td>
<td>250HP-WT, 26’ Tandem Disk &amp; Pack</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>Soil Test</td>
<td>Custom</td>
<td>$0.30/Acre</td>
</tr>
<tr>
<td>August</td>
<td>Fertilizer</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Fertilizer approximately $100/Acre</td>
</tr>
<tr>
<td>August</td>
<td>Disc Ripper</td>
<td>250HP-WT, 17.5’ Disc Ripper</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>Seedbed Maker</td>
<td>150HP-WT, 20’ Seedbed Maker</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>Plant</td>
<td>150HP-WT, 20’ Double Disc Drill</td>
<td>20 lbs Alfalfa Seed @ $3/lb</td>
</tr>
<tr>
<td>August</td>
<td>Herbicide Spray</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Herbicide approximately $12/Acre</td>
</tr>
<tr>
<td>August</td>
<td>Insecticide Spray</td>
<td>Custom Aerial Application</td>
<td>$7.50/Acre, Insecticide approximately $7/Acre</td>
</tr>
</tbody>
</table>

Table 4. Production Costs for Establishing Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa Seed</td>
<td>20</td>
<td>lb</td>
<td>$3.00</td>
<td>$60.00</td>
</tr>
<tr>
<td><strong>Fertilizer:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$181.75</td>
</tr>
<tr>
<td>Base your rate on your soil test results.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A typical recommendation might include the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Nitrogen (N)</td>
<td>25</td>
<td>lb</td>
<td>$0.49</td>
<td>$12.25</td>
</tr>
<tr>
<td>Dry Phosphate (P)</td>
<td>100</td>
<td>lb</td>
<td>$1.17</td>
<td>$117.00</td>
</tr>
<tr>
<td>Dry Potash (K)</td>
<td>75</td>
<td>lb</td>
<td>$0.70</td>
<td>$52.50</td>
</tr>
<tr>
<td><strong>Pesticides:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$19.00</td>
</tr>
<tr>
<td>Rates &amp; chemicals will depend on the pests in your crop.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consult a certified pesticide applicator or the PNW Pest Control Management Guides.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The following cost estimates are typical:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide</td>
<td>1</td>
<td>acre</td>
<td>$12.00</td>
<td>$12.00</td>
</tr>
<tr>
<td>Insecticide</td>
<td>1</td>
<td>acre</td>
<td>$7.00</td>
<td>$7.00</td>
</tr>
</tbody>
</table>

(continued on next page)
Table 4. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom &amp; Consultants:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Test</td>
<td>1</td>
<td>acre</td>
<td>$0.30</td>
<td>$0.30</td>
</tr>
<tr>
<td>Fertilizer Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Herbicide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Insecticide Aerial Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Irrigation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation Power-CP</td>
<td>1</td>
<td>acre</td>
<td>$12.00</td>
<td>$12.00</td>
</tr>
<tr>
<td>Water Access</td>
<td>1</td>
<td>acre</td>
<td>$11.25</td>
<td>$11.25</td>
</tr>
<tr>
<td>Irrigation Repairs</td>
<td>1</td>
<td>acre</td>
<td>$6.25</td>
<td>$6.25</td>
</tr>
<tr>
<td>Irrigation Labor-CP</td>
<td>1</td>
<td>acre</td>
<td>$4.25</td>
<td>$4.25</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td>6.30</td>
<td>gal</td>
<td>$2.00</td>
<td>$12.59</td>
</tr>
<tr>
<td>Lubricants</td>
<td>1</td>
<td>acre</td>
<td>$2.22</td>
<td>$2.22</td>
</tr>
<tr>
<td>Machinery Repairs</td>
<td>1</td>
<td>acre</td>
<td>$7.89</td>
<td>$7.89</td>
</tr>
<tr>
<td>Storage Facility &amp; Equip. Repairs</td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Machinery Labor</td>
<td>0.55</td>
<td>acre</td>
<td>$20.00</td>
<td>$11.00</td>
</tr>
<tr>
<td>Overhead</td>
<td></td>
<td></td>
<td></td>
<td>$17.55</td>
</tr>
<tr>
<td>Operating Interest</td>
<td></td>
<td></td>
<td></td>
<td>$14.04</td>
</tr>
<tr>
<td>Total Variable Costs</td>
<td></td>
<td></td>
<td></td>
<td>$382.59</td>
</tr>
<tr>
<td>FIXED COSTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery depreciation</td>
<td></td>
<td></td>
<td></td>
<td>$17.09</td>
</tr>
<tr>
<td>Machinery interest</td>
<td></td>
<td></td>
<td></td>
<td>$10.57</td>
</tr>
<tr>
<td>Machinery insurance, taxes housing, licenses</td>
<td></td>
<td></td>
<td></td>
<td>$4.13</td>
</tr>
<tr>
<td>Land Cost</td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Total Fixed Costs</td>
<td></td>
<td></td>
<td></td>
<td>$31.79</td>
</tr>
<tr>
<td>Fixed Costs per Unit</td>
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<tr>
<td>Total Costs per Acre</td>
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<td>$414.38</td>
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<tr>
<td>Total Cost per Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Straw removal costs from the prior grain crop as well as all fixed costs associated with land are allocated to the preceding crop.
### Table 5. Schedule of Operations for Producing Small (2-tie) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Custom Haying

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Operation</th>
<th>Tooling</th>
<th>Materials/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Soil Test</td>
<td>Custom</td>
<td>$0.30/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Fertilizer</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Fertilizer $100/Acre approximately</td>
</tr>
<tr>
<td>March</td>
<td>Weed Control</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Herbicide $28/Acre approximately</td>
</tr>
<tr>
<td>Seasonal</td>
<td>Irrigation</td>
<td>Center Pivot</td>
<td>$48/Acre Power, $45 Water, .85 hrs of Labor, $25/Acre Repair</td>
</tr>
<tr>
<td>4X</td>
<td>Swath Hay</td>
<td>Custom</td>
<td>$18/Acre, 2 Tons/Acre per Swathing</td>
</tr>
<tr>
<td>4X</td>
<td>Rake Hay</td>
<td>Custom</td>
<td>$9.50/Acre, 2 Tons/Acre per Raking</td>
</tr>
<tr>
<td>4X</td>
<td>Bale Hay</td>
<td>Custom</td>
<td>$17/Ton for Small Bales</td>
</tr>
<tr>
<td>4X</td>
<td>Haul and Stack</td>
<td>Custom</td>
<td>$9/Ton for Small Bales</td>
</tr>
<tr>
<td>4X</td>
<td>Tarp Hay</td>
<td>Rental</td>
<td>$4/Ton</td>
</tr>
</tbody>
</table>

### Table 6. Production Costs for Small (2-tie) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Custom Haying

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price or Unit Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa Hay</td>
<td>8</td>
<td>8 ton</td>
<td>$220.00</td>
</tr>
<tr>
<td><strong>GROSS RETURNS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer:</td>
<td></td>
<td></td>
<td>$183.07</td>
</tr>
<tr>
<td>Base your rate on your soil test results. A typical recommendation might include the following:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Nitrogen (N)</td>
<td>20</td>
<td>lb</td>
<td>$0.49</td>
</tr>
<tr>
<td>Dry Phosphate (P)</td>
<td>100</td>
<td>lb</td>
<td>$1.17</td>
</tr>
<tr>
<td>Dry Potash (K)</td>
<td>75</td>
<td>lb</td>
<td>$0.70</td>
</tr>
<tr>
<td>Dry Sulfur (S)</td>
<td>10</td>
<td>lb</td>
<td>$0.38</td>
</tr>
<tr>
<td>Pesticides:</td>
<td></td>
<td></td>
<td>$15.85</td>
</tr>
<tr>
<td>Consult a certified pesticide applicator or the PNW Pest Control Management Guides. Common pesticides for alfalfa include the following:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malathion 5EC</td>
<td>0.5</td>
<td>qt</td>
<td>$7.95</td>
</tr>
<tr>
<td>Sencor 4L</td>
<td>0.5</td>
<td>qt</td>
<td>$23.75</td>
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</table>
Table 6. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom &amp; Consultants</td>
<td></td>
<td></td>
<td>$333.30</td>
<td></td>
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<tr>
<td>Soil Test</td>
<td>1</td>
<td>acre</td>
<td>$0.30</td>
<td>$0.30</td>
</tr>
<tr>
<td>Fertilizer Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Herbicide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Swath</td>
<td>4</td>
<td>acre</td>
<td>$18.00</td>
<td>$72.00</td>
</tr>
<tr>
<td>Rake</td>
<td>4</td>
<td>acre</td>
<td>$9.50</td>
<td>$38.00</td>
</tr>
<tr>
<td>Bale</td>
<td>8</td>
<td>ton</td>
<td>$17.00</td>
<td>$136.00</td>
</tr>
<tr>
<td>Haul and Stack</td>
<td>8</td>
<td>ton</td>
<td>$9.00</td>
<td>$72.00</td>
</tr>
<tr>
<td>Tarping (rental)</td>
<td>8</td>
<td>ton</td>
<td>$4.00</td>
<td>$32.00</td>
</tr>
<tr>
<td>Irrigation:</td>
<td></td>
<td></td>
<td>$135.00</td>
<td></td>
</tr>
<tr>
<td>Irrigation Power-CP</td>
<td>1</td>
<td>acre</td>
<td>$48.00</td>
<td>$48.00</td>
</tr>
<tr>
<td>Water Access</td>
<td>1</td>
<td>acre</td>
<td>$45.00</td>
<td>$45.00</td>
</tr>
<tr>
<td>Irrigation Repairs</td>
<td>1</td>
<td>acre</td>
<td>$25.00</td>
<td>$25.00</td>
</tr>
<tr>
<td>Irrigation Labor-CP</td>
<td>0.85</td>
<td>acre</td>
<td>$20.00</td>
<td>$17.00</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td>$79.16</td>
<td></td>
</tr>
<tr>
<td>Crop insurance</td>
<td>8</td>
<td>ton</td>
<td>$2.00</td>
<td>$16.00</td>
</tr>
<tr>
<td>Gopher control</td>
<td>1</td>
<td>acre</td>
<td>$6.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
<td>acre</td>
<td>$50.00</td>
<td>$50.00</td>
</tr>
<tr>
<td>Fuel</td>
<td>2.28</td>
<td>gal</td>
<td>$2.00</td>
<td>$4.56</td>
</tr>
<tr>
<td>Lubricants</td>
<td>1</td>
<td>acre</td>
<td>$0.80</td>
<td>$0.80</td>
</tr>
<tr>
<td>Machinery Repairs</td>
<td>1</td>
<td>acre</td>
<td>$1.80</td>
<td>$1.80</td>
</tr>
<tr>
<td>Storage Facility &amp; Equip. Repairs</td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Overhead</td>
<td></td>
<td></td>
<td>$37.32</td>
<td></td>
</tr>
<tr>
<td>Operating Interest</td>
<td></td>
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<td>$29.86</td>
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</tr>
<tr>
<td><strong>Total Variable Costs</strong></td>
<td></td>
<td></td>
<td>$845.55</td>
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<tr>
<td><strong>Variable Costs per Unit</strong></td>
<td></td>
<td></td>
<td>$105.69</td>
<td></td>
</tr>
<tr>
<td><strong>Net Returns Above Variable Costs</strong></td>
<td></td>
<td></td>
<td>$914.45</td>
<td></td>
</tr>
</tbody>
</table>

**FIXED COSTS**

<table>
<thead>
<tr>
<th>Item</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery depreciation</td>
<td></td>
<td></td>
<td>$5.42</td>
</tr>
<tr>
<td>Machinery interest</td>
<td></td>
<td></td>
<td>$3.08</td>
</tr>
<tr>
<td>Machinery insurance, taxes housing, licenses</td>
<td></td>
<td></td>
<td>$2.79</td>
</tr>
<tr>
<td>Establishment Cost</td>
<td></td>
<td></td>
<td>$160.79</td>
</tr>
<tr>
<td>Land Cost</td>
<td>1</td>
<td>acre</td>
<td>$400.00</td>
</tr>
<tr>
<td><strong>Total Fixed Costs</strong></td>
<td></td>
<td></td>
<td>$572.08</td>
</tr>
<tr>
<td><strong>Fixed Costs per Unit</strong></td>
<td></td>
<td></td>
<td>$71.51</td>
</tr>
<tr>
<td><strong>Total Costs per Acre</strong></td>
<td></td>
<td></td>
<td>$1,417.64</td>
</tr>
<tr>
<td><strong>Total Cost per Unit</strong></td>
<td></td>
<td></td>
<td>$177.20</td>
</tr>
<tr>
<td><strong>Returns to Risk</strong></td>
<td></td>
<td></td>
<td>$342.36</td>
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(continued on next page)
### Table 7. Schedule of Operations for Producing Large (1-ton) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Custom Haying

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Operation</th>
<th>Tooling</th>
<th>Materials/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Soil Test</td>
<td>Custom</td>
<td>$0.30/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Fertilizer</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Fertilizer approximately $100/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Weed Control</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Herbicide approximately $28/Acre</td>
</tr>
<tr>
<td>Season</td>
<td>Irrigation</td>
<td>Center Pivot</td>
<td>$48/Acre Power, $45 Water, .85 Hrs. of Labor, $25/Acre Repairs</td>
</tr>
<tr>
<td>4X</td>
<td>Swath Hay</td>
<td>Custom</td>
<td>$18/Acre, 2 Tons/Acre per Swathing</td>
</tr>
<tr>
<td>4X</td>
<td>Rake Hay</td>
<td>Custom</td>
<td>$9.50/Acre, 2 Tons/Acre per Raking</td>
</tr>
<tr>
<td>4X</td>
<td>Bale Hay</td>
<td>Custom</td>
<td>$18/Ton for 1-ton Bales</td>
</tr>
<tr>
<td>4X</td>
<td>Haul and Stack</td>
<td>Custom</td>
<td>$4/Ton for 1-ton Bales</td>
</tr>
<tr>
<td>4X</td>
<td>Tarp Hay</td>
<td>Rental</td>
<td>$4/Ton for 1-ton Bales</td>
</tr>
</tbody>
</table>
Table 8. Production Costs for Large (1-ton) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Custom Haying

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROSS RETURNS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa Hay 8 ton</td>
<td>8</td>
<td>ton</td>
<td>$200.00</td>
<td>$1,600.00</td>
</tr>
<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fertilizer</strong>:</td>
<td></td>
<td></td>
<td></td>
<td>$183.07</td>
</tr>
<tr>
<td>Base your rate on your soil test results.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A typical recommendation might include the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Nitrogen (N)  20 lb  $0.49</td>
<td></td>
<td>lb</td>
<td>$9.80</td>
<td></td>
</tr>
<tr>
<td>Dry Phosphate (P)  100 lb  $1.17</td>
<td></td>
<td>lb</td>
<td>$117.00</td>
<td></td>
</tr>
<tr>
<td>Dry Potash (K)  75 lb  $0.70</td>
<td></td>
<td>lb</td>
<td>$52.50</td>
<td></td>
</tr>
<tr>
<td>Dry Sulfur (S)  10 lb  $0.38</td>
<td></td>
<td>lb</td>
<td>$3.77</td>
<td></td>
</tr>
<tr>
<td><strong>Pesticides</strong>:</td>
<td></td>
<td></td>
<td></td>
<td>$15.85</td>
</tr>
<tr>
<td>Consult a certified pesticide applicator or the PNW Pest Control Management Guides.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common pesticides for alfalfa include the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malathion 5EC  0.5 qt  $7.95</td>
<td></td>
<td>qt</td>
<td>$3.98</td>
<td></td>
</tr>
<tr>
<td>Sencor 4L  0.5 qt  $23.75</td>
<td></td>
<td>qt</td>
<td>$11.88</td>
<td></td>
</tr>
<tr>
<td><strong>Custom &amp; Consultants</strong>:</td>
<td></td>
<td></td>
<td></td>
<td>$333.30</td>
</tr>
<tr>
<td>Soil Test  1 acre  $0.30</td>
<td></td>
<td>acre</td>
<td>$0.30</td>
<td></td>
</tr>
<tr>
<td>Fertilizer Ground Application  1 acre  $7.50</td>
<td></td>
<td>acre</td>
<td>$7.50</td>
<td></td>
</tr>
<tr>
<td>Herbicide Ground Application  1 acre  $7.50</td>
<td></td>
<td>acre</td>
<td>$7.50</td>
<td></td>
</tr>
<tr>
<td>Swath  4 acre  $18.00</td>
<td></td>
<td>acre</td>
<td>$72.00</td>
<td></td>
</tr>
<tr>
<td>Rake  4 acre  $9.50</td>
<td></td>
<td>acre</td>
<td>$38.00</td>
<td></td>
</tr>
<tr>
<td>Bale  8 ton  $18.00</td>
<td></td>
<td>ton</td>
<td>$144.00</td>
<td></td>
</tr>
<tr>
<td>Haul and Stack  8 ton  $4.00</td>
<td></td>
<td>ton</td>
<td>$32.00</td>
<td></td>
</tr>
<tr>
<td>Tarping (rental)  8 ton  $4.00</td>
<td></td>
<td>ton</td>
<td>$32.00</td>
<td></td>
</tr>
<tr>
<td><strong>Irrigation</strong>:</td>
<td></td>
<td></td>
<td></td>
<td>$135.00</td>
</tr>
<tr>
<td>Irrigation Power-CP  1 acre  $48.00</td>
<td></td>
<td>acre</td>
<td>$48.00</td>
<td></td>
</tr>
<tr>
<td>Water Access  1 acre  $45.00</td>
<td></td>
<td>acre</td>
<td>$45.00</td>
<td></td>
</tr>
<tr>
<td>Irrigation Repairs  1 acre  $25.00</td>
<td></td>
<td>acre</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Irrigation Labor-CP  0.85 acre  $20.00</td>
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<td>acre</td>
<td>$17.00</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong>:</td>
<td></td>
<td></td>
<td></td>
<td>$93.16</td>
</tr>
<tr>
<td>Baling Twine  8 ton  $1.75</td>
<td></td>
<td>ton</td>
<td>$14.00</td>
<td></td>
</tr>
<tr>
<td>Crop insurance  8 acre  $2.00</td>
<td></td>
<td>acre</td>
<td>$16.00</td>
<td></td>
</tr>
<tr>
<td>Gopher control  1 acre  $6.00</td>
<td></td>
<td>acre</td>
<td>$6.00</td>
<td></td>
</tr>
<tr>
<td>Management  1 acre  $50.00</td>
<td></td>
<td>acre</td>
<td>$50.00</td>
<td></td>
</tr>
<tr>
<td>Fuel  2.28 gal  $2.00</td>
<td></td>
<td>gal</td>
<td>$4.56</td>
<td></td>
</tr>
<tr>
<td>Lubricants  1 acre  $0.80</td>
<td></td>
<td>acre</td>
<td>$0.80</td>
<td></td>
</tr>
<tr>
<td>Machinery Repairs  1 acre  $1.80</td>
<td></td>
<td>acre</td>
<td>$1.80</td>
<td></td>
</tr>
<tr>
<td>Storage Facility &amp; Equip. Repairs</td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Other Labor</td>
<td></td>
<td></td>
<td>$0.00</td>
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</tr>
</tbody>
</table>

(continued on next page)
Table 8. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td></td>
<td></td>
<td>$38.02</td>
<td></td>
</tr>
<tr>
<td>Operating Interest</td>
<td></td>
<td></td>
<td>$30.42</td>
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</tr>
<tr>
<td><strong>Total Variable Costs</strong></td>
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<td></td>
<td><strong>$828.81</strong></td>
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</tr>
<tr>
<td>Variable Costs per Unit</td>
<td></td>
<td></td>
<td>$103.60</td>
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</tr>
<tr>
<td><strong>Net Returns Above Variable Costs</strong></td>
<td></td>
<td></td>
<td><strong>$771.19</strong></td>
<td></td>
</tr>
</tbody>
</table>

**FIXED COSTS**

| Item                                         |                   |      |               |                    |
| Machinery depreciation                       |                   |      | $5.42         |                    |
| Machinery interest                           |                   |      | $3.08         |                    |
| Machinery insurance, taxes housing, licenses |                   |      | $2.79         |                    |
| Establishment Cost                           |                   |      | $160.79       |                    |
| Land Cost                                    | 1                 | acre | $400.00       | $400.00            |
| **Total Fixed Costs**                        |                   |      | **$572.08**   |                    |
| Fixed Costs per Unit                         |                   |      | $71.51        |                    |
| **Total Costs per Acre**                     |                   |      | **$1,400.90** |                    |
| Total Cost per Unit                          |                   |      | **$175.11**   |                    |
| **Returns to Risk**                          |                   |      | **$199.10**   |                    |

**BREAK EVEN ANALYSIS**

<table>
<thead>
<tr>
<th>PRICE</th>
<th>10%</th>
<th>Base Yield</th>
<th>+ 10%</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$7.2</td>
<td>8.4</td>
<td>8</td>
<td>115</td>
</tr>
<tr>
<td>Operating Cost Breakeven</td>
<td>79</td>
<td>72</td>
<td>68</td>
</tr>
<tr>
<td>Ownership Cost Breakeven</td>
<td>195</td>
<td>175</td>
<td>167</td>
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</table>

**PRICE**

<table>
<thead>
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<th>YIELD</th>
<th>$180.00</th>
<th>$200.00</th>
<th>$220.00</th>
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<tr>
<td>Operating Cost Breakeven</td>
<td>4.6</td>
<td>4.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Ownership Cost Breakeven</td>
<td>3.2</td>
<td>2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Total Cost Breakeven</td>
<td>7.8</td>
<td>7.0</td>
<td>6.4</td>
</tr>
</tbody>
</table>
Table 9. Schedule of Operations for Producing Small (2-tie) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Owner-Operator Management

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Operation</th>
<th>Tooling</th>
<th>Materials/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Soil Test</td>
<td>Custom</td>
<td>$0.30/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Fertilizer</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Weed Control</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre</td>
</tr>
<tr>
<td>Season</td>
<td>Irrigation</td>
<td>Center Pivot</td>
<td>$48/Acre Power, $45 Water, .85 Hrs. of Labor, $25/Acre Repairs</td>
</tr>
<tr>
<td>4X</td>
<td>Swath Hay</td>
<td>Self-Propelled Windrower</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Rake Hay</td>
<td>150HP-WT, 20’ Side Delivery Rake</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Bale Hay</td>
<td>150HP-WT, 2-Tie Baler</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Haul and Stack</td>
<td>Self-Propelled Bale Wagon</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Tarp Hay</td>
<td>Rental</td>
<td>$4/Ton</td>
</tr>
</tbody>
</table>
Table 10. Production Costs for Alfalfa Hay Following Wheat or Barley in the Columbia Basin, Center Pivot Irrigation, Small (2-tie) Bales, Owner-Operator Management

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROSS RETURNS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>8</td>
<td>ton</td>
<td>$200.00</td>
<td>$1,760.00</td>
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<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fertilizer:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$173.27</td>
</tr>
<tr>
<td><em>Base your rate on your soil test results.</em></td>
<td></td>
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</tr>
<tr>
<td>A typical recommendation might include the following:</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Dry Nitrogen (N)</td>
<td>20</td>
<td>lb</td>
<td>$0.49</td>
<td>$9.80</td>
</tr>
<tr>
<td>Dry Phosphate (P)</td>
<td>100</td>
<td>lb</td>
<td>$1.17</td>
<td>$117.00</td>
</tr>
<tr>
<td>Dry Potash (K)</td>
<td>75</td>
<td>lb</td>
<td>$0.70</td>
<td>$52.50</td>
</tr>
<tr>
<td>Dry Sulfur (S)</td>
<td>10</td>
<td>lb</td>
<td>$0.38</td>
<td>$3.77</td>
</tr>
<tr>
<td><strong>Pesticides:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$15.85</td>
</tr>
<tr>
<td><em>Rates &amp; chemicals will depend on the pests in your crop.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consult a certified pesticide applicator or the PNW Pest Control Management Guides.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common pesticides for alfalfa include the following:</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Malathion 5EC</td>
<td>0.5</td>
<td>qt</td>
<td>$7.95</td>
<td>$3.98</td>
</tr>
<tr>
<td>Sencor 4L</td>
<td>0.5</td>
<td>qt</td>
<td>$23.75</td>
<td>$11.88</td>
</tr>
<tr>
<td><strong>Custom &amp; Consultants:</strong></td>
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<td>$22.80</td>
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<tr>
<td>Soil Test</td>
<td>1</td>
<td>acre</td>
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<td>$0.30</td>
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<tr>
<td>Fertilizer Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Herbicide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Insecticide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td><strong>Irrigation:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$135.00</td>
</tr>
<tr>
<td>Irrigation Power-CP</td>
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<td>acre</td>
<td>$48.00</td>
<td>$48.00</td>
</tr>
<tr>
<td>Water Access</td>
<td>1</td>
<td>acre</td>
<td>$45.00</td>
<td>$45.00</td>
</tr>
<tr>
<td>Irrigation Repairs</td>
<td>1</td>
<td>acre</td>
<td>$25.00</td>
<td>$25.00</td>
</tr>
<tr>
<td>Irrigation Labor-CP</td>
<td>0.85</td>
<td>acre</td>
<td>$20.00</td>
<td>$17.00</td>
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<tr>
<td><strong>Other:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$101.15</td>
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<tr>
<td>Baling Twine</td>
<td>8</td>
<td>ton</td>
<td>$3.85</td>
<td>$30.80</td>
</tr>
<tr>
<td>Crop insurance</td>
<td>8</td>
<td>acre</td>
<td>$2.00</td>
<td>$16.00</td>
</tr>
<tr>
<td>Gopher control</td>
<td>1</td>
<td>acre</td>
<td>$6.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>Tarping</td>
<td>8</td>
<td>ton</td>
<td>$4.00</td>
<td>$32.00</td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
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<td>$50.00</td>
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<tr>
<td>Fuel</td>
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<td>Lubricants</td>
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<td>acre</td>
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<td>$5.15</td>
</tr>
<tr>
<td>Machinery Repairs</td>
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<td>acre</td>
<td>$22.52</td>
<td>$22.52</td>
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<td>Storage Facility &amp; Equip. Repairs</td>
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<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Machinery Labor</td>
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<td>acre</td>
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<td>$38.60</td>
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<td>Other Labor</td>
<td></td>
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<td>$0.00</td>
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</tbody>
</table>

(continued on next page)
Table 10. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td></td>
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<td>$15.65</td>
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<tr>
<td>Operating Interest</td>
<td></td>
<td></td>
<td>$12.52</td>
<td></td>
</tr>
<tr>
<td><strong>Total Variable Costs</strong></td>
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<td>$620.85</td>
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<tr>
<td>Variable Costs per Unit</td>
<td></td>
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<td>$77.61</td>
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<tr>
<td><strong>Net Returns Above Variable Costs</strong></td>
<td></td>
<td></td>
<td>$1,139.15</td>
<td></td>
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</tbody>
</table>

**FIXED COSTS**

| Item                                           |                   |      |               |                    |
| Machinery depreciation                         |                   |      | $56.38        |                    |
| Machinery interest                             |                   |      | $31.56        |                    |
| Machinery insurance, taxes housing, licenses  |                   |      | $12.75        |                    |
| Establishment Cost*                            |                   |      | $160.79       |                    |
| Land Cost                                      | 1 acre            |      | $400.00       | $400.00            |
| **Total Fixed Costs**                          |                   |      | $661.48       |                    |
| Fixed Costs per Unit                           |                   |      | $82.69        |                    |
| **Total Costs per Acre**                       |                   |      | $1,282.33     |                    |
| Total Cost per Unit                            |                   |      | $160.29       |                    |
| **Returns to Risk**                            |                   |      | $477.67       |                    |

**BREAKEVEN ANALYSIS**

<table>
<thead>
<tr>
<th>PRICE</th>
<th>10% Base Yield</th>
<th>+ 10% Base Yield</th>
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<tbody>
<tr>
<td>7.2</td>
<td>8</td>
<td>8.4</td>
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</table>

- Operating Cost Breakeven
- Ownership Cost Breakeven
- Total Cost Breakeven

<table>
<thead>
<tr>
<th>YIELD</th>
<th>$198.00</th>
<th>$220.00</th>
<th>$242.00</th>
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<tr>
<td>Operating Cost Breakeven</td>
<td>3.1</td>
<td>2.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Ownership Cost Breakeven</td>
<td>3.3</td>
<td>3.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Total Cost Breakeven</td>
<td>6.5</td>
<td>5.8</td>
<td>5.3</td>
</tr>
</tbody>
</table>

*Establishment costs are amortized over the productive life of the stand, which is assumed to be 3 years at an 8% interest rate.*
Table 11. Schedule of Operations for Producing Large (1-ton) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Owner-Operator Management

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Operation</th>
<th>Tooling</th>
<th>Materials/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Soil Test</td>
<td>Custom</td>
<td>$0.30/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Fertilizer</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Fertilizer $100/Acre</td>
</tr>
<tr>
<td>March</td>
<td>Weed Control</td>
<td>Custom Ground Application</td>
<td>$7.50/Acre, Herbicide $10.75/Acre</td>
</tr>
<tr>
<td>Season</td>
<td>Irrigation</td>
<td>Center Pivot</td>
<td>$48/Acre Power, $45 Water, .85 Hrs. of Labor, $25/Acre Repairs</td>
</tr>
<tr>
<td>4X</td>
<td>Swath Hay</td>
<td>Self-Propelled Windrower</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Rake Hay</td>
<td>150HP-WT, 20’ Side Delivery Rake</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Bale Hay</td>
<td>150HP-WT, 1500-lb Baler</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Haul and Stack</td>
<td>Self-Propelled Bale Wagon</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>Tarp Hay</td>
<td>Rental</td>
<td>$4/Ton for 1-ton Bales</td>
</tr>
</tbody>
</table>
Table 12. Production Costs for Large (1-ton) Bales of Alfalfa Hay Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation and Owner-Operator Management

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Unit</th>
<th>Price or Cost per Unit</th>
<th>Value or Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROSS RETURNS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>8</td>
<td>ton</td>
<td>$200.00</td>
<td>$1,600.00</td>
</tr>
<tr>
<td><strong>Fertilizer:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$173.27</td>
</tr>
<tr>
<td>Base your rate on your soil test results.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A typical recommendation might include the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Nitrogen (N)</td>
<td>20</td>
<td>lb</td>
<td>$0.49</td>
<td>$9.80</td>
</tr>
<tr>
<td>Dry Phosphate (P)</td>
<td>100</td>
<td>lb</td>
<td>$1.17</td>
<td>$117.00</td>
</tr>
<tr>
<td>Dry Potash (K)</td>
<td>75</td>
<td>lb</td>
<td>$0.70</td>
<td>$52.50</td>
</tr>
<tr>
<td>Dry Sulfur (S)</td>
<td>10</td>
<td>lb</td>
<td>$0.38</td>
<td>$3.77</td>
</tr>
<tr>
<td><strong>Pesticides:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$15.85</td>
</tr>
<tr>
<td>Rates &amp; chemicals will depend on the pests in your crop.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consult a certified pesticide applicator or the PNW Pest Control Management Guides.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common pesticides for alfalfa include the following:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malathion 5EC</td>
<td>0.5</td>
<td>qt</td>
<td>$7.95</td>
<td>$3.98</td>
</tr>
<tr>
<td>Sencor 4L</td>
<td>0.5</td>
<td>qt</td>
<td>$23.75</td>
<td>$11.88</td>
</tr>
<tr>
<td><strong>Custom &amp; Consultants:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$22.80</td>
</tr>
<tr>
<td>Soil Test</td>
<td>1</td>
<td>acre</td>
<td>$0.30</td>
<td>$0.30</td>
</tr>
<tr>
<td>Fertilizer Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Herbicide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>Insecticide Ground Application</td>
<td>1</td>
<td>acre</td>
<td>$7.50</td>
<td>$7.50</td>
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<tr>
<td><strong>Irrigation:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$135.00</td>
</tr>
<tr>
<td>Irrigation Power-CP</td>
<td>1</td>
<td>acre</td>
<td>$48.00</td>
<td>$48.00</td>
</tr>
<tr>
<td>Water Access</td>
<td>1</td>
<td>acre</td>
<td>$45.00</td>
<td>$45.00</td>
</tr>
<tr>
<td>Irrigation Repairs</td>
<td>1</td>
<td>acre</td>
<td>$25.00</td>
<td>$25.00</td>
</tr>
<tr>
<td>Irrigation Labor-CP</td>
<td>0.85</td>
<td>acre</td>
<td>$20.00</td>
<td>$17.00</td>
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<tr>
<td><strong>Other:</strong></td>
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<td>Baling Twine</td>
<td>8</td>
<td>ton</td>
<td>$1.75</td>
<td>$14.00</td>
</tr>
<tr>
<td>Crop insurance</td>
<td>8</td>
<td>ton</td>
<td>$2.00</td>
<td>$16.00</td>
</tr>
<tr>
<td>Gopher control</td>
<td>1</td>
<td>acre</td>
<td>$6.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>Tarping</td>
<td>8</td>
<td>ton</td>
<td>$4.00</td>
<td>$32.00</td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
<td>acre</td>
<td>$50.00</td>
<td>$50.00</td>
</tr>
<tr>
<td>Fuel</td>
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<td>gal</td>
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<tr>
<td>Lubricants</td>
<td>1</td>
<td>acre</td>
<td>$4.76</td>
<td>$4.76</td>
</tr>
<tr>
<td>Machinery Repairs</td>
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<td>acre</td>
<td>$19.28</td>
<td>$19.28</td>
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<tr>
<td>Storage Facility &amp; Equip. Repairs</td>
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<td>$0.00</td>
</tr>
<tr>
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</tr>
<tr>
<td>Other Labor</td>
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<td>$0.00</td>
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</table>

(continued on next page)
Table 12. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity Per Acre</th>
<th>Price or Cost</th>
<th>Value or Cost/Acre</th>
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<tbody>
<tr>
<td>Overhead</td>
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<tr>
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<td><strong>Net Returns Above Variable Costs</strong></td>
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**FIXED COSTS**

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<tr>
<td>Machinery interest</td>
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<tr>
<td>Machinery insurance, taxes housing, licenses</td>
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</tr>
<tr>
<td>Establishment Cost*</td>
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</tr>
<tr>
<td>Land Cost</td>
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</tr>
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<td>Fixed Costs per Unit</td>
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<td><strong>Total Costs per Acre</strong></td>
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<tr>
<td>Total Cost per Unit</td>
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<tr>
<td><strong>Returns to Risk</strong></td>
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<td>$334.98</td>
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**BREAK EVEN ANALYSIS**

<table>
<thead>
<tr>
<th>Price</th>
<th>Operating Cost Breakeven</th>
<th>Ownership Cost Breakeven</th>
<th>Total Cost Breakeven</th>
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</thead>
<tbody>
<tr>
<td>7.2 10%</td>
<td>84</td>
<td>91</td>
<td>176</td>
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<tr>
<td>8 8.4 10%</td>
<td>76 72</td>
<td>82 78</td>
<td>158 151</td>
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</table>

<table>
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<th>Ownership Cost Breakeven</th>
<th>Total Cost Breakeven</th>
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<td></td>
</tr>
</tbody>
</table>

*Establishment costs are amortized over the productive life of the stand, which is assumed to be 3 years at an 8% interest rate.
Table 13. Machinery Complement for Producing Alfalfa Following Wheat or Barley in the Columbia Basin with Center Pivot Irrigation

<table>
<thead>
<tr>
<th>Machine</th>
<th>Current Value ($)</th>
<th>Annual Usage in Hours or Miles (pickups)</th>
<th>Current Age (years)</th>
<th>Remaining Life (years)</th>
<th>Labor Multiplier (%)</th>
<th>Annual Repair Cost ($)</th>
<th>Salvage Value ($)</th>
<th>Acres/ Hour</th>
<th>Fuel Type</th>
<th>Fuel Use (gal./hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250HP-WT</td>
<td>100,000</td>
<td>500</td>
<td>5</td>
<td>10</td>
<td>1.20</td>
<td>2,000</td>
<td>26,000</td>
<td></td>
<td>Diesel</td>
<td>11.0</td>
</tr>
<tr>
<td>150HP-WT</td>
<td>80,000</td>
<td>500</td>
<td>5</td>
<td>10</td>
<td>1.20</td>
<td>1,530</td>
<td>20,000</td>
<td></td>
<td>Diesel</td>
<td>6.5</td>
</tr>
<tr>
<td>26' Tandem Disk &amp; Pack</td>
<td>31,000</td>
<td>150 new</td>
<td>15</td>
<td>1.10</td>
<td>0.60</td>
<td>1,500</td>
<td>3,000</td>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.5' Disk Ripper</td>
<td>25,500</td>
<td>150 new</td>
<td>15</td>
<td>1.10</td>
<td>0.60</td>
<td>1,500</td>
<td>3,000</td>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20' Seedbed Maker</td>
<td>17,000</td>
<td>150 new</td>
<td>15</td>
<td>1.10</td>
<td>0.60</td>
<td>800</td>
<td>1,650</td>
<td>9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20' Double Disk Drill</td>
<td>22,000</td>
<td>120 new</td>
<td>12</td>
<td>1.20</td>
<td>3.00</td>
<td>1,250</td>
<td>3,050</td>
<td>6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20' Side Delivery Rake</td>
<td>15,900</td>
<td>200</td>
<td>0</td>
<td>15</td>
<td>1.10</td>
<td>0.60</td>
<td>500</td>
<td>1,800</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td>1500-lb Rectangular Baler</td>
<td>80,000</td>
<td>150</td>
<td>5</td>
<td>10</td>
<td>1.20</td>
<td>2.50</td>
<td>500</td>
<td>7,500</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>2-tie Baler (PTO)</td>
<td>30,000</td>
<td>150</td>
<td>0</td>
<td>10</td>
<td>1.20</td>
<td>2.50</td>
<td>1,000</td>
<td>4,500</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>14' Swather</td>
<td>80,000</td>
<td>200</td>
<td>0</td>
<td>10</td>
<td>1.10</td>
<td>3.20</td>
<td>1,920</td>
<td>20,000</td>
<td>6.8 Diesel</td>
<td>4.8</td>
</tr>
<tr>
<td>Balewagon, Small Bales</td>
<td>115,000</td>
<td>150</td>
<td>5</td>
<td>10</td>
<td>1.20</td>
<td>3.10</td>
<td>2,000</td>
<td>12,000</td>
<td>16.3 Diesel</td>
<td>4.0</td>
</tr>
<tr>
<td>Balewagon, Large Bales</td>
<td>115,000</td>
<td>150</td>
<td>5</td>
<td>10</td>
<td>1.20</td>
<td>3.10</td>
<td>2,000</td>
<td>12,000</td>
<td>27.2 Diesel</td>
<td>4.0</td>
</tr>
<tr>
<td>Manager's Pickup</td>
<td>30,000</td>
<td>18,000</td>
<td>0</td>
<td>7</td>
<td>6.80</td>
<td>600</td>
<td>15,000</td>
<td>18.0 Gasoline</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Labor's Pickup</td>
<td>15,000</td>
<td>6,000</td>
<td>7</td>
<td>7</td>
<td>6.80</td>
<td>600</td>
<td>3,500</td>
<td>12.0 Gasoline</td>
<td>12.0</td>
<td></td>
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</tbody>
</table>
Table 14. Per Acre Machine Costs (Calculated using the MachCost Calculator from the University of Idaho), $/acre

<table>
<thead>
<tr>
<th>Machine Combination</th>
<th>Depreciation</th>
<th>Interest</th>
<th>THI&amp;L*</th>
<th>Total Fixed Costs</th>
<th>Repairs</th>
<th>Labor</th>
<th>Fuel/Lube</th>
<th>Total Variable Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager’s Pickup</td>
<td>2.14</td>
<td>1.69</td>
<td>1.53</td>
<td>5.36</td>
<td>0.60</td>
<td>0.00</td>
<td>6.04</td>
<td>6.64</td>
<td>12.00</td>
</tr>
<tr>
<td>Labor’s Pickup</td>
<td>3.28</td>
<td>1.39</td>
<td>1.26</td>
<td>5.93</td>
<td>1.20</td>
<td>0.00</td>
<td>4.02</td>
<td>5.22</td>
<td>11.15</td>
</tr>
<tr>
<td>250HP-WT, Disk &amp; Pack</td>
<td>2.27</td>
<td>1.50</td>
<td>0.19</td>
<td>3.96</td>
<td>1.16</td>
<td>1.83</td>
<td>3.96</td>
<td>6.95</td>
<td>10.91</td>
</tr>
<tr>
<td>250HP-WT, Disk Ripper</td>
<td>3.12</td>
<td>2.09</td>
<td>0.26</td>
<td>5.47</td>
<td>1.76</td>
<td>2.77</td>
<td>5.97</td>
<td>10.50</td>
<td>15.97</td>
</tr>
<tr>
<td>150HP-WT Seedbed Maker</td>
<td>2.09</td>
<td>1.35</td>
<td>0.17</td>
<td>3.61</td>
<td>0.93</td>
<td>2.44</td>
<td>3.12</td>
<td>6.49</td>
<td>10.10</td>
</tr>
<tr>
<td>150HP-WT, Disk Drill</td>
<td>4.19</td>
<td>2.55</td>
<td>0.72</td>
<td>7.46</td>
<td>2.24</td>
<td>4.00</td>
<td>4.67</td>
<td>10.91</td>
<td>18.37</td>
</tr>
<tr>
<td>150HP-WT, 20’ Side Delivery Rake</td>
<td>1.43</td>
<td>0.93</td>
<td>0.12</td>
<td>2.48</td>
<td>0.47</td>
<td>2.06</td>
<td>2.73</td>
<td>5.26</td>
<td>7.74</td>
</tr>
<tr>
<td>150HP-WT, 1500-lb Baler</td>
<td>3.89</td>
<td>1.89</td>
<td>0.55</td>
<td>6.33</td>
<td>0.41</td>
<td>1.55</td>
<td>2.05</td>
<td>4.01</td>
<td>10.34</td>
</tr>
<tr>
<td>150HP-WT, 2-tie Baler</td>
<td>2.67</td>
<td>1.48</td>
<td>0.38</td>
<td>4.53</td>
<td>0.89</td>
<td>2.21</td>
<td>2.54</td>
<td>5.64</td>
<td>10.17</td>
</tr>
<tr>
<td>Balewagon, Small Bales</td>
<td>4.22</td>
<td>1.95</td>
<td>0.81</td>
<td>6.98</td>
<td>0.82</td>
<td>1.47</td>
<td>1.20</td>
<td>3.49</td>
<td>10.47</td>
</tr>
<tr>
<td>Balewagon, Large Bales</td>
<td>2.53</td>
<td>1.17</td>
<td>0.48</td>
<td>4.18</td>
<td>0.49</td>
<td>0.88</td>
<td>0.72</td>
<td>2.09</td>
<td>6.27</td>
</tr>
<tr>
<td>14’ Swather</td>
<td>4.42</td>
<td>2.76</td>
<td>1.18</td>
<td>8.36</td>
<td>2.83</td>
<td>3.24</td>
<td>3.46</td>
<td>9.53</td>
<td>17.89</td>
</tr>
</tbody>
</table>

*Taxes, housing, insurance, and licenses