



District I

## Northern Idaho:

### Alfalfa Establishment with Barley

Kathleen Painter

## Background and Assumptions

The University of Idaho's costs and returns estimates are based on economic costs, not accounting costs. All resources are valued at a market rate or "opportunity cost." Input prices are taken from the U of I's annual survey of agricultural supply companies. The selling price is an historical average, not a current year's price. The cost estimate shown here is typical for establishing alfalfa with a barley crop in northern Idaho. Production practices most closely resemble those in Boundary County. Although production practices may be similar for individual farms, each farm has a unique set of resources with different levels of productivity, different production problems, and therefore different costs. Farm size, crop rotation, age and type of equipment, and the quality and intensity of management are all crucial factors that influence costs.

### The Model Farm

This costs and returns estimate models a 400-acre farm with 300 acres in alfalfa hay and 100 acres in spring grain. The alfalfa stand is kept in production 6 years including the establishment year. Approximately 50 acres of alfalfa are established each year.

### Production Practices

Alfalfa hay establishment with a barley crop begins with a fall plowing. In April of the following spring, the ground is cultivated, custom fertilized, and cultivated again, typically cross-cultivated (at right angles to the first pass). The next pass consists of a spike harrow, typically in early May, followed by a packer. Then the alfalfa and barley crops are seeded at that rates of 16 lb of alfalfa seed and 80 lb of barley seed. The barley crop is harvested by a custom operator in August.

Table 1 lists costs and returns by cost category (fertilizers, pesticides, machinery) for alfalfa hay establishment with a barley crop in northern Idaho. The cost for each operation can be

found in Table 2. Costs by month can be found in Table 3.

### Resources: Machinery, Land, Labor, and Capital

Table 4 lists hourly equipment costs for the tractors, trucks, and other farm equipment, along with total annual hours of use for this crop and for all crops in the model farm. Except for trucks, machinery is valued at 75 percent of new replacement cost. In the years between equipment price surveys, which are done approximately every five years, machinery prices are adjusted using USDA's Farm Machinery Prices Paid Index. Machinery cost assumptions are listed in Table 5, and include purchase price, salvage value, annual capital recovery costs, and cash overhead costs.

A crop and cost share arrangement is used to calculate land rent. For grains, landlords typically receive 1/3 of the crop and pay 1/3 of the costs for chemicals (fertilizers and pesticides) and for crop insurance. For pulse crops, landlords typically receive 1/4 of the crop and pay 1/4 of the costs for chemicals (fertilizers and pesticides) and for crop insurance.

The University of Idaho uses the budget generator program *Budget Planner* from the University of California-Davis to produce the various tables shown in this publication. Machinery operating and ownership costs are calculated based on engineering equations in this program. Machinery operating costs include fuel, lubricants and repairs.

The cost of labor used in this study includes a base wage, plus a percentage to account for various payroll taxes (FICA, SUTA & FUTA), and workman's compensation, as well as benefits such as paid vacation/personal leave days, health insurance and bonuses. Labor is classified by the type of work performed. Labor classifications, labor rates and payroll overhead are shown below.

## Labor Values

Labor Class	Base Rate	Payroll Overhead	Effective Rate
General Farm Labor	\$8.90	15%	\$10.25
Truck Drivers	\$12.00	15%	\$13.80
Equipment Operators	\$14.25	25%	\$17.80

Based on the speed, width and overall field efficiency, Budget Planner calculates equipment operator labor hours for all field operations except those performed on a custom basis. Custom operations are listed separately. General farm labor accounts for extra field labor used during planting or harvest.

A management fee is charged based on approximately 5% of expected revenue.

### Capital and Overhead Costs

Interest on operating capital is charged from the time an input is applied until harvest and is calculated at a nominal rate of 5.75 percent. Interest on intermediate term capital, primarily equipment, is calculated using a rate of 6.0 percent. A general overhead charge, calculated at approximately 2.5 percent of operating expenses, is included to cover unallocated whole-farm costs such as office expenses, legal and accounting fees,

cell phones, internet service and utilities. Irrigation power is not included as part of general farm utilities.

### Sensitivity Analysis

Impacts of changes in crop price and yield assumptions on net returns, known as sensitivity or ranging analysis, can be found in Table 6.

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TABLE 1. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Barley	1.25	ton	180.00	225.00	
<b>TOTAL GROSS RETURNS</b>	1.25	ton		225.00	
<b>OPERATING COSTS</b>					
<b>Seed:</b>				<b>92.00</b>	
Alfalfa Seed, "Ladek"	16.00	lb	4.50	72.00	
Barley Seed, "Champion"	80.00	lb	0.25	20.00	
<b>Fertilizer:</b>				<b>62.55</b>	
Nitrogen (Urea)	25.00	lb N	0.69	17.25	
P2O5 (Phosphorus), Dry	70.00	lb P	0.57	39.90	
Sulfur, Elemental	20.00	lb S	0.27	5.40	
<b>Custom:</b>				<b>31.00</b>	
Fertilizer spreader, 30'	1.00	acre	1.00	1.00	
Custom Combine	1.00	acre	30.00	30.00	
<b>Labor</b>				<b>60.29</b>	
Equipment Operator Labor	3.22	hrs	17.80	57.34	
Truck Driver Labor	0.10	hrs	13.80	1.38	
Non-Machine Labor	0.22	hrs	7.15	1.57	
<b>Machinery</b>				<b>56.41</b>	
Fuel-Gas	0.00	gal	3.40	0.00	
Fuel-Diesel	8.45	gal	3.50	29.59	
Fuel-Road Diesel	2.82	gal	3.95	11.15	
Lube				6.11	
Machinery Repair				9.56	
Interest on Operating Capital @ 5.75%				7.75	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>310.00</b>	
<b>TOTAL OPERATING COSTS/TON</b>				<b>248.00</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>-85.00</b>	

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TABLE 1. CONTINUED

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
General Overhead				5.50	
Land Rent				52.73	
Management Fee				7.50	
Property Taxes				0.00	
Property Insurance				1.83	
Investment Repairs				0.00	
TOTAL CASH OVERHEAD COSTS/ACRE				67.56	
TOTAL CASH OVERHEAD COSTS/TON				54.05	
TOTAL CASH COSTS/ACRE				377.56	
TOTAL CASH COSTS/TON				302.05	
NET RETURNS ABOVE CASH COSTS				-152.56	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Equipment				69.16	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				69.16	
TOTAL NON-CASH OVERHEAD COSTS/TON				55.33	
TOTAL COST/ACRE				446.72	
TOTAL COST/TON				357.38	
NET RETURNS ABOVE TOTAL COST				-221.72	

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**TABLE 2. COSTS PER ACRE TO PRODUCE ALFALFA**

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent		
Preharvest:								
Plow	0.36	7.68	8.44	2.63	0.00	0.00	18.75	
Cultivate	0.29	6.28	6.90	2.16	0.00	0.00	15.34	
Fertilize	0.05	1.00	1.10	0.31	62.55	1.00	65.96	
Harrow	0.08	1.66	1.82	0.53	0.00	0.00	4.01	
Pack	0.13	2.88	3.16	0.96	0.00	0.00	7.00	
Plant	0.20	4.20	4.61	1.39	92.00	0.00	102.19	
<b>TOTAL PREHARVEST COSTS</b>	<b>1.11</b>	<b>23.70</b>	<b>26.03</b>	<b>7.98</b>	<b>154.55</b>	<b>1.00</b>	<b>213.26</b>	
Harvest:								
Combine	0.22	1.57	0.00	0.00	0.00	30.00	31.57	
Crop Hauling	0.38	8.01	2.91	1.21	0.00	0.00	12.13	
<b>TOTAL HARVEST COSTS</b>	<b>0.60</b>	<b>9.58</b>	<b>2.91</b>	<b>1.21</b>	<b>0.00</b>	<b>30.00</b>	<b>43.70</b>	
Annual:								
General Pickup Use	1.20	25.63	11.15	6.22	0.00	0.00	43.00	
General Truck Use	0.08	1.38	0.65	0.27	0.00	0.00	2.30	
<b>TOTAL ANNUAL COSTS</b>	<b>1.28</b>	<b>27.01</b>	<b>11.80</b>	<b>6.48</b>	<b>0.00</b>	<b>0.00</b>	<b>45.30</b>	
Interest on Operating Capital at 5.75%							7.75	
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>2.99</b>	<b>60.29</b>	<b>40.74</b>	<b>15.67</b>	<b>154.55</b>	<b>31.00</b>	<b>310.00</b>	

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TABLE 2. CONTINUED

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent		
CASH OVERHEAD:								
General Overhead							5.50	
Land Rent							52.73	
Management Fee							7.50	
Property Taxes							0.00	
Property Insurance							1.83	
Investment Repairs							0.00	
TOTAL CASH OVERHEAD COSTS/ACRE							67.56	
TOTAL CASH COSTS/ACRE							377.56	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost Capital Recovery				
Equipment		649.90		69.16			69.16	
TOTAL NON-CASH OVERHEAD COSTS							69.16	
TOTAL COSTS/ACRE							446.72	

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TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA

	OCT 12	NOV 12	DEC 12	JAN 13	FEB 13	MAR 13	APR 13	MAY 13	JUN 13	JUL 13	AUG 13	SEP 13	Total
Preharvest:													
Plow	18.75												18.75
Cultivate							15.34						15.34
Fertilize							65.96						65.96
Harrow								4.01					4.01
Pack								7.00					7.00
Plant								102.19					102.19
<b>TOTAL PREHARVEST COSTS</b>	<b>18.75</b>						<b>81.30</b>	<b>113.20</b>					<b>213.26</b>
Harvest:													
Combine												31.57	31.57
Crop Hauling												12.13	12.13
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>						<b>0.00</b>	<b>0.00</b>				<b>43.70</b>	<b>43.70</b>
Annual:													
General Pickup Use	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	43.00
General Truck Use	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	2.30
<b>TOTAL ANNUAL COSTS</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>3.77</b>	<b>45.30</b>
Interest on Operating Capital @5.75%	0.11	0.13	0.14	0.16	0.18	0.20	0.61	1.17	1.18	1.20	1.22	1.45	7.75
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>22.64</b>	<b>3.90</b>	<b>3.92</b>	<b>3.94</b>	<b>3.96</b>	<b>3.97</b>	<b>85.68</b>	<b>118.14</b>	<b>4.96</b>	<b>4.98</b>	<b>5.00</b>	<b>48.93</b>	<b>310.00</b>
CASH OVERHEAD													
General Overhead												5.50	5.50
Land Rent												52.73	52.73
Management Fee												7.50	7.50
Property Taxes				0.00						0.00			0.00
Property Insurance				0.92						0.92			1.83
Investment Repairs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.92</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.92</b>	<b>0.00</b>	<b>65.73</b>	<b>67.56</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>22.64</b>	<b>3.90</b>	<b>3.92</b>	<b>4.85</b>	<b>3.96</b>	<b>3.97</b>	<b>85.68</b>	<b>118.14</b>	<b>4.96</b>	<b>5.89</b>	<b>5.00</b>	<b>114.66</b>	<b>377.56</b>

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TABLE 4. HOURLY EQUIPMENT COSTS

Yr	Description	Alfalfa	Total	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel		
13	Pickup 1 - 3/4 ton	60	250	18.32	0.35	0.00	5.18	9.29	14.47	33.15
13	Field cultivator, 12'	15	30	12.46	0.35	0.00	0.69	0.00	0.69	13.49
13	Spike tooth harrow, 25'	4	20	6.23	0.17	0.00	0.13	0.00	0.13	6.53
13	Tractor, 105HP	61	400	13.18	0.44	0.00	6.06	21.33	27.39	41.01
13	Truck 1 - 2 ton, used	23	150	10.60	0.33	0.00	3.23	7.76	10.99	21.92
13	Fertilizer spreader	2	20	0.05	0.00	0.00	0.00	0.00	0.00	0.06
13	Moldboard plow, 4-btm, used	18	20	33.22	0.92	0.00	0.65	0.00	0.65	34.79
13	Roller-packer, 12', used	7	20	20.76	0.58	0.00	0.44	0.00	0.44	21.77
13	Grain drill, 12', used	10	20	37.31	0.96	0.00	0.39	0.00	0.39	38.66



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TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
13	Pickup 1 - 3/4 ton	37,000.00	8	5,000.00	5,453.15	105.00	0.00	5,558.15
13	Field cultivator, 12'	4,500.00	15	432.03	444.77	12.33	0.00	457.10
13	Spike tooth harrow, 25'	1,500.00	15	144.01	148.26	4.11	0.00	152.37
13	Tractor, 105HP	75,000.00	20	9,623.36	6,277.23	211.56	0.00	6,488.79
13	Truck 1 - 2 ton, used	20,000.00	15	3,893.65	1,891.97	59.73	0.00	1,951.71
13	Fertilizer spreader	10.00	10	1.77	1.22	0.03	0.00	1.25
13	Moldboard plow, 4-btm, used	8,000.00	15	768.05	790.70	21.92	0.00	812.62
13	Roller-packer, 12', used	5,000.00	15	480.03	494.19	13.70	0.00	507.89
13	Grain drill, 12', used	8,000.00	12	1,108.05	888.53	22.77	0.00	911.30
TOTAL		159,010.00	-	21,450.95	16,390.04	451.15	0.00	16,841.19
84% of New Cost*		133,568.40	-	18,018.80	13,767.63	378.97	0.00	14,146.60

\*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
TOTAL INVESTMENT	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
General Overhead	50.00	acre	5.50	275.00
Land Rent	50.00	acre	52.73	2,636.50
Management Fee	50.00	acre	7.50	375.00

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TABLE 6. RANGING ANALYSIS - ALFALFA

COSTS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE ALFALFA

	YIELD(TON)						
	1.10	1.15	1.20	1.25	1.30	1.35	1.40
OPERATING COSTS/ACRE:							
Preharvest	213.26	213.26	213.26	213.26	213.26	213.26	213.26
Harvest	42.25	42.73	43.22	43.70	44.19	44.67	45.16
Annual	45.30	45.30	45.30	45.30	45.30	45.30	45.30
Interest on Operating Capital @ 5.75%	7.75	7.75	7.75	7.75	7.75	7.75	7.75
TOTAL OPERATING COSTS/ACRE	308.55	309.03	309.52	310.00	310.49	310.97	311.46
TOTAL OPERATING COSTS/TON	280.50	268.72	257.93	248.00	238.84	230.35	222.47
CASH OVERHEAD COSTS/ACRE	67.56	67.56	67.56	67.56	67.56	67.56	67.56
TOTAL CASH COSTS/ACRE	376.11	376.59	377.08	377.56	378.05	378.54	379.02
TOTAL CASH COSTS/TON	341.92	327.47	314.23	302.05	290.81	280.40	270.73
NON-CASH OVERHEAD COSTS/ACRE	69.16	69.16	69.16	69.16	69.16	69.16	69.16
TOTAL COSTS/ACRE	445.27	445.75	446.24	446.72	447.21	447.69	448.18
TOTAL COSTS/TON	404.79	387.61	371.86	357.38	344.01	331.62	320.13

## Net Return Per Acre Above Operating Costs For Alfalfa

PRICE (\$/ton)	YIELD (ton/acre)						
	1.10	1.15	1.20	1.25	1.30	1.35	1.40
Barley							
150.00	-143.55	-136.53	-129.52	-122.50	-115.49	-108.47	-101.46
160.00	-132.55	-125.03	-117.52	-110.00	-102.49	-94.97	-87.46
170.00	-121.55	-113.53	-105.52	-97.50	-89.49	-81.47	-73.46
180.00	-110.55	-102.03	-93.52	-85.00	-76.49	-67.97	-59.46
190.00	-99.55	-90.53	-81.52	-72.50	-63.49	-54.47	-45.46
200.00	-88.55	-79.03	-69.52	-60.00	-50.49	-40.97	-31.46
210.00	-77.55	-67.53	-57.52	-47.50	-37.49	-27.47	-17.46

## Net Return Per Acre Above Cash Costs For Alfalfa

PRICE (\$/ton)	YIELD (ton/acre)						
	1.10	1.15	1.20	1.25	1.30	1.35	1.40
Barley							
150.00	-211.11	-204.09	-197.08	-190.06	-183.05	-176.04	-169.02
160.00	-200.11	-192.59	-185.08	-177.56	-170.05	-162.54	-155.02
170.00	-189.11	-181.09	-173.08	-165.06	-157.05	-149.04	-141.02
180.00	-178.11	-169.59	-161.08	-152.56	-144.05	-135.54	-127.02
190.00	-167.11	-158.09	-149.08	-140.06	-131.05	-122.04	-113.02
200.00	-156.11	-146.59	-137.08	-127.56	-118.05	-108.54	-99.02
210.00	-145.11	-135.09	-125.08	-115.06	-105.05	-95.04	-85.02

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**TABLE 6. RANGING ANALYSIS CONTINUED**

Net Return Per Acre Above Total Costs For Alfalfa

PRICE (\$/ton)	YIELD (ton/acre)							
	Barley	1.10	1.15	1.20	1.25	1.30	1.35	1.40
150.00		-280.27	-273.25	-266.24	-259.22	-252.21	-245.19	-238.18
160.00		-269.27	-261.75	-254.24	-246.72	-239.21	-231.69	-224.18
170.00		-258.27	-250.25	-242.24	-234.22	-226.21	-218.19	-210.18
180.00		-247.27	-238.75	-230.24	-221.72	-213.21	-204.69	-196.18
190.00		-236.27	-227.25	-218.24	-209.22	-200.21	-191.19	-182.18
200.00		-225.27	-215.75	-206.24	-196.72	-187.21	-177.69	-168.18
210.00		-214.27	-204.25	-194.24	-184.22	-174.21	-164.19	-154.18