

Eastern Idaho:**Alfalfa Hay Establishment in Grain Stubble**

Ben Eborn

**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 based on the data collected annually by the University of Idaho from agricultural supply companies. The selling price for the commodity is typically an historical average, not a current year's price. The cost estimate shown here is typical for establishing irrigated alfalfa hay. Production practices are based on data from farmers, crop consultants, and extension personnel in eastern Idaho. These aren't University of Idaho recommendations. Production practices most closely resemble those in Bonneville, Clark, Jefferson and Madison counties. 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 production costs.

The Model Farm

The model farm for this costs and returns estimate is a 1,250-acre farm with 1,000 acres in alfalfa hay and 250 acres in grain. Corn may substitute for grain. The alfalfa stand is kept in production four years, including the establishment year. Approximately 250 acres of alfalfa are established every year.

The farm uses a center pivot irrigation system and surface water delivered to the farm from an irrigation district. The irrigation district charges a flat fee per acre for water. Irrigation power use is based only on pressurization (no lift). Power costs per acre-inch of water applied are calculated using 2017 Idaho Power Schedule 24 Agricultural Irrigation Service rates. Power costs per acre-inch

for water pumped from different depths and for different irrigation systems are found in the Crop Input Cost Summary located at:

<https://www.uidaho.edu/cals/idaho-agbiz/crop-budgets>

Production Practices

After the straw from the preceding grain crop is removed, the ground is irrigated and disked. Fertilizer is applied in the spring by a custom applicator. In the spring the ground is roller harrowed, and planted to alfalfa. Alfalfa is harvested twice in the establishment year, July and September. The cost of all harvest operations are based on rates charged by a custom operator, who swaths, rakes, bales and stacks the one-ton bales. No pesticide costs are included in the establishment year since treatments are infrequent and unpredictable. Alfalfa receives 23 inches of water during the growing season, 2 inches in May, 4 inches in June, 6 inches in July, 7 inches in August, and 4 inches in September. An additional 2 inches of water applied to the grain stubble before plowing is also credited to the alfalfa, for a total of 25 inches.

Machinery

Equipment used to establish irrigated alfalfa hay is shown in Tables 4 and 5. Table 4 lists the equipment and their hourly operating and ownership costs, while Table 5 lists the equipment and their annual ownership costs. Machinery ownership cost (capital recovery) is based on 75% of the replacement cost of a new piece of equipment, except for trucks. Capital recovery combines depreciation and interest into a single value. To keep machinery prices current between years in which a comprehensive survey is conducted, machinery prices are adjusted using USDA's Farm Machinery Prices Paid Index.

Equipment prices are collected approximately every five years.

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.

Labor and Management

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 on the following page.

Labor Values

Labor Class	Base Rate	Payroll Overhead	Effective Rate
General Farm Labor	\$9.85	15%	\$11.35
Truck Drivers	\$13.35	15%	\$15.35
Equipment Operators	\$15.75	25%	\$19.70
Irrigation Labor			
Set Move: HL & WL	\$10.75	30%	\$14.00
Continuous Move: CP & L	\$15.75	25%	\$19.70

Set Move includes: handlines and wheellines
 Continuous Move includes: center pivots and linear move
 Payroll overhead for set move systems includes housing

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 based on approximately 5% of the total production costs is included. Prior to

2013, the basis of the 5% charge was expected revenue.

Capital, Land 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 6.25 percent. Interest on intermediate term capital, primarily equipment, is calculated using a nominal 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.

Land rent is based on a one-year cash lease for grain and covers the ownership costs (depreciation, interest, and insurance) of the irrigation system. Because the charge for water, irrigation system repairs and irrigation power costs are listed separately, the land rent may appear low because the land owner in many circumstances pays some or even all these expenses.

Budget Format

In addition to the Background and Assumption pages, this publication has six tables presenting a variety of cost and returns information.

Table 1 shows both expected revenue, based on a specified yield and price, and expenses. Expenses are broken into two main categories: operating and ownership. Operating expenses are those that typically vary with the level of production and involve inputs that are used in a single production cycle. Ownership expenses include a systematic cost recovery over the useful life for inputs used in the production process that have a useful life of more than one year. Machinery and land fall into this category. Operating inputs are organized by category. In addition to the cost per unit and cost per acre for each input, a total cost is given for each category. Table 1 also gives a total of all operating, ownership and total costs per acre, as well as these same categories on a yield basis (per bushel, cwt, ton, etc.).

Table 2 has most of the same cost information presented in Table 1 but the data is organized by operation for both pre-harvest and harvest costs. Operations can define a single activity, such as seed hauling, or multiple activities as in the case of tillage. The quantity of labor is shown for each operation. The cash costs per acre for labor, machinery costs, materials and custom are also specified. Cash overhead expenses are listed separately as are the non-cash overhead.

Table 3 is a monthly cash flow of expenses based on when the operation occurs and when inputs are applied. Field operations are classified as pre-harvest, harvest and post-harvest.

Table 4 lists the equipment used to produce this crop and the costs per hour to operate this equipment. Total annual hours of use for the current crop and for all crops on the farm is also shown.

Table 5 lists the purchase price and salvage value of equipment used to produce this crop, as well annual capital recovery and cash overhead expenses.

Table 6 provides a ranging analysis, sometime referred to as a sensitivity analysis. It shows how the costs and returns per acre will vary as the yield and/or price ranges above and below the base values from Table 1.

Authors

Ben Eborn is a University of Idaho Extension agricultural economist.

Disclaimer

The practices and chemicals specified in the publication are not recommendations. Always read and follow the directions printed on the pesticide label. Due to constantly changing pesticide laws and labels, some pesticides may have been cancelled or had certain uses prohibited. The use of trade names for various products simplifies presentation of this material and should not be considered an endorsement, nor is any criticism implied of similar products not mentioned.

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TABLE 1. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA HAY ESTABLISHMENT

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa	3.50	ton	130.00	455.00	
TOTAL GROSS RETURNS				455.00	
OPERATING COSTS					
Seed:				76.50	
Alfalfa Seed (pvt): inoculated	18.00	lb	4.25	76.50	
Fertilizer:				45.54	
Dry Nitrogen - Pre-plant	16.00	lb	0.40	6.40	
Dry P2O5	78.00	lb	0.38	29.64	
K2O	20.00	lb	0.31	6.20	
Sulfur	15.00	lb	0.22	3.30	
Custom:				131.50	
Custom Fertilize: 0 - 400 lbs	1.00	acre	7.25	7.25	
Custom Swath Hay	2.00	acre	18.00	36.00	
Custom Rake Hay	2.00	acre	6.50	13.00	
Custom Bale Hay: 4x4	3.50	ton	16.00	56.00	
Custom Haul/Stack Hay	3.50	ton	5.50	19.25	
Irrigation:				79.75	
Irrigation Power - Center Pivot	25.00	ac-in	1.94	48.50	
Irrigation Water Assessment - Al	1.00	acre	18.00	18.00	
Irrigation Repairs - CP	25.00	ac-in	0.53	13.25	
Labor				44.51	
Equipment Operator Labor	1.08	hrs	19.70	21.18	
Irrigation Labor - CP	1.04	hrs	19.70	20.49	
General Farm Labor	0.25	hrs	11.35	2.84	
Machinery				20.53	
Fuel-Gas	1.68	gal	2.40	4.04	
Fuel-Diesel	3.30	gal	2.15	7.10	
Fuel-Road Diesel	0.06	gal	2.70	0.17	
Lube				1.70	
Machinery Repair				7.53	
Interest on Operating Capital @ 6.25%				11.27	
TOTAL OPERATING COSTS/ACRE				409.60	
TOTAL OPERATING COSTS/TON				117.03	
NET RETURNS ABOVE OPERATING COSTS				45.40	

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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				10.00	
Land Rent				210.00	
Management Fee				33.00	
Property Taxes				0.00	
Property Insurance				0.76	
Investment Repairs				0.00	
TOTAL CASH OVERHEAD COSTS/ACRE				253.76	
TOTAL CASH OVERHEAD COSTS/TON				72.50	
TOTAL CASH COSTS/ACRE				663.36	
TOTAL CASH COSTS/TON				189.53	
NET RETURNS ABOVE CASH COSTS				-208.36	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Equipment				27.76	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				27.76	
TOTAL NON-CASH OVERHEAD COSTS/TON				7.93	
TOTAL COST/ACRE				691.11	
TOTAL COST/TON				197.46	
NET RETURNS ABOVE TOTAL COST				-236.11	

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TABLE 2. COSTS PER ACRE TO PRODUCE ALFALFA HAY ESTABLISHMENT

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Preharvest:								
Remove Straw	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Irrigate	0.00	20.49	0.00	0.00	48.50	0.00	68.99	
Tillage	0.20	4.61	4.55	4.64	0.00	0.00	13.80	
Fertilize	0.00	0.00	0.00	0.00	45.54	7.25	52.79	
Plant & Pack	0.11	5.42	2.55	2.84	76.50	0.00	87.31	
Irrigation Water Assessment	0.00	0.00	0.00	0.00	18.00	0.00	18.00	
Irrigation Repairs	0.00	0.00	0.00	0.00	13.25	0.00	13.25	
General Pickup Use	0.50	11.82	4.00	1.64	0.00	0.00	17.45	
General 4-Wheeler Use	0.07	1.58	0.04	0.04	0.00	0.00	1.65	
Service Truck Use	0.03	0.59	0.17	0.07	0.00	0.00	0.83	
TOTAL PREHARVEST COSTS	0.90	44.51	11.31	9.22	201.79	7.25	274.08	
Harvest:								
Swath	0.00	0.00	0.00	0.00	0.00	36.00	36.00	
Rake	0.00	0.00	0.00	0.00	0.00	13.00	13.00	
Bale	0.00	0.00	0.00	0.00	0.00	56.00	56.00	
Custom Haul & Stack	0.00	0.00	0.00	0.00	0.00	19.25	19.25	
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	124.25	124.25	
Interest on Operating Capital at 6.25%							11.27	
TOTAL OPERATING COSTS/ACRE	0.90	44.51	11.31	9.22	201.79	131.50	409.60	

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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							10.00	
Land Rent							210.00	
Management Fee							33.00	
Property Taxes							0.00	
Property Insurance							0.76	
Investment Repairs							0.00	
TOTAL CASH OVERHEAD COSTS/ACRE							253.76	
TOTAL CASH COSTS/ACRE							663.36	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost Capital Recovery				
Equipment		263.80		27.76			27.76	
TOTAL NON-CASH OVERHEAD COSTS							27.76	
TOTAL COSTS/ACRE							691.11	

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TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA HAY ESTABLISHMENT

	SEP 14	OCT 14	NOV 14	DEC 14	JAN 15	FEB 15	MAR 15	APR 15	MAY 15	JUN 15	JUL 15	AUG 15	SEP 15	OCT 15	Total
Preharvest:															
Remove Straw															0.00
Irrigate	6.24								5.46	10.91	16.37	19.10		10.91	68.99
Tillage	6.93							6.87							13.80
Fertilize								52.79							52.79
Plant & Pack								87.31							87.31
Irrigation Water Assessment								18.00							18.00
Irrigation Repairs								13.25							13.25
General Pickup Use	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	17.45
General 4-Wheeler Use	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	1.65
Service Truck Use	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.83
TOTAL PREHARVEST COSTS	14.60	1.42	1.42	1.42	1.42	1.42	1.42	179.64	6.88	12.34	17.79	20.52	1.42	12.34	274.08
Harvest:															
Swath											18.00		18.00		36.00
Rake											6.50		6.50		13.00
Bale											24.00		32.00		56.00
Custom Haul & Stack											8.25		11.00		19.25
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.75	0.00	67.50	0.00	124.25
Interest on Operating Capital @6.25%	0.08	0.08	0.09	0.10	0.11	0.11	0.12	1.06	1.09	1.16	1.54	1.65	2.01	2.07	11.27
TOTAL OPERATING COSTS/ACRE	14.68	1.51	1.52	1.52	1.53	1.54	1.54	180.70	7.97	13.49	76.09	22.17	70.93	14.41	409.60
CASH OVERHEAD															
General Overhead	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	10.00
Land Rent							210.00								210.00
Management Fee	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	33.00
Property Taxes															0.00
Property Insurance								0.76							0.76
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	0.00	0.00
TOTAL CASH OVERHEAD COSTS	3.07	3.07	3.07	3.07	3.07	3.07	213.07	3.83	3.07	3.07	3.07	3.07	3.07	3.07	253.76
TOTAL CASH COSTS/ACRE	17.75	4.58	4.59	4.59	4.60	4.61	214.62	184.53	11.04	16.56	79.16	25.24	74.01	17.48	663.36

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TABLE 4. HOURLY EQUIPMENT COSTS

ALFALFA HAY ESTABLISHMENT		Total		Cash Overhead			Operating		Total	Total
Yr	Description	Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel	Oper.	Costs/Hr.
15	4-wheeler	17	90	7.01	0.19	0.00	0.56	0.60	1.16	8.36
15	Grain Drill - 24'	27	150	30.69	0.68	0.00	11.97	0.00	11.97	43.33
15	Packer - 24'	27	35	33.04	0.92	0.00	1.45	0.00	1.45	35.41
15	Pickup 1 - 3/4 ton	63	800	8.47	0.16	0.00	3.28	7.99	11.27	19.90
15	Pickup 2 - 3/4 ton	63	800	8.47	0.16	0.00	3.28	7.99	11.27	19.90
15	Roller-harrow -24'	24	150	36.99	0.95	0.00	12.35	0.00	12.35	50.28
15	Tractor - 200hp	84	500	24.41	0.82	0.00	11.46	21.22	32.68	57.90
15	Service Truck	6	80	39.30	1.24	0.00	2.86	6.75	9.61	50.14
15	Tandem Disk - 24'	25	120	34.25	0.95	0.00	10.02	0.00	10.02	45.22

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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	
15	4-wheeler	6,000.00	10	1,500.00	701.41	18.75	0.00	720.16
15	Grain Drill - 24'	37,000.00	8	8,354.09	5,114.27	113.39	0.00	5,227.65
15	Packer - 24'	13,000.00	15	1,248.08	1,284.89	35.62	0.00	1,320.52
15	Pickup 1 - 3/4 ton	42,000.00	5	13,750.00	7,531.45	139.38	0.00	7,670.82
15	Pickup 2 - 3/4 ton	42,000.00	5	13,750.00	7,531.45	139.38	0.00	7,670.82
15	Roller-harrow -24'	55,500.00	12	7,687.12	6,164.21	157.97	0.00	6,322.17
15	Tractor - 200hp	162,000.00	20	20,786.46	13,558.83	456.97	0.00	14,015.79
15	Service Truck	41,000.00	20	3,000.00	3,493.01	110.00	0.00	3,603.01
15	Tandem Disk - 24'	46,200.00	15	4,435.50	4,566.32	126.59	0.00	4,692.91
TOTAL		444,700.00	-	74,511.25	49,945.83	1,298.03	0.00	51,243.86
90% of New Cost*		400,230.00	-	67,060.12	44,951.25	1,168.23	0.00	46,119.47

*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	250	acre	10.00	2,500.00
Land Rent	250	acre	210.00	52,500.00
Management Fee	250	acre	33.00	8,250.00

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TABLE 6. RANGING ANALYSIS - ALFALFA HAY ESTABLISHMENT

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

	YIELD(TON)						
	2.00	2.50	3.00	3.50	4.00	4.50	5.00
OPERATING COSTS/ACRE:							
Preharvest	274.08	274.08	274.08	274.08	274.08	274.08	274.08
Harvest	124.25	124.25	124.25	124.25	124.25	124.25	124.25
Interest on Operating Capital @ 6.25%	11.27	11.27	11.27	11.27	11.27	11.27	11.27
TOTAL OPERATING COSTS/ACRE	409.60	409.60	409.60	409.60	409.60	409.60	409.60
TOTAL OPERATING COSTS/TON	204.80	163.84	136.53	117.03	102.40	91.02	81.92
CASH OVERHEAD COSTS/ACRE	253.76	253.76	253.76	253.76	253.76	253.76	253.76
TOTAL CASH COSTS/ACRE	663.36	663.36	663.36	663.36	663.36	663.36	663.36
TOTAL CASH COSTS/TON	331.68	265.34	221.12	189.53	165.84	147.41	132.67
NON-CASH OVERHEAD COSTS/ACRE	27.76	27.76	27.76	27.76	27.76	27.76	27.76
TOTAL COSTS/ACRE	691.11	691.11	691.11	691.11	691.11	691.11	691.11
TOTAL COSTS/TON	345.56	276.45	230.37	197.46	172.78	153.58	138.22

Net Return Per Acre Above Operating Costs For Alfalfa Hay Establishment

PRICE (\$/ton)	YIELD (ton/acre)							
	Alfalfa	2.00	2.50	3.00	3.50	4.00	4.50	5.00
120.00		-169.60	-109.60	-49.60	10.40	70.40	130.40	190.40
125.00		-159.60	-97.10	-34.60	27.90	90.40	152.90	215.40
130.00		-149.60	-84.60	-19.60	45.40	110.40	175.40	240.40
135.00		-139.60	-72.10	-4.60	62.90	130.40	197.90	265.40
140.00		-129.60	-59.60	10.40	80.40	150.40	220.40	290.40
145.00		-119.60	-47.10	25.40	97.90	170.40	242.90	315.40
150.00		-109.60	-34.60	40.40	115.40	190.40	265.40	340.40

Net Return Per Acre Above Cash Costs For Alfalfa Hay Establishment

PRICE (\$/ton)	YIELD (ton/acre)							
	Alfalfa	2.00	2.50	3.00	3.50	4.00	4.50	5.00
120.00		-423.36	-363.36	-303.36	-243.36	-183.36	-123.36	-63.36
125.00		-413.36	-350.86	-288.36	-225.86	-163.36	-100.86	-38.36
130.00		-403.36	-338.36	-273.36	-208.36	-143.36	-78.36	-13.36
135.00		-393.36	-325.86	-258.36	-190.86	-123.36	-55.86	11.64
140.00		-383.36	-313.36	-243.36	-173.36	-103.36	-33.36	36.64
145.00		-373.36	-300.86	-228.36	-155.86	-83.36	-10.86	61.64
150.00		-363.36	-288.36	-213.36	-138.36	-63.36	11.64	86.64

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TABLE 6. RANGING ANALYSIS CONTINUED

Net Return Per Acre Above Total Costs For Alfalfa Hay Establishment

PRICE (\$/ton)	YIELD (ton/acre)							
	Alfalfa	2.00	2.50	3.00	3.50	4.00	4.50	5.00
120.00		-451.11	-391.11	-331.11	-271.11	-211.11	-151.11	-91.11
125.00		-441.11	-378.61	-316.11	-253.61	-191.11	-128.61	-66.11
130.00		-431.11	-366.11	-301.11	-236.11	-171.11	-106.11	-41.11
135.00		-421.11	-353.61	-286.11	-218.61	-151.11	-83.61	-16.11
140.00		-411.11	-341.11	-271.11	-201.11	-131.11	-61.11	8.89
145.00		-401.11	-328.61	-256.11	-183.61	-111.11	-38.61	33.89
150.00		-391.11	-316.11	-241.11	-166.11	-91.11	-16.11	58.89