



Magic Valley

## Southcentral Idaho: Magic Valley

### Alfalfa Hay Production

Paul Patterson

## 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 data collected annually by the University of Idaho from agricultural supply companies. The selling price for the commodity is an historical average, not a current year's forecast price. The cost estimate shown here is typical for growing alfalfa hay under irrigation in the Magic Valley of southcentral Idaho. Production practices are based on data from farmers, crop consultants, and extension personnel. These aren't University of Idaho recommendations. Production practices most closely represent those in Cassia, Minidoka, Jerome, Gooding, and Twin Falls 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

This costs and returns estimate models a 2,200-acre farm with 400 acres in alfalfa hay, 550 acres in potatoes, 550 acres in sugarbeets, and 700 acres in some combination of grain, corn or dry beans. The alfalfa stand is kept in production 4 years. Approximately 100 acres of alfalfa are established each 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 2015 Idaho Power Schedule 24 Agricultural Irrigation Service rates. Power costs per acre-inch for water pumped from different depths and for different irrigation systems is found in the annual Crop Input Cost Summary

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

### Production Practices

Tillage costs are incurred only in the year hay is established and these are prorated along with other

establishment costs over the alfalfa hay's four production years. This is approximately \$75 per acre assuming a 4-year stand life. Alfalfa hay is cut four times, then raked, baled, hauled, and stacked by a custom operator. A total of seven tons of hay are produced.

Fertilizer is applied by a custom applicator in the spring before the stand breaks winter dormancy. An herbicide is applied along with the fertilizer. An insecticide is custom applied by air in June for aphid and weevil control. Alfalfa hay receives about 36 inches of water during the growing season: 3.0 inches in April, 5 inches in May, 7 inches in June, 7 inches in July, 7 inches in August, 5 inches in September, and 2 inches in October.

### Machinery

Equipment used to produce 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. Truck prices are for a used vehicle with a new bed. 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 publication 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	\$9.25	15%	\$10.65
Truck Drivers	\$12.50	15%	\$14.40
Equipment Operators	\$14.80	25%	\$18.50
Irrigation Labor			
Set Move: HL & WL	\$10.10	30%	\$13.15
Continuous Move: CP & L	\$14.80	25%	\$18.50

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 5.75 percent. Interest on intermediate term capital, primarily equipment, is calculated using a nominal rate of 5.5 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 multiple-year cash lease for hay and covers the irrigation system ownership costs (depreciation, interest, and insurance). Since charges for irrigation water, repairs and power costs are listed separately, land rent may appear low because land owners pay some or even all these expenses in many cash leases.

#### 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. Table 6 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

Paul Patterson is a retired 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

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa Hay	7.00	ton	150.00	1,050.00	
TOTAL GROSS RETURNS	7.00	ton		1,050.00	
OPERATING COSTS					
<b>Fertilizer:</b>				<b>96.35</b>	
Dry P2O5	95.00	lb	0.53	50.35	
K2O	55.00	lb	0.44	24.20	
Dry Nitrogen	20.00	lb	0.55	11.00	
Sulfur	40.00	lb	0.27	10.80	
<b>Pesticide:</b>				<b>23.29</b>	
Metribuzin 75DF	1.00	lb	14.65	14.65	
Warrior II w/ Zeon Technology	3.00	fl oz	2.88	8.64	
<b>Custom:</b>				<b>283.50</b>	
Custom Fertilize w/ Herbicide	1.00	acre	8.75	8.75	
Custom Swath Hay	4.00	acre	17.25	69.00	
Custom Rake & Bale: 4'x4'x8'	7.00	ton	22.00	154.00	
Custom Stack: 4'x4'x8'	7.00	ton	6.25	43.75	
Custom Air Spray - 3 gallon	1.00	acre	8.00	8.00	
<b>Irrigation:</b>				<b>132.36</b>	
Water Assessment	1.00	acre	45.60	45.60	
Irrigation Repairs - CP	36.00	ac-in	0.51	18.36	
Irrigation Power - CP	36.00	ac-in	1.90	68.40	
<b>Labor</b>				<b>44.77</b>	
Equipment Operator Labor	0.98	hrs	18.50	18.13	
Irrigation Labor: CP	1.44	hrs	18.50	26.64	
<b>Machinery</b>				<b>9.36</b>	
Fuel-Gas	2.47	gal	2.50	6.17	
Fuel-Diesel	0.00	gal	2.30	0.00	
Fuel-Road Diesel	0.19	gal	2.85	0.53	
Lube				1.01	
Machinery Repair				1.64	
Interest on Operating Capital @ 5.75%				17.38	
TOTAL OPERATING COSTS/ACRE				607.00	
TOTAL OPERATING COSTS/TON				86.71	
NET RETURNS ABOVE OPERATING COSTS				443.00	

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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				15.00	
Land Rent				275.00	
Management Fee				45.00	
Property Taxes				0.00	
Property Insurance				0.94	
Investment Repairs				0.00	
TOTAL CASH OVERHEAD COSTS/ACRE				335.94	
TOTAL CASH OVERHEAD COSTS/TON				47.99	
TOTAL CASH COSTS/ACRE				942.94	
TOTAL CASH COSTS/TON				134.71	
NET RETURNS ABOVE CASH COSTS				107.06	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Amort. Est. Cost				77.74	
Equipment				9.91	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				87.65	
TOTAL NON-CASH OVERHEAD COSTS/TON				12.52	
TOTAL COST/ACRE				1,030.59	
TOTAL COST/TON				147.23	
NET RETURNS ABOVE TOTAL COST				19.41	

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

Operation	Operation Time	Cash and Labor Costs per Acre					Total Cost	Your Cost
	(Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent		
Preharvest:								
Fertilize	0.00	0.00	0.00	0.00	111.00	8.75	119.75	
Water Assessment	0.00	0.00	0.00	0.00	45.60	0.00	45.60	
Irrigation Repairs	0.00	0.00	0.00	0.00	18.36	0.00	18.36	
Irrigate	0.00	26.64	0.00	0.00	68.40	0.00	95.04	
Air Spray	0.00	0.00	0.00	0.00	8.64	8.00	16.64	
General Pickup Use	0.74	16.47	6.17	2.43	0.00	0.00	25.07	
Service Truck Use	0.08	1.66	0.53	0.22	0.00	0.00	2.41	
<b>TOTAL PREHARVEST COSTS</b>	<b>0.82</b>	<b>44.77</b>	<b>6.71</b>	<b>2.65</b>	<b>252.00</b>	<b>16.75</b>	<b>322.88</b>	
Harvest :								
Swath	0.00	0.00	0.00	0.00	0.00	69.00	69.00	
Rake & Bale	0.00	0.00	0.00	0.00	0.00	154.00	154.00	
Stack with Short Haul	0.00	0.00	0.00	0.00	0.00	43.75	43.75	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>266.75</b>	<b>266.75</b>	
Interest on Operating Capital at 5.75%							17.38	
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>0.82</b>	<b>44.77</b>	<b>6.71</b>	<b>2.65</b>	<b>252.00</b>	<b>283.50</b>	<b>607.00</b>	

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TABLE 2. CONTINUED

	Operation	Cash and Labor Costs per Acre						
Operation	Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
General Overhead							15.00	
Land Rent							275.00	
Management Fee							45.00	
Property Taxes							0.00	
Property Insurance							0.94	
Investment Repairs							0.00	
TOTAL CASH OVERHEAD COSTS/ACRE							335.94	
TOTAL CASH COSTS/ACRE							942.94	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Amort. Est. Cost		272.50		77.74			77.74	
Equipment		85.79		9.91			9.91	
TOTAL NON-CASH OVERHEAD COSTS		358.29		87.65			87.65	
TOTAL COSTS/ACRE							1,030.59	

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TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA HAY

	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:													
Fertilize	119.75												119.75
Water Assessment						45.60							45.60
Irrigation Repairs						18.36							18.36
Irrigate						7.92	13.20	18.48	18.48	18.48	13.20	5.28	95.04
Air Spray								16.64					16.64
General Pickup Use	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	25.07
Service Truck Use	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.41
TOTAL PREHARVEST COSTS	122.04	2.29	2.29	2.29	2.29	74.17	15.49	37.41	20.77	20.77	15.49	7.57	322.88
Harvest :													
Swath							17.25		17.25	17.25	17.25		69.00
Rake & Bale							55.00		44.00	33.00	22.00		154.00
Stack with Short Haul							15.63		12.50	9.38	6.25		43.75
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	0.00	87.88	0.00	73.75	59.63	45.50	0.00	266.75
Interest on Operating Capital @5.75%	0.58	0.60	0.61	0.62	0.63	0.98	1.48	1.66	2.11	2.50	2.79	2.83	17.38
TOTAL OPERATING COSTS/ACRE	122.63	2.89	2.90	2.91	2.92	75.15	104.84	39.07	96.63	82.89	63.78	10.40	607.00
CASH OVERHEAD													
General Overhead	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	15.00
Land Rent													275.00
Management Fee	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	45.00
Property Taxes													0.00
Property Insurance						0.94							0.94
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
TOTAL CASH OVERHEAD COSTS	5.00	5.00	5.00	5.00	5.00	5.94	5.00	5.00	5.00	5.00	5.00	5.00	335.94
TOTAL CASH COSTS/ACRE	127.63	7.89	7.90	7.91	7.92	81.09	109.84	44.07	101.63	87.89	68.78	15.40	942.94

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TABLE 4. HOURLY EQUIPMENT COSTS

Yr	Description	Alfalfa Hay	Total	Cash Overhead			Operating			Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel	Total Oper.	
15	Pickup 1 - 3/4 ton	100	750	8.57	0.16	0.00	3.28	8.32	11.60	20.33
15	Pickup 2 - 3/4 ton	100	750	8.57	0.16	0.00	3.28	8.32	11.60	20.33
15	Service Truck	30	80	36.69	1.21	0.00	2.87	7.13	9.99	47.89
15	Pickup 3 - 3/4 ton	48	325	11.91	0.34	0.00	3.28	8.32	11.60	23.85
15	Pickup 4 - 3/4 ton	48	325	11.91	0.34	0.00	3.28	8.32	11.60	23.85



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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	Pickup 1 - 3/4 ton	41,000.00	5	13,750.00	7,137.56	136.88	0.00	7,274.43
15	Pickup 2 - 3/4 ton	41,000.00	5	13,750.00	7,137.56	136.88	0.00	7,274.43
15	Service Truck	40,000.00	20	3,000.00	3,261.14	107.50	0.00	3,368.64
15	Pickup 3 - 3/4 ton	41,000.00	12	7,500.00	4,299.48	121.25	0.00	4,420.73
15	Pickup 4 - 3/4 ton	41,000.00	12	7,500.00	4,299.48	121.25	0.00	4,420.73
TOTAL		204,000.00	-	45,500.00	26,135.21	623.75	0.00	26,758.96
90% of New Cost*		183,600.00	-	40,950.00	23,521.69	561.38	0.00	24,083.06

\*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								
Amort. Est. Cost	109,000.00	4	0.00	31,097.10	272.50	0.00	0.00	31,369.60
TOTAL INVESTMENT	109,000.00	-	0.00	31,097.10	272.50	0.00	0.00	31,369.60

## ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
General Overhead	400	acre	15.00	6,000.00
Land Rent	400	acre	275.00	110,000.00
Management Fee	400	acre	45.00	18,000.00

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TABLE 6. RANGING ANALYSIS - ALFALFA HAY

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

	YIELD(TON)						
	5.50	6.00	6.50	7.00	7.50	8.00	8.50
OPERATING COSTS/ACRE:							
Preharvest	322.88	322.88	322.88	322.88	322.88	322.88	322.88
Harvest	266.75	266.75	266.75	266.75	266.75	266.75	266.75
Interest on Operating Capital @ 5.75%	17.38	17.38	17.38	17.38	17.38	17.38	17.38
TOTAL OPERATING COSTS/ACRE	607.00	607.00	607.00	607.00	607.00	607.00	607.00
TOTAL OPERATING COSTS/TON	110.36	101.17	93.39	86.71	80.93	75.88	71.41
CASH OVERHEAD COSTS/ACRE	335.94	335.94	335.94	335.94	335.94	335.94	335.94
TOTAL CASH COSTS/ACRE	942.94	942.94	942.94	942.94	942.94	942.94	942.94
TOTAL CASH COSTS/TON	171.44	157.16	145.07	134.71	125.73	117.87	110.93
NON-CASH OVERHEAD COSTS/ACRE	87.65	87.65	87.65	87.65	87.65	87.65	87.65
TOTAL COSTS/ACRE	1,030.59	1,030.59	1,030.59	1,030.59	1,030.59	1,030.59	1,030.59
TOTAL COSTS/TON	187.38	171.77	158.55	147.23	137.41	128.82	121.25

## Net Return Per Acre Above Operating Costs For Alfalfa Hay

PRICE (\$/ton)	YIELD (ton/acre)						
Alfalfa Hay	5.50	6.00	6.50	7.00	7.50	8.00	8.50
145.00	190.50	263.00	335.50	408.00	480.50	553.00	625.50
150.00	218.00	293.00	368.00	443.00	518.00	593.00	668.00
155.00	245.50	323.00	400.50	478.00	555.50	633.00	710.50
160.00	273.00	353.00	433.00	513.00	593.00	673.00	753.00
165.00	300.50	383.00	465.50	548.00	630.50	713.00	795.50
170.00	328.00	413.00	498.00	583.00	668.00	753.00	838.00
175.00	355.50	443.00	530.50	618.00	705.50	793.00	880.50

## Net Return Per Acre Above Cash Costs For Alfalfa Hay

PRICE (\$/ton)	YIELD (ton/acre)						
Alfalfa Hay	5.50	6.00	6.50	7.00	7.50	8.00	8.50
145.00	-145.44	-72.94	-0.44	72.06	144.56	217.06	289.56
150.00	-117.94	-42.94	32.06	107.06	182.06	257.06	332.06
155.00	-90.44	-12.94	64.56	142.06	219.56	297.06	374.56
160.00	-62.94	17.06	97.06	177.06	257.06	337.06	417.06
165.00	-35.44	47.06	129.56	212.06	294.56	377.06	459.56
170.00	-7.94	77.06	162.06	247.06	332.06	417.06	502.06
175.00	19.56	107.06	194.56	282.06	369.56	457.06	544.56

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**TABLE 6. RANGING ANALYSIS CONTINUED**

Net Return Per Acre Above Total Costs For Alfalfa Hay

PRICE (\$/ton)	YIELD (ton/acre)						
Alfalfa Hay	5.50	6.00	6.50	7.00	7.50	8.00	8.50
145.00	-233.09	-160.59	-88.09	-15.59	56.91	129.41	201.91
150.00	-205.59	-130.59	-55.59	19.41	94.41	169.41	244.41
155.00	-178.09	-100.59	-23.09	54.41	131.91	209.41	286.91
160.00	-150.59	-70.59	9.41	89.41	169.41	249.41	329.41
165.00	-123.09	-40.59	41.91	124.41	206.91	289.41	371.91
170.00	-95.59	-10.59	74.41	159.41	244.41	329.41	414.41
175.00	-68.09	19.41	106.91	194.41	281.91	369.41	456.91