



Magic Valley

Southcentral Idaho: Magic Valley

Alfalfa Hay Establishment with Oats

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 establishing alfalfa hay with oats 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

After the previous grain crop is harvested, the ground is irrigated and plowed. Manure is applied before the

ground is plowed. In the spring, the ground is roller harrowed. The alfalfa seed is custom applied along with the fertilizer in April, and the oats are then seeded. The field is harvested twice during the establishment year. Alfalfa/oat hay is harvested in July and alfalfa hay is harvested in September. The hay is harvested by a custom operator who swaths, rakes, bales and stacks the hay in 4'x4'x8' bales. No insecticide is applied in the establishment year. The new seeding of alfalfa hay receives a total of 25 inches of water: 3 inches in May, 6 inches in June, 6 inches in July, 3 inches in August, 3 inches in September, and 2 inches in October. The two inches of water applied before fall tillage is also credited to this crop.

Machinery

Equipment used to establish 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 on the following page.

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 crop 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.

The land rent is based on a multiple-year cash lease for hay and it covers the irrigation system ownership costs (depreciation, interest, and insurance). Since charges for irrigation water, repairs and power 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, sometimes 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

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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-OAT HAY

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa-Oat Hay	2.00	ton	90.00	180.00	
Alfalfa	2.00	ton	150.00	300.00	
TOTAL GROSS RETURNS	4.00	ton		480.00	
OPERATING COSTS					
Seed:				98.50	
Alfalfa Seed (pvt.): Inoculated	20.00	lb	4.25	85.00	
Oat Seed	45.00	lb	0.30	13.50	
Fertilizer:				97.30	
Dry Nitrogen	25.00	lb	0.55	13.75	
Dry P2O5	75.00	lb	0.53	39.75	
K2O	75.00	lb	0.44	33.00	
Sulfur	40.00	lb	0.27	10.80	
Custom:				189.00	
Custom Haul/Apply Manure	11.00	ton	3.00	33.00	
Custom Fertilize & Seed	1.00	acre	8.50	8.50	
Custom Swath Hay	2.00	acre	17.25	34.50	
Custom Rake & Bale: 4'x4'x8'	4.00	ton	22.00	88.00	
Custom Stack: 4'x4'x8'	4.00	ton	6.25	25.00	
Irrigation:				105.85	
Irrigation Power - CP	25.00	ac-in	1.90	47.50	
Irrigation Repairs - CP	25.00	ac-in	0.51	12.75	
Water Assessment	1.00	acre	45.60	45.60	
Labor				49.85	
Equipment Operator Labor	1.52	hrs	18.50	28.15	
Irrigation Labor: CP	1.00	hrs	18.50	18.50	
General Farm Labor	0.30	hrs	10.65	3.20	
Machinery				31.16	
Fuel-Gas	2.47	gal	2.50	6.17	
Fuel-Diesel	5.63	gal	2.30	12.94	
Lube				2.87	
Machinery Repair				9.18	
Interest on Operating Capital @ 5.75%				17.48	
TOTAL OPERATING COSTS/ACRE				589.14	
NET RETURNS ABOVE OPERATING COSTS				-109.14	

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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				14.75	
Land Rent				275.00	
Management Fee				45.00	
Property Taxes				0.00	
Property Insurance				0.97	
Investment Repairs				0.00	
TOTAL CASH OVERHEAD COSTS/ACRE				335.72	
TOTAL CASH COSTS/ACRE				924.86	
NET RETURNS ABOVE CASH COSTS				-444.86	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Equipment				33.00	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				33.00	
TOTAL COST/ACRE				957.87	
NET RETURNS ABOVE TOTAL COST				-477.87	

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TABLE 2. COSTS PER ACRE TO PRODUCE ALFALFA-OAT 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:								
Irrigation	0.00	18.50	0.00	0.00	47.50	0.00	66.00	
Custom haul and spread manure	0.00	0.00	0.00	0.00	0.00	33.00	33.00	
Tillage	0.42	9.27	10.42	7.73	0.00	0.00	27.42	
Fertilize	0.00	0.00	0.00	0.00	182.30	8.50	190.80	
Plant	0.11	5.62	2.52	1.88	13.50	0.00	23.52	
Irrigation Repairs	0.00	0.00	0.00	0.00	12.75	0.00	12.75	
Irrigation Water Assessment	0.00	0.00	0.00	0.00	45.60	0.00	45.60	
General Pickup Use	0.74	16.47	6.17	2.43	0.00	0.00	25.07	
TOTAL PREHARVEST COSTS	1.27	49.85	19.12	12.05	301.65	41.50	424.16	
Harvest:								
Swath	0.00	0.00	0.00	0.00	0.00	34.50	34.50	
Bale	0.00	0.00	0.00	0.00	0.00	88.00	88.00	
Custom Haul & Stack	0.00	0.00	0.00	0.00	0.00	25.00	25.00	
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	147.50	147.50	
Interest on Operating Capital at 5.75%							17.48	
TOTAL OPERATING COSTS/ACRE	1.27	49.85	19.12	12.05	301.65	189.00	589.14	

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TABLE 2. CONTINUED

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TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA-OAT HAY

	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:															
Irrigation	5.28								7.92	15.84	15.84	7.92	7.92	5.28	66.00
Custom haul and spread manure	33.00														33.00
Tillage	20.88							6.54							27.42
Fertilize								190.80							190.80
Plant								23.52							23.52
Irrigation Repairs								12.75							12.75
Irrigation Water Assessment								45.60							45.60
General Pickup Use	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	25.07
TOTAL PREHARVEST COSTS	60.95	1.79	1.79	1.79	1.79	1.79	1.79	281.00	9.71	17.63	17.63	9.71	9.71	7.07	424.16
Harvest:															
Swath											17.25		17.25		34.50
Bale											44.00		44.00		88.00
Custom Haul & Stack											12.50		12.50		25.00
TOTAL HARVEST COSTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.75	0.00	73.75	0.00	147.50
Interest on Operating Capital @5.75%	0.29	0.30	0.31	0.32	0.33	0.33	0.34	1.69	1.74	1.82	2.26	2.31	2.71	2.74	17.48
TOTAL OPERATING COSTS/ACRE	61.25	2.09	2.10	2.11	2.12	2.13	2.13	282.69	11.45	19.45	93.64	12.02	86.17	9.81	589.14
CASH OVERHEAD															
General Overhead	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	14.75
Land Rent															275.00
Management Fee	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	45.00
Property Taxes															0.00
Property Insurance								0.97							0.97
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	4.27	4.27	4.27	4.27	4.27	4.27	4.27	5.24	4.27	4.27	4.27	4.27	4.27	4.27	335.72
TOTAL CASH COSTS/ACRE	65.51	6.36	6.37	6.38	6.39	6.39	6.40	287.93	15.72	23.72	97.91	16.28	90.43	14.08	924.86

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TABLE 4. HOURLY EQUIPMENT COSTS

Yr	Description	Alfalfa-Oat Hay	Total	Cash Overhead		Operating			Total	Total
		Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel	Oper.	Costs/Hr.
15	Grain Drill - 24'	11	65	53.63	1.42	0.00	7.00	0.00	7.00	62.05
15	Moldboard Plow 4b	32	180	7.14	0.18	0.00	4.63	0.00	4.63	11.95
15	Pickup 1 - 3/4 ton	25	750	8.57	0.16	0.00	3.28	8.32	11.60	20.33
15	Pickup 2 - 3/4 ton	25	750	8.57	0.16	0.00	3.28	8.32	11.60	20.33
15	Roller Harrow 20'	9	100	43.76	1.26	0.00	9.84	0.00	9.84	54.85
15	Tractor - 185hp	12	400	26.64	0.94	0.00	9.31	21.00	30.30	57.88
15	Tractor - 200hp	46	500	22.61	0.80	0.00	11.57	22.70	34.27	57.67
15	Pickup 3 - 3/4 ton	12	325	11.91	0.34	0.00	3.28	8.32	11.60	23.85
15	Pickup 4 - 3/4 ton	12	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	Grain Drill - 24'	36,000.00	12	4,986.24	3,872.75	102.47	0.00	3,975.21
15	Moldboard Plow 4b	12,000.00	10	2,122.10	1,427.19	35.31	0.00	1,462.50
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	Roller Harrow 20'	51,000.00	15	4,896.33	4,862.40	139.74	0.00	5,002.14
15	Tractor - 185hp	148,000.00	20	18,990.10	11,839.92	417.48	0.00	12,257.39
15	Tractor - 200hp	157,000.00	20	20,144.91	12,559.91	442.86	0.00	13,002.77
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		568,000.00	-	93,639.67	57,436.25	1,654.10	0.00	59,090.35
90% of New Cost*		511,200.00	-	84,275.70	51,692.62	1,488.69	0.00	53,181.31

*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	100	acre	14.75	1,475.00
Land Rent	100	acre	275.00	27,500.00
Management Fee	100	acre	45.00	4,500.00

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TABLE 6. RANGING ANALYSIS - ALFALFA-OAT HAY

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALFALFA-OAT HAY

	YIELD(TON)						
	2.50	3.00	3.50	4.00	4.50	5.00	5.50
OPERATING COSTS/ACRE:							
Preharvest	424.16	424.16	424.16	424.16	424.16	424.16	424.16
Harvest	147.50	147.50	147.50	147.50	147.50	147.50	147.50
Interest on Operating Capital @ 5.75%	17.48	17.48	17.48	17.48	17.48	17.48	17.48
TOTAL OPERATING COSTS/ACRE	589.14	589.14	589.14	589.14	589.14	589.14	589.14
TOTAL OPERATING COSTS/TON	235.66	196.38	168.33	147.29	130.92	117.83	107.12
CASH OVERHEAD COSTS/ACRE	335.72	335.72	335.72	335.72	335.72	335.72	335.72
TOTAL CASH COSTS/ACRE	924.86	924.86	924.86	924.86	924.86	924.86	924.86
TOTAL CASH COSTS/TON	369.95	308.29	264.25	231.22	205.53	184.97	168.16
NON-CASH OVERHEAD COSTS/ACRE	33.00	33.00	33.00	33.00	33.00	33.00	33.00
TOTAL COSTS/ACRE	957.87	957.87	957.87	957.87	957.87	957.87	957.87
TOTAL COSTS/TON	383.15	319.29	273.68	239.47	212.86	191.57	174.16

Net Return Per Acre Above Operating Costs For Alfalfa-Oat Hay

PRICE (\$/ton)		YIELD (ton/acre)						
Alfalfa-Oat Hay	Alfalfa	1.25	1.50	1.75	2.00	2.25	2.50	2.75
		1.25	1.50	1.75	2.00	2.25	2.50	2.75
85.00	145.00	-301.64	-244.14	-186.64	-129.14	-71.64	-14.14	43.36
90.00	150.00	-289.14	-229.14	-169.14	-109.14	-49.14	10.86	70.86
95.00	155.00	-276.64	-214.14	-151.64	-89.14	-26.64	35.86	98.36
100.00	160.00	-264.14	-199.14	-134.14	-69.14	-4.14	60.86	125.86
105.00	165.00	-251.64	-184.14	-116.64	-49.14	18.36	85.86	153.36
110.00	170.00	-239.14	-169.14	-99.14	-29.14	40.86	110.86	180.86
115.00	175.00	-226.64	-154.14	-81.64	-9.14	63.36	135.86	208.36

Net Return Per Acre Above Cash Costs For Alfalfa-Oat Hay

PRICE (\$/ton)		YIELD (ton/acre)						
Alfalfa-Oat Hay	Alfalfa	1.25	1.50	1.75	2.00	2.25	2.50	2.75
		1.25	1.50	1.75	2.00	2.25	2.50	2.75
85.00	145.00	-637.36	-579.86	-522.36	-464.86	-407.36	-349.86	-292.36
90.00	150.00	-624.86	-564.86	-504.86	-444.86	-384.86	-324.86	-264.86
95.00	155.00	-612.36	-549.86	-487.36	-424.86	-362.36	-299.86	-237.36
100.00	160.00	-599.86	-534.86	-469.86	-404.86	-339.86	-274.86	-209.86
105.00	165.00	-587.36	-519.86	-452.36	-384.86	-317.36	-249.86	-182.36
110.00	170.00	-574.86	-504.86	-434.86	-364.86	-294.86	-224.86	-154.86
115.00	175.00	-562.36	-489.86	-417.36	-344.86	-272.36	-199.86	-127.36

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TABLE 6. RANGING ANALYSIS CONTINUED

Net Return Per Acre Above Total Costs For Alfalfa-Oat Hay

PRICE (\$/ton)		YIELD (ton/acre)						
Alfalfa-Oat Hay		1.25	1.50	1.75	2.00	2.25	2.50	2.75
	Alfalfa	1.25	1.50	1.75	2.00	2.25	2.50	2.75
85.00	145.00	-670.37	-612.87	-555.37	-497.87	-440.37	-382.87	-325.37
90.00	150.00	-657.87	-597.87	-537.87	-477.87	-417.87	-357.87	-297.87
95.00	155.00	-645.37	-582.87	-520.37	-457.87	-395.37	-332.87	-270.37
100.00	160.00	-632.87	-567.87	-502.87	-437.87	-372.87	-307.87	-242.87
105.00	165.00	-620.37	-552.87	-485.37	-417.87	-350.37	-282.87	-215.37
110.00	170.00	-607.87	-537.87	-467.87	-397.87	-327.87	-257.87	-187.87
115.00	175.00	-595.37	-522.87	-450.37	-377.87	-305.37	-232.87	-160.37