EBB3-AE1-19 2019 Costs and Returns Estimate

Southcentral Idaho: Magic Valley Alfalfa Hay Establishment with Oats

Ashlee Westerhold

Magic Valley

Introduction to Costs & Returns Estimates

The University of Idaho Extension produces crop costs and returns estimates every other year. The overall goal of this project is to provide the Idaho agricultural industry with an unbiased and consistently calculated estimate of the cost of producing various crops and to track the change in production costs per acre and per unit over time.

The University of Idaho's costs and returns estimates are based on economic costs, not just 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 a historical average, not a current year's price. Production practices are based on data from growers, crop consultants, and extension personnel throughout Idaho. 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 cost of production estimates shows the typical or representative production costs by region based on documented production practices. These production costs are not area averages, rather they are based on model farms for four areas of the state.

University of Idaho costs and returns estimates can be used as a management tool to help producers in three ways:

1. **Templates.** Excel spreadsheets have been created by the University of Idaho to make enterprise budgeting and record keeping an easy task. You can start by substituting our costs and returns estimates with your own numbers. You can also enter them in the "Your Cost" column.
2. **Marketing.** Estimating production costs on a per acre or per unit basis can help you calculate your farm's break-even prices. Knowing your break-even price to cover operating costs and total costs can help with contract negotiations and selling on the open market.
3. **Benchmarks.** The University of Idaho costs and returns estimates are based on a typical or model farm and are calculated annually using consistent methodology. You can use these estimates as benchmarks by comparing your own total costs or specific cost categories to our estimates. This is a good way to find strengths and weaknesses in your production practices.

It's important to remember, just because your production costs are similar to our estimates, that isn't necessarily a good thing. Our model farms are also typically unprofitable! Average producers usually don't make an economic profit (which includes opportunity costs and non-cash costs such as depreciation). Being profitable requires fine-tuned management and a competitive advantage that the average producer doesn't have. (Being average is not okay in farming)

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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

These 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 2019 Idaho Power Schedule 24 Agricultural Irrigation Service rates.

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	$15.25	15%	$17.55
Truck Drivers	$15.25	15%	$17.55
Equipment Operators	$18.00	25%	$22.50
Irrigation Labor			
Set Move: HL & WL	$17.30	30%	$17.55
Continuous Move: CP & L	$18.00	25%	$22.50

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.

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 7.00 percent. Interest on intermediate term capital, primarily equipment, is calculated using a nominal rate of 6.75 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 landowners 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 revenues, 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. 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
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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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SOUTHCENTRAL IDAHO

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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	2.10	ton	75.00	157.50	
Alfalfa	2.45	ton	145.00	355.25	
TOTAL GROSS RETURNS	4.55	ton		512.75	
OPERATING COSTS					
Seed:				**96.25**	
Alfalfa Seed (pvt.): Inoculated	20.00	lb	4.25	85.00	
Oat Seed	45.00	lb	0.25	11.25	
Fertilizer:				**70.55**	
Dry Nitrogen	25.00	lb	0.40	10.00	
Dry P2O5	75.00	lb	0.38	28.50	
K2O	75.00	lb	0.31	23.25	
Sulfur	40.00	lb	0.22	8.80	
Custom:				**194.50**	
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	18.00	36.00	
Custom Rake & Bale: 4'x4'x8'	4.00	ton	23.00	92.00	
Custom Stack: 4'x4'x8'	4.00	ton	6.25	25.00	
Irrigation:				**109.25**	
Irrigation Power - CP	25.00	ac-in	1.94	48.50	
Irrigation Repairs - CP	25.00	ac-in	0.53	13.25	
Water Assessment	1.00	acre	47.50	47.50	
Labor				**62.01**	
Equipment Operator Labor	1.52	hrs	22.50	34.24	
Irrigation Labor: CP	1.00	hrs	22.50	22.50	
General Farm Labor	0.30	hrs	17.55	5.27	
Machinery				**37.78**	
Fuel-Gas	2.47	gal	3.25	8.03	
Fuel-Diesel	5.63	gal	3.00	16.88	
Lube				3.74	
Machinery Repair				9.14	
Interest on Operating Capital @ 7.00%				16.12	
TOTAL OPERATING COSTS/ACRE				586.46	
NET RETURNS ABOVE OPERATING COSTS				-73.71	

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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				14.66	
Land Rent				275.00	
Management Fee				48.00	
Property Taxes				0.00	
Property Insurance				1.00	
Investment Repairs				0.00	
TOTAL CASH OVERHEAD COSTS/ACRE				338.66	
TOTAL CASH COSTS/ACRE				925.12	
NET RETURNS ABOVE CASH COSTS				-412.37	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Equipment				37.03	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				37.03	
TOTAL COST/ACRE				962.15	
NET RETURNS ABOVE TOTAL COST				-450.15	

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TABLE 2. COSTS PER ACRE TO PRODUCE ALFALFA-OAT HAY

	Operation	Cash and Labor Costs per Acre						
Operation	Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Preharvest:								
Irrigation	0.00	22.50	0.00	0.00	48.50	0.00	71.00	
Custom haul and spread manure	0.00	0.00	0.00	0.00	0.00	33.00	33.00	
Tillage	0.42	11.27	13.59	8.14	0.00	0.00	33.00	
Fertilize	0.00	0.00	0.00	0.00	155.55	8.50	164.05	
Plant	0.11	8.21	3.29	1.98	11.25	0.00	24.74	
Irrigation Repairs	0.00	0.00	0.00	0.00	13.25	0.00	13.25	
Irrigation Water Assessment	0.00	0.00	0.00	0.00	47.50	0.00	47.50	
General Pickup Use	0.74	20.02	8.03	2.75	0.00	0.00	30.80	
TOTAL PREHARVEST COSTS	1.27	62.01	24.91	12.87	276.05	41.50	417.34	
Harvest:								
Swath	0.00	0.00	0.00	0.00	0.00	36.00	36.00	
Bale	0.00	0.00	0.00	0.00	0.00	92.00	92.00	
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	153.00	153.00	
Interest on Operating Capital at 7.00%							16.12	
TOTAL OPERATING COSTS/ACRE	1.27	62.01	24.91	12.87	276.05	194.50	586.46	

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TABLE 2. CONTINUED

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
General Overhead							14.66	
Land Rent							275.00	
Management Fee							48.00	
Property Taxes							0.00	
Property Insurance							1.00	
Investment Repairs							0.00	
TOTAL CASH OVERHEAD COSTS/ACRE							338.66	
TOTAL CASH COSTS/ACRE							925.12	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Equipment		347.10		37.03			37.03	
TOTAL NON-CASH OVERHEAD COSTS		347.10		37.03			37.03	
TOTAL COSTS/ACRE							962.15	

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

	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	Total
Preharvest:								
Irrigation		8.52	17.04	17.04	8.52	14.20	5.68	71.00
Custom haul and spread manure						33.00		33.00
Tillage	7.77					25.23		33.00
Fertilize	164.05							164.05
Plant	24.74							24.74
Irrigation Repairs	13.25							13.25
Irrigation Water Assessment	47.50							47.50
General Pickup Use	4.40	4.40	4.40	4.40	4.40	4.40	4.40	30.80
TOTAL PREHARVEST COSTS	261.70	12.92	21.44	21.44	12.92	76.83	10.08	417.34
Harvest:								
Swath				18.00		18.00		36.00
Bale				46.00		46.00		92.00
Custom Haul & Stack				12.50		12.50		25.00
TOTAL HARVEST COSTS	0.00	0.00	0.00	76.50	0.00	76.50	0.00	153.00
Interest on Operating Capital @7.00%	1.53	1.60	1.73	2.30	2.37	3.27	3.33	16.12
TOTAL OPERATING COSTS/ACRE	263.23	14.52	23.17	100.24	15.29	156.60	13.41	586.46
CASH OVERHEAD								
General Overhead	2.09	2.09	2.09	2.09	2.09	2.09	2.09	14.66
Land Rent								275.00
Management Fee	6.86	6.86	6.86	6.86	6.86	6.86	6.86	48.00
Property Taxes								0.00
Property Insurance	1.00							1.00
Investment Repairs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CASH OVERHEAD COSTS	9.95	8.95	8.95	8.95	8.95	8.95	8.95	338.66
TOTAL CASH COSTS/ACRE	273.18	23.47	32.12	109.19	24.24	165.55	22.36	925.12

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TABLE 4. HOURLY EQUIPMENT COSTS

Yr	Description	Alfalfa-Oat Hay Hours Used	Total Hours Used	Capital Recovery	Cash Overhead Insur-ance	Cash Overhead Taxes	Operating Lube& Repairs	Operating Fuel	Operating Total Oper.	Total Costs/Hr.
19	Grain Drill - 24'	11	65	59.62	1.46	0.00	7.00	0.00	7.00	68.08
19	Moldboard Plow 4b	32	180	7.86	0.18	0.00	4.66	0.00	4.66	12.70
19	Pickup 1 - 3/4 ton	25	750	9.33	0.17	0.00	3.70	10.82	14.52	24.02
19	Pickup 2 - 3/4 ton	25	750	9.33	0.17	0.00	3.70	10.82	14.52	24.02
19	Roller Harrow 20'	9	100	47.81	1.26	0.00	9.59	0.00	9.59	58.66
19	Tractor - 185hp	12	400	30.56	0.96	0.00	10.15	27.39	37.54	69.06
19	Tractor - 200hp	46	500	26.05	0.82	0.00	12.49	29.61	42.10	68.98
19	Pickup 3 - 3/4 ton	12	325	13.27	0.34	0.00	3.70	10.82	14.52	28.14
19	Pickup 4 - 3/4 ton	12	325	13.27	0.34	0.00	3.70	10.82	14.52	28.14

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

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
19	Grain Drill - 24'	37,000.00	12	5,124.74	4,305.78	105.31	0.00	4,411.09
19	Moldboard Plow 4b	12,300.00	10	2,175.15	1,571.76	36.19	0.00	1,607.95
19	Pickup 1 - 3/4 ton	42,000.00	5	13,750.00	7,771.98	139.38	0.00	7,911.36
19	Pickup 2 - 3/4 ton	42,000.00	5	13,750.00	7,771.98	139.38	0.00	7,911.36
19	Roller Harrow 20'	51,000.00	15	4,896.33	5,312.80	139.74	0.00	5,452.54
19	Tractor - 185hp	152,000.00	20	19,503.35	13,581.25	428.76	0.00	14,010.01
19	Tractor - 200hp	162,000.00	20	20,786.46	14,474.76	456.97	0.00	14,931.72
19	Pickup 3 - 3/4 ton	42,000.00	12	7,500.00	4,792.18	123.75	0.00	4,915.93
19	Pickup 4 - 3/4 ton	42,000.00	12	7,500.00	4,792.18	123.75	0.00	4,915.93
	TOTAL	582,300.00	-	94,986.03	64,374.66	1,693.22	0.00	66,067.88
	90% of New Cost*	524,070.00	-	85,487.43	57,937.20	1,523.89	0.00	59,461.09

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Repairs	Total
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	14.66	1,466.00
Land Rent	100	acre	275.00	27,500.00
Management Fee	100	acre	48	4,800.00

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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	417.34	417.34	417.34	417.34	417.34	417.34	417.34
Harvest	153.00	153.00	153.00	153.00	153.00	153.00	153.00
Interest on Operating Capital @ 7.00%	16.12	16.12	16.12	16.12	16.12	16.12	16.12
TOTAL OPERATING COSTS/ACRE	586.46	586.46	586.46	586.46	586.46	586.46	586.46
TOTAL OPERATING COSTS/TON	234.58	195.49	167.56	146.62	130.32	117.29	106.63
CASH OVERHEAD COSTS/ACRE	338.66	338.66	338.66	338.66	338.66	338.66	338.66
TOTAL CASH COSTS/ACRE	925.12	925.12	925.12	925.12	925.12	925.12	925.12
TOTAL CASH COSTS/TON	370.05	308.37	264.32	231.28	205.58	185.02	168.20
NON-CASH OVERHEAD COSTS/ACRE	37.03	37.03	37.03	37.03	37.03	37.03	37.03
TOTAL COSTS/ACRE	962.15	962.15	962.15	962.15	962.15	962.15	962.15
TOTAL COSTS/TON	384.86	320.72	274.90	240.54	213.81	192.43	174.94

Net Return Per Acre Above Operating 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	-298.96	-241.46	-183.96	-126.46	-68.96	-11.46	46.04
90.00	150.00	-286.46	-226.46	-166.46	-106.46	-46.46	13.54	73.54
95.00	155.00	-273.96	-211.46	-148.96	-86.46	-23.96	38.54	101.04
100.00	160.00	-261.46	-196.46	-131.46	-66.46	-1.46	63.54	128.54
105.00	165.00	-248.96	-181.46	-113.96	-46.46	21.04	88.54	156.04
110.00	170.00	-236.46	-166.46	-96.46	-26.46	43.54	113.54	183.54
115.00	175.00	-223.96	-151.46	-78.96	-6.46	66.04	138.54	211.04

Net Return Per Acre Above Cash 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	-637.62	-580.12	-522.62	-465.12	-407.62	-350.12	-292.62
90.00	150.00	-625.12	-565.12	-505.12	-445.12	-385.12	-325.12	-265.12
95.00	155.00	-612.62	-550.12	-487.62	-425.12	-362.62	-300.12	-237.62
100.00	160.00	-600.12	-535.12	-470.12	-405.12	-340.12	-275.12	-210.12
105.00	165.00	-587.62	-520.12	-452.62	-385.12	-317.62	-250.12	-182.62
110.00	170.00	-575.12	-505.12	-435.12	-365.12	-295.12	-225.12	-155.12
115.00	175.00	-562.62	-490.12	-417.62	-345.12	-272.62	-200.12	-127.62

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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	-674.65	-617.15	-559.65	-502.15	-444.65	-387.15	-329.65
90.00	150.00	-662.15	-602.15	-542.15	-482.15	-422.15	-362.15	-302.15
95.00	155.00	-649.65	-587.15	-524.65	-462.15	-399.65	-337.15	-274.65
100.00	160.00	-637.15	-572.15	-507.15	-442.15	-377.15	-312.15	-247.15
105.00	165.00	-624.65	-557.15	-489.65	-422.15	-354.65	-287.15	-219.65
110.00	170.00	-612.15	-542.15	-472.15	-402.15	-332.15	-262.15	-192.15
115.00	175.00	-599.65	-527.15	-454.65	-382.15	-309.65	-237.15	-164.65