



Enterprise Budgets

Alfalfa Hay Production, Flood Irrigated, Southern Arizona

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This enterprise budget estimates the typical economic costs and returns to grow alfalfa hay using flood irrigation in southern Arizona. It should be used as a guide to estimate actual costs and returns and is not representative of any farm. The assumptions used in constructing this budget are discussed below. Assistance provided by area producers and agribusinesses is much appreciated.

As of the date of this publication, the price for labor, fuel, fertilizer, and chemicals is increasing dramatically, which makes developing a long-term budget difficult. Therefore, a sensitivity analysis shows the net returns per acre as these inputs increase by 10 and 20 percent.

Cropping Pattern

This budget is based on a 1,500-tillable acre farm. As Arizona is experiencing irrigation water shortages, approximately 40 percent (597 acres) of the total farm tillable acres are fallowed. This fallowed land will allow adequate water to irrigate the following crops: 271 acres in cotton, 45 acres in silage corn, 90 acres in spring barley, 181 acres in durum wheat, and 316 acres of alfalfa hay. The costs to fallow land are allocated to each crop based on its water use. All crops are grown using flood irrigation.

Labor

Tractor driver labor cost is \$17.89 per hour and general labor \$14.55 per hour; both rates include social security, workers' compensation, unemployment insurance, and other labor overhead expenses. For this study, owner labor is valued at the same rate as tractor driver rates, and all labor is assumed to be a cash cost. Tractor labor hours are calculated based on machinery hours, plus ten percent.

Capital

Interest on operating capital for harvest and production inputs (six percent) is treated as a cash expense, borrowed for 6-months. An interest rate of six percent is charged as an opportunity to the owner for machinery ownership.

Machinery and Equipment

The machinery and equipment used in this budget are sufficient for a 1,500-acre farm with 1,000 acre in crops. The machinery and equipment hours reflect producing cotton, silage corn, spring barley, durum wheat, and alfalfa hay. A detailed breakdown of machinery values is shown in Table 2. Estimated labor, variable, and fixed costs for machinery are shown in Table 3, based on an hour and per acre basis. The machinery costs are calculated based on the total farm use of the machinery. Off-road diesel is \$4.00 per gallon.

Operations

The cultural operations are listed approximately in the order in which they are performed. A 175-hp tractor is used to pull the v-ripper, heavy offset disk, moldboard plow, landplane, lister, and planter. A 125-hp tractor is used to pull the shredder/root puller, drill, cultivator, fertilizer spreader, and boom sprayer. A charge for miscellaneous and other expenses is five percent of production costs, including additional labor, machinery repairs and maintenance, supplies and materials, tax preparation, memberships in professional organizations, and educational workshops not included in field operations.

Results

In both the establishment and full production budgets the price of alfalfa hay is \$250 per ton, with an average

yield of 8.5 tons per acre, resulting in a gross income of \$2,125. The variable costs in the establishment year are \$1,630 per acre and fixed cash costs of \$343 per acre, giving a net return above variable cash costs of \$152 per acre. Total fixed costs are \$74 per acre and total costs of \$2,047 per acre, when all variable and fixed costs are considered. The gross income minus total costs in the establishment year results in a \$78 per acre return.

The variable costs for the three full production years are \$1,568 per acre and fixed cash costs of \$343 per acre, giving a net return above variable cash costs of \$214 per acre. Total fixed costs are \$10 per acre and total costs of \$1,922 per acre, when all variable and fixed costs are considered. The gross income minus total costs results in a \$203 per

acre return. A breakeven price of \$225 per ton would be required to cover variable and fixed cash costs and \$226 per ton to cover total costs.

Tables 4 and 5 show the baseline net returns per acre for cash and total costs at various yields and prices for the full production years. Tables 6, 7, 8, and 9 show a sensitivity analysis of returns per acre as the price for labor, fuel, fertilizer, and chemicals are increased an additional 10 and 20 percent.

NOTE: Not included in these budgets are family living withdrawals for unpaid labor, returns to management, depreciation and opportunity costs for vehicles, buildings and improvements, inflation, property and crop insurance, and local, state, and federal income and property taxes.

Table 1a. Economic and Cash Costs and Returns of Establishing Alfalfa Hay, \$/acre.

Returns		Unit	\$/Unit	Quantity	Value		
Alfalfa Hay Establishment		ton	\$250.00	8.50	<u>\$2,125.00</u>		
Total Returns					\$2,125.00		
Variable Cash Costs	Price	Quantity	Unit	Labor	Machinery	Materials	Total
Land Preparation and Maintenance							
V-Ripper		1.00	acre	\$13.53	\$34.60	\$0.00	\$48.13
Offset Disk		2.00	acre	9.43	23.76	0.00	33.19
Moldboard Plow		1	acre	7.73	24.50	0.00	32.23
Landplane		1.00	acre	3.87	9.31	0.00	13.18
Crop Production							
Drill		1.00	acre	5.41	10.13	140.00	155.54
- Seed	\$140.00	1.00	acre				
Fertilizer Spreader		1.00	acre	1.88	3.73	68.00	73.61
- Fertilizer Program	\$68.00	1.00	acre				
Boom Sprayer		2.00	acre	2.38	3.64	90.00	96.02
- Herbicides	\$50.00	1.00	acre				
- Insecticides	\$40.00	1.00	acre				
Irrigation				87.30	0.00	330.00	417.30
- Irrigation Water, Flood	\$55.00	6.00	ac ft				
- Irrigation Labor, Flood	\$14.55	6.00	hours				
Harvest							
Harvest, Custom	\$75.00	8.50	tons	0.00	0.00	637.50	637.50
Other Charges							
Other Expenses		5.0%		0.00	0.00	75.34	75.34
Interest on Operating Capital		6.0%		<u>0.00</u>	<u>0.00</u>	<u>47.46</u>	<u>47.46</u>
Total Variable Cash Costs				\$131.53	\$109.69	\$1,388.30	\$1,629.51
Fixed Cash Costs				Unit	\$/Unit	Value	
Fallow Costs				acre		\$173.32	173.32
Annual Cash Rent Payment				acre		170.00	<u>170.00</u>
Total Fixed Cash Costs							\$343.32
Total Returns minus Total Variable and Fixed Cash Costs							\$152.17
Fixed Non-Cash Costs				Unit	\$/Unit	Value	
Power Units, Machinery & Equipment, depreciation & interest				acre		\$73.76	<u>\$73.76</u>
Total Fixed Non-Cash Costs							\$73.76
Total Annual Costs							\$2,046.59
Returns minus Total Annual Costs							\$78.41

Table 1a. Economic and Cash Costs and Returns of Producing Alfalfa Hay, \$/acre.

Returns			Unit	\$/Unit		Quantity	Value
Alfalfa Hay Establishment			ton	\$250.00		8.50	<u>\$2,125.00</u>
Total Returns							\$2,125.00
Variable Cash Costs	Price	Quantity	Unit	Labor	Machinery	Materials	Total
Crop Production							
Fertilizer Spreader		2.00	acre	\$3.76	\$7.47	\$297.50	\$308.72
- Fertilizer Program	\$297.50	1.00	acre				
Boom Sprayer		2.00	acre	2.38	3.64	150.00	156.02
- Herbicides	\$90.00	1.00	acre				
- Insecticides	\$60.00	1.00	acre				
Irrigation				72.75	0.00	275.00	347.75
- Irrigation Water, Flood	\$55.00	5.00	ac ft				
- Irrigation Labor, Flood	\$14.55	5.00	hours			68.00	73.61
Harvest							
Harvest, Custom	\$75.00	8.50	tons	0.00	0.00	637.50	637.50
Other Charges							
Other Expenses		5.0%		0.00	0.00	72.50	72.50
Interest on Operating Capital		6.0%		0.00	0.00	45.67	45.67
Total Variable Cash Costs				\$78.89	\$11.11	\$1,478.17	<u>\$1,568.17</u>
Fixed Cash Costs					Unit	\$/Unit	Value
Fallow Costs					acre	\$173.32	173.32
Annual Cash Rent Payment					acre	170.00	<u>170.00</u>
Total Fixed Cash Costs							\$343.32
Total Returns minus Total Variable and Fixed Cash Costs							\$213.51
Fixed Non-Cash Costs					Unit	\$/Unit	Value
Power Units, Machinery & Equipment, depreciation & interest					acre	\$10.25	<u>\$10.25</u>
Total Fixed Non-Cash Costs							\$10.25
Total Annual Costs							\$,1921.749
Returns minus Total Annual Costs							\$203.26

Table 2. Whole Farm Machinery Cost Assumptions.

Machine	Width (feet)	Market Value	Annual Use	Hours of Expected Life (Years)
175 HP Tractor	N/A	\$180,000	1,365	10
125 HP Tractor	N/A	80,000	495	15
V-Ripper	8.0	22,000	459	10
Offset Disk	18.0	30,000	517	15
Moldboard Plow	9.3	35,000	138	15
Landplane	16.0	18,000	78	15
Lister	10.0	6,500	99	15
Cotton Shredder/Root Puller	20.0	12,000	41	15
Row Planter	24.0	40,000	72	15
Row Cultivator	24.0	22,000	103	10
Drill	20.0	25,000	97	15
Fertilizer Spreader	40.0	18,000	109	20
Boom Sprayer	60.0	9,500	145	20

Table 3. Machinery Cost Calculations, on a per hour and per acre basis.

Machie	-Variable Costs-		Fixed Cost		
	Fuel & Lube	Repairs & Maint.	Deprec. & Interest	Total Cost	
----- Costs Per Hour -----					
175 HP Tractor	\$36.80	\$7.37	\$17.20	\$61.37	
125 HP Tractor	23.00	1.78	18.31	43.09	
V-Ripper	0.00	6.16	6.19	12.35	
Offset Disk	0.00	5.40	6.48	11.88	
Moldboard Plow	0.00	18.20	28.29	46.50	
Landplane	0.00	3.24	25.80	29.04	
Lister	0.00	1.78	7.32	9.10	
Cotton Shredder/Root Puller	0.00	2.76	32.57	35.33	
Row Planter	0.00	14.02	64.48	78.50	
Row Cultivator	0.00	3.90	27.10	30.99	
Drill	0.00	12.06	30.14	42.20	
Fertilizer Spreader	0.00	14.31	19.02	33.34	
Boom Sprayer	0.00	5.36	7.51	12.87	
----- Costs Per Acre -----					
Field Operation	Acre/ Hour	Operator Labor	Variable Costs	Fixed Costs	Total Costs
175 HP Tractor & V-Ripper	1.45	\$13.53	\$34.60	\$16.08	\$64.21
175 HP Tractor & Offset Disk	4.17	4.72	11.88	5.68	22.27
175 HP Tractor & Moldboard Plow	2.55	7.73	24.50	17.87	50.11
175 HP Tractor & Landplane	5.09	3.87	9.31	8.45	21.62
175 HP Tractor & Lister	3.18	6.18	14.44	7.71	28.33
175 HP Tractor & Shredder	6.64	2.97	4.15	7.67	14.78
175 HP Tractor & Planter	4.36	4.51	13.34	18.72	36.56
175 HP Tractor & Cultivator	6.55	3.01	4.38	6.94	14.32
175 HP Tractor & Drillr	3.64	5.41	10.13	13.32	28.87
175 HP Tractor & Fertilizer Spreader	10.47	1.88	3.73	3.56	9.18
175 HP Tractor & Boom Sprayer	16.55	1.19	1.82	1.56	4.57

Table 4. Estimated Per Acre Returns Over Cash Cost at Varying Yields and Prices at Full Production.

Price/Ton	----- Tons per Acre -----						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$220.00	(701)	(481)	(261)	(41)	179	399	619
\$230.00	(646)	(416)	(186)	44	274	504	734
\$240.00	(591)	(351)	(111)	129	369	609	849
\$250.00	(536)	(286)	(36)	214	464	714	964
\$260.00	(481)	(221)	39	299	559	819	1,079
\$270.00	(426)	(156)	114	384	654	924	1,194
\$280.00	(371)	(91)	189	469	749	1,029	1,309

Table 5. Estimated Per Acre Returns Over Total Cost at Varying Yields and Prices at Full Production.

Price/Ton	----- Tons per Acre -----						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$220.00	(712)	(492)	(272)	(52)	168	388	608
\$230.00	(657)	(427)	(197)	33	263	493	723
\$240.00	(602)	(362)	(122)	118	358	598	838
\$250.00	(547)	(297)	(47)	203	453	703	953
\$260.00	(492)	(232)	28	288	548	808	1,068
\$270.00	(437)	(167)	103	373	643	913	1,183
\$280.00	(382)	(102)	178	458	738	1,018	1,298

Table 6. Estimated Per Acre Returns Over Cash Cost at Varying Yields and Prices at Full Production with a 10 percent Increase in Fuel, Labor, Fertilizer and Chemical Costs.

Price/Ton	Tons per Acre						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$248.50	(712)	(492)	(272)	(52)	168	388	608
\$249.00	(657)	(427)	(197)	33	263	493	723
\$249.50	(602)	(362)	(122)	118	358	598	838
\$250.00	(547)	(297)	(47)	203	453	703	953
\$250.50	(492)	(232)	28	288	548	808	1,068
\$251.00	(437)	(167)	103	373	643	913	1,183
\$251.50	(382)	(102)	178	458	738	1,018	1,298

Table 7. Estimated Per Acre Returns Over Total Cost at Varying Yields and Prices at Full Production with a 10 percent Increase in Fuel, Labor, Fertilizer and Chemical Costs.

Price/Ton	Tons per Acre						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$248.50	(722)	(502)	(282)	(62)	158	378	598
\$249.00	(667)	(437)	(207)	23	253	483	713
\$249.50	(612)	(372)	(132)	108	348	588	828
\$250.00	(557)	(307)	(57)	193	443	693	943
\$250.50	(502)	(242)	18	278	538	798	1,058
\$251.00	(447)	(177)	93	363	633	903	1,173
\$251.50	(392)	(112)	168	448	728	1,008	1,288

Table 8. Estimated Per Acre Returns Over Cash Cost at Varying Yields and Prices at Full Production with a 20 percent Increase in Fuel, Labor, Fertilizer and Chemical Costs.

Price/Ton	Tons per Acre						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$248.50	(723)	(503)	(283)	(63)	157	377	597
\$249.00	(668)	(438)	(208)	22	252	482	712
\$249.50	(613)	(373)	(133)	107	347	587	827
\$250.00	(558)	(308)	(58)	192	442	692	942
\$250.50	(503)	(243)	17	277	537	797	1,057
\$251.00	(448)	(178)	92	362	632	902	1,172
\$251.50	(393)	(113)	167	447	727	1,007	1,287

Table 9. Estimated Per Acre Returns Over Total Cost at Varying Yields and Prices at Full Production with a 20 percent Increase in Fuel, Labor, Fertilizer and Chemical Costs.

Price/Ton	Tons per Acre						
	5.5	6.5	7.5	8.5	9.5	10.5	11.5
\$248.50	(733)	(513)	(293)	(73)	147	367	587
\$249.00	(678)	(448)	(218)	12	242	472	702
\$249.50	(623)	(383)	(143)	97	337	577	817
\$250.00	(568)	(318)	(68)	182	432	682	932
\$250.50	(513)	(253)	7	267	527	787	1,047
\$251.00	(458)	(188)	82	352	622	892	1,162
\$251.50	(403)	(123)	157	437	717	997	1,277



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