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**UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION  
AGRICULTURE AND NATURAL RESOURCES  
AGRICULTURAL ISSUES CENTER**

**2016**

**SAMPLE COSTS TO ESTABLISH AND PRODUCE**

**ALFALFA**



**TULARE COUNTY, SOUTHERN SAN JOAQUIN VALLEY  
50 Acre Planting**

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Tulare County - Southern San Joaquin Valley - 2016  
50 Acre Planting

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**INTRODUCTION**

This study is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on early 2016 figures. Practices described are based on production practices considered typical for the crop and area, but will not apply to every situation. A blank column titled Your Costs is provided in Tables 1 and 2 to enter your estimated costs.

For an explanation of calculations used in the study refer to the section titled Assumptions. For more information contact the University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, Donald Stewart, at 530-752-4651 or [destewart@ucdavis.edu](mailto:destewart@ucdavis.edu), or Christine Gutierrez, at 530-752-5021 or [cagut@ucdavis.edu](mailto:cagut@ucdavis.edu). The local extension office can be contacted through Nicholas Clark, UC Cooperative Extension Farm Advisor, at 559-852-2788 or [neclark@ucanr.edu](mailto:neclark@ucanr.edu).

Sample Cost of Production studies for many commodities are available and can be down loaded from the website at <http://coststudies.ucdavis.edu>. Archived studies are also available on the website.

## ASSUMPTIONS

The assumptions refer to Tables 1 through 10 pertain to sample costs to establish an alfalfa stand and produce alfalfa hay in the southern San Joaquin Valley. Cultural practices and costs for alfalfa production vary considerably among growers within the region; therefore, many of the costs, practices, and materials for the study will not be applicable to every farm. The practices and inputs used in this cost study serve as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California, nor is any criticism implied by omission of other similar products or cultural practices.**

**Farm.** The hypothetical farm consists of 50 contiguous acres owned and managed by the grower. Alfalfa is planted on the entire 50 acres. Farms of this size may have minimum charges for custom services, versus larger farms that experience increased efficiencies and thus lower costs per acre. Some operations may have equipment move-in fees; these possible costs are not reflected in the study.

### Stand Establishment Operating Costs (Tables 1-3)

Tables 1 through 3 show the costs associated with ground preparation, planting and establishing an alfalfa stand. Land preparation and planting are done in the fall. The establishment year ends after the herbicide application in December.

**Land Preparation.** Stand establishment begins by discing down (stubble disc) the residue from the previous crop. The ground is chiseled to a depth of 18 to 24 inches to fracture the soil, which improves root penetration and water infiltration. The field is then rolled with a rice roller. Next, the field is laser leveled at a cost of \$175 per acre. Lastly, the field is disced and harrowed with a ring roller to prepare the seedbed. Borders (levees) for irrigation checks are made at periodic intervals (60 ft. in this study) through the field. A custom operator does all of the land preparation.

**Fertilization.** Nitrogen (N) and phosphorus (P) as 11-52-0 at 200 pounds per acre of material are applied by a custom operator in September prior to the final discing. Pre-plant soil testing for phosphorous (P) and potassium (K) is recommended. In this study, the PCA collects one soil sample per 20 acres at a cost of \$10.60 for each test.

**Planting.** A custom operator plants Roundup Ready alfalfa seed with a Brillion seeder 1/4 inch to 1/2 inch deep at 25 pounds of seed per acre. The seed is planted in September or October and the stand life is expected to be three years. Cost of seed varies, Roundup Ready seed is used in this study at a cost of \$5.84 per pound with an additional \$3.00 per pound tech fee.

**Irrigation.** In this study, the irrigation method is sprinkler irrigation during establishment, followed by border flood irrigation during production. Water for seed germination is applied using a sprinkler irrigation system in early fall immediately after planting (8 acre-inches). If winter rains do not occur, a second irrigation may be necessary. Water is supplied by the irrigation district and is supplemented by well water. Prices for water vary considerably among irrigation districts and pumping costs vary due to well depth, pumping level and type of irrigation system. This study applies a charge of \$130 per acre-foot, (\$10.83 per acre-inch). Irrigation labor is provided as a separate line item and includes the cost of setting up and taking down the sprinkler irrigation system.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in the following

publications: *Integrated Pest Management for Alfalfa* and UC Pest Management Guidelines, Alfalfa. **Pesticides mentioned in this study are not recommendations, but those commonly used in the region.** For information and pesticide use permits, contact the local county Agricultural Commissioner's office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). **Pest control costs and vary considerably each year depending upon local conditions and pest populations in any given year.** Adjuvants are recommended for many pesticides for effective control and are an added cost. Adjuvants are not included as a cost in this study.

*Pest Control Advisor (PCA).* Written recommendations are required for many pesticides and are available from licensed pest control advisors. In addition, the PCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition. Growers may hire a private PCA or receive the services as part of a service agreement with an agricultural chemical and fertilizer company. In this study, the PCA services are provided by the fertilizer company free of charge.

*Application Methods.* After planting, treatment of alfalfa with pesticides are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by tractor or ATV mounted ground/boom sprayer, or foliar-broadcast by airplane. Some pesticides and fertilizers are mixed and applied together during the same irrigation. Some pesticides are applied to a portion of the alfalfa acreage. Pesticides with different modes of action and sites of action, and different active ingredients should be rotated to avoid resistance development by the targeted pests. Fertilizer is applied via air application using a custom operator and pesticides are applied via an ATV sprayer system with a 30' boom.

*Weeds.* Broad-spectrum post-emergent herbicides, such as Roundup PowerMax, are applied depending on environmental conditions. In this study, RoundUp PowerMax is applied to the field at a rate of 2 pints per acre in December of the establishment year. A pre-emergence herbicide such as Treflan TR or Prowl H20 could be applied for grass control, but is not included in this study during the establishment year. Contact herbicides, such as Gramoxone, or Select Max, could also be applied for selective weed control and to combat species shift & resistance. In some areas of the San Joaquin Valley, sheep are introduced and allowed to graze the alfalfa fields in January as a weed, Sclerotinia Stem, and Crown Rot control measure. This operation and associated costs are not included in this study.

### **Production Operating Costs** (Tables 3-10)

**Irrigation.** During the production years, this study uses border flood irrigation. The water is pumped through alfalfa valves at the head of the field and flows down the alfalfa check between the borders. A semi-permanent drain ditch is dug at the edge of the field using a V-Ditcher pulled by a tractor. All field operations turn inside the field and do not cross the drain. From April to October, ten irrigations totaling 64 acre inches (5.3 acre-feet) of water are applied by flooding the checks based on evapotranspiration (ET) requirements. Applied water values are greater than the actual water requirement due to an estimated application efficiency of 75 percent. The actual water requirement will vary each year based on soil, climatic, and plant physiological factors.

Irrigation includes the water and pumping costs, with irrigation labor provided as a separate line item. Water costs will vary considerably depending upon the irrigation district and, when pumped, upon the due to well depth, pumping level and type of irrigation system. A cost of \$10.83 per acre-inch (\$130 per acre-foot) is used in this study. Due to the high cost and/or unavailability of water in recent years, some growers have reduced water usage or summer fallowed the fields at a cost of lower yields.

**Fertilization.** After establishment, plant tissue tests should be taken each year to determine nutrient

requirements. Tissue samples should be scheduled once during the growing season and your Ag consultant (PCA) may recommend this be done in either the spring or fall. Tissue testing in this study is done each year in August to determine the levels of P and K. Costs shown are for the analysis based on one sample per 20 acres collected by the PCA at a cost of \$25.90 per sample. In this study, an allocation of phosphorous as 11-52-0, at 200 pounds per acre is charged to the field in the fall of each year. Subsequent micronutrient fertilizers are applied as needed from tissue analysis and PCA recommendations.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in the following publications: *Integrated Pest Management for Alfalfa* and UC Pest Management Guidelines, Alfalfa. **Pesticides mentioned in this study are not recommendations, but those commonly used in the region.** For information and pesticide use permits, contact the local county Agricultural Commissioner's office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). **Pest control costs and vary considerably each year depending upon local conditions and pest populations in any given year.** Adjuvants are recommended for many pesticides for effective control and are an added cost. Adjuvants are not included as a cost in this study.

*Weeds.* Prior to the first cutting, a post-emergence herbicide can be applied to control broadleaf and other grasses, such as 2,4-D (Butyrac 200), Buctril, Raptor, or Pursuit, or a combination thereof. During production years, herbicides other than Roundup should be used at least once to avoid weed shifts and selection for resistance. In this study, Roundup PowerMax is applied at a rate of 2 pints per acre in February of the production year.

During the second year, a pre-emergence herbicide (Treflan TR-10 or Prowl H2O) may be applied in January for grass control with a second application in April if dodder is expected (the study does not include this application). Residual herbicides for control of winter weeds could be applied starting at the end of the first year, such as Karmex DF, Velpar L, Chateau or Prowl H2O. This application is included in this study at a rate of 4 oz/acre of Chateau and 1 gallon/acre of Prowl H2O in December of the production year. A contact herbicide (Gramoxone) may be applied at the end of the second year, and is included at a rate of 1.5 pints per acre in this study.

In May of the third year, a post-emergence herbicide (SelectMax or Roundup) is applied to control summer grasses. This application is included in this study at a rate of 2 pints per acre of Roundup PowerMax during May of the production year. The herbicide costs will vary slightly during the production years due to the difference in weed control each year. For additional information regarding weed management, refer to the "Herbicide Treatment Table for Seedling Alfalfa" available on the UC Davis IPM website (<http://www.ipm.ucdavis.edu>). The table provides a listing of available herbicides and their application rates and times.

*Insects.* Several insect species attack alfalfa, but alfalfa weevil, aphids, alfalfa caterpillar, and armyworms are the pests that cause the most economic damage. Weevils and aphids are assumed to reach population levels requiring a single treatment for control for which the insecticide Warrior II (lambda-cyhalothrin, a synthetic pyrethroid) is applied at a rate of 1.5 fl oz per acre in March of the production year. Aphids can also be controlled with an application of Sivanto (flupyradifurone). Worms, alfalfa caterpillar and armyworms are controlled in July with the insecticide Coragen (chlorantraniliprole) application of 3.5 fl. oz. per acre during July of the production year.

**Harvest.** In this study, the alfalfa is custom harvested for hay nine times – March, April, May, June, July, August, September, October and November. Alfalfa for hay is cut with a self-propelled swather and left to dry for several days before it is turned and windrowed using a rake. Once the hay has dried to the correct moisture

content, it is baled into 125-pound bales. The bales are picked up with a bale wagon that moves them from the field and roadsides them in a stack.

*Custom Harvest.* A harvesting companies' swath, rake, bale, and roadside (pick up bales and stack) the harvested alfalfa. Charges in this study for the custom harvest services are swathing and raking for \$22.50 per acre, baling for \$1.10 per bale and roadsiding for \$0.60 per bale. In total, this is an approximate cost of \$40.10 per ton for swathing/raking and baling with a roadside charge of \$9.50 per ton for 125# bales.

**Yields.** The crop is assumed to yield 10.00 tons of hay per acre at 90 percent dry matter (DM.). Annual yields range from 5 to 11 tons of hay per acre in this region. In this study, yields are calculated as the same for each cutting, but most often the first and second cuttings are the largest and the mid-summer cuttings have the lowest yield.

**Returns.** A price of \$250 per ton for premium hay is based on USDA first quarter 2016 averages for the central San Joaquin Valley market districts. Hay prices and hay quality will vary during the season and by district. USDA alfalfa hay standards are Supreme, Premium, Good, Fair, and Utility, with Supreme garnering the highest price. The hay price in this study is based on 90 percent dry matter. This study focuses on hay production to be sold in small bales (125#), which a primarily sold to the horse feed industry at a premium, as they are a higher cost to handle and more expensive to produce than a large bale.

**Pickup/ATV.** The pickup is used for business purposes as needed. The ATV is used for irrigation and pesticide applications. Associated costs are included in this study.

### **Labor, Equipment and Interest**

**Labor.** Labor rates of \$20.44 per hour for machine operators and \$17.52 for general labor includes payroll overhead of 46 percent. The basic hourly wages are \$14.00 for machine operators and \$12.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for field crops (code 1071) and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study, the cost is based upon the average industry final rate as of January 1, 2016. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 1 and 4 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. The cost includes a 9.25 percent sales tax on diesel fuel and 2.25 percent sales tax on gasoline. Prices for on-farm delivery of diesel and gasoline are \$2.38 and \$2.65 per gallon, respectively. The costs are based on the last quarter of 2015 and first quarter of 2016 Energy Information Administration (EIA) price information. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair costs per acre for each operation are determined by multiplying the total hourly operating cost for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 per cent higher than implement time for a given operation to account for setup, travel and maintenance.

**Interest on Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 4.25 per cent per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post-harvest operations is discounted back to the last harvest month

using a negative interest charge. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm-lending agency as of January 2016.

**Risk.** The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability of alfalfa production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner, in various combinations for a sustainable operation.

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm, not to a particular operation. Employee benefits, payroll taxes and workers' compensation insurance are included in labor costs and not under cash overhead.

**Property Taxes.** Counties charge a base property tax rate of 1 per cent on the assessed value of the property. In some counties, special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1 per cent of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

**Insurance.** Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.834 per cent of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$638 for the entire farm.

**Office.** Costs are estimated at \$50 per acre for the ranch and are not based on any specific information, except that there is a cost involved for bookkeeping, payroll, tax preparation and communication systems.

**Investment Repairs.** Annual repairs on investments or capital recovery items that require maintenance are calculated as 2 per cent of the purchase price. Repairs are not calculated for land and establishment costs.

### **Non-Cash Overhead**

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. One-half of the overhead costs in the establishment year are allocated to the previous crop.

**Capital Recovery Costs.** Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is  $(\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor} + (\text{Salvage Value} \times \text{Interest Rate})$ .

*Salvage Value.* Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements), the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by ASABE based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE by the annual hours of use in this operation. For other investments including irrigation

systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in the tables.

*Capital Recovery Factor.* Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

*Interest Rate.* An interest rate of 3.25 per cent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm-lending agency as of January 2016.

**Irrigation System.** Irrigation practices in the southern San Joaquin Valley range from the dominant border flood, to sprinkler, to subsurface drip, or a combination thereof. More information regarding Alfalfa raised on sub-surface drip irrigation can be found in the “2014 Sample Costs to Establish and Produce Alfalfa in the Sacramento and Northern Delta using Sub-Surface Drip Irrigation” study at <http://coststudies.ucdavis.edu>.

The system utilizes a combination of well water and district water. Some growers include a tail water return system, which may increase water application efficiencies up to 85 percent. The flood irrigation system consists of underground lines with alfalfa valves. There is an 18-inch mainline (1,680 feet) with 10 or 12-inch alfalfa valves every 60-feet. During establishment, a sprinkler irrigation system is used in this study, which consists of pipes & risers, laterals lines, valve openers/bonnets and booster pumps owned by grower and shown under non-cash overhead. The permanent irrigation system consists of wells, pumps and buried mainline included in the land purchase price.

**Land.** Cropland with district water suitable for alfalfa production typically ranges in value among counties from \$15,000 to \$25,000 per acre. The land in this study is owned by the grower and cost \$15,000 per acre. Small farms (50 acres and less) tend to have higher land costs than farms over 50 acres. Cropland with district water rents for \$300 per acre and rents may vary according to value or type of crop planted.

**Establishment Costs.** Costs to establish the alfalfa stand are used to determine capital recovery expenses, depreciation, and interest on investment, during the production years. The establishment cost is the sum of cash costs for land preparation, planting, and cash overhead for establishing the alfalfa. The Total Cash Cost shown in Table 1 represents the establishment cost per acre. For this study, the cost is \$966 per acre or \$48,300 for the 50 acres. The alfalfa stand establishment cost is amortized over the 3-year stand life.

**Equipment.** Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60 percent to indicate a mix of new and used equipment. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.



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UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 1. COSTS PER ACRE to ESTABLISH ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Operation	Cash and Labor Costs per Acre							Total Cost	Your Cost
	Equipment Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom Rent			
Cultural:									
Soil Analysis (P&K)	0.00	0	0	0	0	1	1		
Disc Stubble	0.00	0	0	0	0	35	35		
Chisel Field	0.00	0	0	0	0	37	37		
Laser Level Field	0.00	0	0	0	0	175	175		
Ridge-Boarders	0.00	0	0	0	0	15	15		
Fertilize 11-52-0 (P2O5)	0.00	0	0	0	74	12	86		
Finish Disc & Roll	0.00	0	0	0	0	22	22		
Plant Roundup Ready Seed	0.00	0	0	0	22	25	246		
Irrigate	0.00	18	0	0	87	0	104		
Weed: RoundUp Power Max	0.07	2	0	0	0	0	9		
<b>TOTAL CULTURAL COSTS</b>	<b>0.07</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>389</b>	<b>322</b>	<b>730</b>		
Interest on Operating Capital at 4.25%							9		
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>0.07</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>389</b>	<b>322</b>	<b>739</b>		
CASH OVERHEAD:									
Liability Insurance							13		
Office Expense							50		
Property Taxes							150		
Property Insurance							13		
Investment Repairs							1		
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>							<b>227</b>		
<b>TOTAL CASH COSTS/ACRE</b>							<b>966</b>		
NON-CASH OVERHEAD:									
		Per Producing Acre		Annual Cost		Capital Recovery			
Sprinkler Pipe (50 acres)		56		4		4			
Land 50 acres		15,000		488		488			
Equipment		2		0		0			
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>15,059</b>		<b>491</b>		<b>491</b>			
<b>TOTAL COSTS/ACRE</b>							<b>1,457</b>		

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 2. MATERIAL and INPUT COSTS to ESTABLISH ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>OPERATING COSTS</b>					
<b>Fertilizer:</b>					<b>74</b>
11-52-0 (P2O5)	200.00	Lb	0.37	74	
<b>Custom:</b>					<b>322</b>
Soil Test P	0.04	Each	10.60	0	
Soil Test K	0.04	Each	10.60	0	
Stubble Disc 1X	1.00	Acre	35.00	35	
Chisel	1.00	Acre	37.00	37	
Laser Level	1.00	Acre	175.00	175	
Ridge-Boarders	1.00	Acre	15.00	15	
Air Application-Fertilizer	2.00	Cwt	6.00	12	
Disc & Roll 1X	1.00	Acre	22.00	22	
Plant Alfalfa	1.00	Acre	25.00	25	
<b>Seed:</b>					<b>221</b>
Alfalfa Seed RR	25.00	Lb	5.84	146	
Seed Tech Fee	25.00	Lb	3.00	75	
<b>Herbicide:</b>					<b>7</b>
Roundup PowerMax	2.00	Pint	3.59	7	
<b>Irrigation:</b>					<b>87</b>
Water SJV-south Alfalfa	8.00	AcIn	10.83	87	
<b>Labor</b>					<b>19</b>
Equipment Operator Labor	0.08	hrs	20.44	2	
Irrigation Labor	1.00	hrs	17.52	18	
<b>Machinery</b>					<b>0</b>
Fuel-Gas	0.07	gal	2.65	0	
Fuel-Diesel	0.00	gal	2.38	0	
Lube				0	
Machinery Repair				0	
Interest on Operating Capital @ 4.25%				9	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>739</b>	

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 3. WHOLE FARM ANNUAL EQUIPMENT COSTS - ESTABLISHMENT YEAR (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Yr	Description	Price	Yrs Life	Salvage Value	Cash Overhead			Total
					Capital Recovery	Insurance	Taxes	
16	ATV	8,350	5	3,742	1,135	5	60	1,200
16	ATV Sprayer System 30'	5,646	10	998	584	3	33	620
<b>TOTAL</b>		<b>13,996</b>	<b>-</b>	<b>4,741</b>	<b>1,719</b>	<b>8</b>	<b>94</b>	<b>1,821</b>
60% of New Cost*		8,398	-	2,844	1,032	5	56	1,092

\*Used to reflect a mix of new and used equipment

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 4. COSTS PER ACRE to PRODUCE ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Operation	Cash & Labor Costs per Acre							Total Cost	Your Cost
	Equipment Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom Rent			
<b>Cultural:</b>									
Weed: Roundup PowerMax (2x)	0.14	4	0	0	14	0	18		
Make Semi-Permanent Drains	0.00	0	0	0	0	12	12		
Insect: Aphid/Weevil (Warrior II)	0.07	2	0	0	8	0	10		
Irrigate - 10X Flood Irrigation	0.00	32	0	0	693	0	725		
Insect: Worms (Coragen)	0.07	2	0	0	29	0	31		
Tissue Sample (P&K) Analysis	0.00	0	0	0	0	1	1		
Fertilize (11-52-0)	0.00	0	0	0	74	12	86		
Weeds: Chateau & Prowl H2O	0.07	2	0	0	63	0	65		
Weeds: Gramoxone	0.00	0	0	0	11	0	11		
Pickup Truck 1/2 Ton	0.12	3	1	0	0	0	4		
ATV	0.12	3	0	0	0	0	3		
<b>TOTAL CULTURAL COSTS</b>	<b>0.56</b>	<b>45</b>	<b>2</b>	<b>1</b>	<b>893</b>	<b>25</b>	<b>966</b>		
<b>Harvest:</b>									
Harvest – 9x (Custom harvest)	0.00	0	0	0	0	463	463		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>463</b>	<b>463</b>		
Interest on Operating Capital at 5.75%							12		
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>0.56</b>	<b>45</b>	<b>2</b>	<b>1</b>	<b>893</b>	<b>488</b>	<b>1,441</b>		
<b>CASH OVERHEAD:</b>									
Liability Insurance							13		
Office Expense							50		
Property Taxes							159		
Property Insurance							13		
Investment Repairs							12		
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>							<b>246</b>		
<b>TOTAL CASH COSTS/ACRE</b>								<b>1,687</b>	
<b>NON-CASH OVERHEAD:</b>									
		Per Producing Acre		Annual Cost					
				Capital Recovery					
Establishment 50 acres		966		343			343		
Irrigation System for 50 acres		582		38			38		
Land 50ac		15,000		488			488		
Equipment		19		2			2		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>16,566</b>		<b>871</b>			<b>871</b>		
<b>TOTAL COSTS/ACRE</b>								<b>2,557</b>	

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 5. COSTS and RETURNS PER ACRE to PRODUCE ALFALFA (50Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Alfalfa Hay	10	Ton	250.00	2,500	
<b>TOTAL GROSS RETURNS</b>	10	Ton		2,500	
<b>OPERATING COSTS</b>					
<b>Fertilizer:</b>					<b>74</b>
11-52-0 (P2O5)	200.00	Lb	0.37		74
<b>Custom:</b>					<b>488</b>
Make Semi-Permanent Drains	1.00	Acre	12.00		12
Swath & Rake Alfalfa	9.00	Acre	22.50		203
Bale 125# bale	153.00	Bale	1.10		168
Roadside Hay 125#	153.00	Bale	0.60		92
Tissue Sample Analysis (P & K)	0.04	Each	25.90		1
Air Application-Fertilizer	2.00	Cwt	6.00		12
<b>Herbicide:</b>					<b>89</b>
Roundup PowerMax	4.00	Pint	3.59		14
Chateau	4.00	Oz	4.62		18
Prowl H2O	1.00	Gal	44.93		45
Gramoxone Max	1.50	Pint	7.33		11
<b>Insecticide:</b>					<b>37</b>
Warrior II	1.50	FLOz	5.25		8
Coragen	3.50	FLOz	8.25		29
<b>Irrigation:</b>					<b>693</b>
Water SJV - S Alfalfa	64.00	Acln	10.83		693
<b>Labor</b>					<b>45</b>
Equipment Operator Labor	0.67	Hrs	20.44		14
Irrigation Labor	1.80	Hrs	17.52		32
<b>Machinery</b>					<b>3</b>
Fuel-Gas	0.44	gal	2.65		1
Fuel-Diesel	0.29	gal	2.38		1
Lube					0
Machinery Repair					1
Interest on Operating Capital @ 4.25%					12
<b>TOTAL OPERATING COSTS</b>					<b>1,441</b>

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 6. MONTHLY CASH COSTS PER ACRE to PRODUCE ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Cultural:	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16	AUG 16	SEP 16	OCT 16	NOV 16	DEC 16	Total
Cultural:													
Weed: Roundup PowerMax (2x)		9		9									18
Make Semi-Permanent Drains			12										12
Insect: Aphid/Weevil (Warrior)			10										10
Irrigate - 10X				77	77	139	139	139	77	77			725
Insect: Worms (Coragen)							31						31
Tissue Sample (P&K) Analysis								1					1
Fertilize (11-52-0)											86		86
Weeds: Chateau & Prowl												65	65
Weeds: Gramoxone												11	11
Pickup Truck 1/2 Ton	0	0	0	0	0	0	0	0	0	0	0	0	4
ATV	0	0	0	0	0	0	0	0	0	0	0	0	3
<b>TOTAL CULTURAL COSTS</b>	<b>1</b>	<b>10</b>	<b>22</b>	<b>78</b>	<b>87</b>	<b>139</b>	<b>170</b>	<b>140</b>	<b>78</b>	<b>78</b>	<b>87</b>	<b>77</b>	<b>966</b>
Harvest: 9x			51	51	51	51	51	51	51	51	51	51	463
			51	51	51	51	51	51	51	51	51	51	463
Interest on Operating Capital @ 4.25%	0	0	0	1	1	2	3	3	4	-1	-1	0	12
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>1</b>	<b>10</b>	<b>74</b>	<b>130</b>	<b>139</b>	<b>193</b>	<b>224</b>	<b>195</b>	<b>133</b>	<b>128</b>	<b>137</b>	<b>77</b>	<b>1,441</b>
<b>CASH OVERHEAD</b>													
Liability Insurance		13											13
Office Expense	4	4	4	4	4	4	4	4	4	4	4	4	50
Property Taxes			79						79				158
Property Insurance			7						7				13
Investment Repairs	1	1	1	1	1	1	1	1	1	1	1	1	12
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>5</b>	<b>18</b>	<b>91</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>91</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>246</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>6</b>	<b>28</b>	<b>165</b>	<b>135</b>	<b>145</b>	<b>198</b>	<b>229</b>	<b>200</b>	<b>224</b>	<b>133</b>	<b>142</b>	<b>82</b>	<b>1,687</b>

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 7. RANGING ANALYSIS ALFALFA (50Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

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

	YIELD (TONS)						
	7.00	7.50	8.00	8.50	9.00	9.50	10.00
OPERATING COSTS/ACRE:							
Cultural	966	966	966	966	966	966	966
Harvest	463	463	463	463	463	463	463
Interest on Operating Capital @ 4.25%	12	12	12	12	12	12	12
TOTAL OPERATING COSTS/ACRE	1,441	1,441	1,441	1,441	1,441	1,441	1,441
TOTAL OPERATING COSTS/TON	205.81	192.09	180.08	169.49	160.07	151.65	144.07
CASH OVERHEAD COSTS/ACRE	246	246	246	246	246	246	246
TOTAL CASH COSTS/ACRE	1,687	1,687	1,687	1,687	1,687	1,687	1,687
TOTAL CASH COSTS/TON	240.93	224.87	210.82	198.41	187.39	177.53	168.65
NON-CASH OVERHEAD COSTS/ACRE	871	871	871	871	871	871	871
TOTAL COSTS/ACRE	2,557	2,557	2,557	2,557	2,557	2,557	2,557
TOTAL COSTS/TON	365.34	340.99	319.67	300.87	284.15	269.20	255.74

Net Return Per Acre Above Operating Costs For Alfalfa

PRICE (\$/ton)	YIELD (Tons/acre)						
	7.00	7.50	8.00	8.50	9.00	9.50	10.00
Alfalfa Hay							
200.00	-41	59	159	259	359	459	559
220.00	99	209	319	429	539	649	759
240.00	239	359	479	599	719	839	959
250.00	309	434	559	684	809	934	1,059
270.00	449	584	719	854	989	1,124	1,259
290.00	589	734	879	1,024	1,169	1,314	1,459
310.00	729	884	1,039	1,194	1,349	1,504	1,659

Net Return Per Acre Above Cash Costs For Alfalfa (300 Acres)

PRICE (\$/ton)	YIELD (Tons/acre)						
	7.00	7.50	8.00	8.50	9.00	9.50	10.00
Alfalfa Hay							
200.00	-287	-187	-87	13	113	213	313
220.00	-147	-37	73	183	293	403	513
240.00	-7	113	233	353	473	593	713
250.00	63	188	313	438	563	688	813
270.00	203	338	473	608	743	878	1,013
290.00	343	488	633	778	923	1,068	1,213
310.00	483	638	793	948	1,103	1,258	1,413

Net Return per Acre above Total Costs for Alfalfa (300 Acres)

PRICE (\$/ton)	YIELD (Tons/acre)						
	7.00	7.50	8.00	8.50	9.00	9.50	10.00
Alfalfa Hay							
200.00	-1,157	-1,057	-957	-857	-757	-657	-557
220.00	-1,017	-907	-797	-687	-577	-467	-357
240.00	-877	-757	-637	-517	-397	-277	-157
250.00	-807	-682	-557	-432	-307	-182	-57
270.00	-667	-532	-397	-262	-127	8	143
290.00	-527	-382	-237	-92	53	198	343
310.00	-387	-232	-77	78	233	388	543

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 8. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT and BUSINESS OVERHEAD COSTS ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
16	ATV	8,350	5	3,742	1,135	5	60	1,200
16	ATV Sprayer System 30'	5,646	10	998	584	3	33	620
16	Pickup 1/2 Ton	34,000	5	15,238	4,621	21	246	4,888
TOTAL		47,996	-	19,979	6,340	29	340	6,709
60% of New Cost*		28,798	-	11,987	3,804	17	204	4,025

\*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Price
					Insurance	Taxes	Total	
INVESTMENT								
Establishment 50 acres	48,300	3	0	17,158	20	242	0	17,420
Irrigation System for 50 acres	29,081	20	2,908	1,895	13	160	581	2,649
Land 50ac	750,000	20	750,000	24,375	632	7,500	0	32,507
TOTAL INVESTMENT	827,381		752,908	43,427	666	7,901	581	52,576

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/	Total
	Farm	Unit		
Liability Insurance 50 acres	50	Acre	12.76	638
Office Expense 50ac	50	Acre	50.00	2,500

UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 9. HOURLY EQUIPMENT COSTS ALFALFA (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Yr	Description	Alfalfa Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
					Insurance	Taxes	Lube & Repairs	Fuel		
16	ATV	22	400	1.70	0.01	0.09	1.02	2.65	3.67	5.47
16	ATV Sprayer System 30'	16	150	2.34	0.01	0.13	1.54	0.00	1.54	4.02
16	Pickup 1/2 Ton	6	400	6.93	0.03	0.37	3.44	5.95	9.39	16.73



UC COOPERATIVE EXTENSION – AGRICULTURAL ISSUES CENTER  
**TABLE 10. OPERATIONS WITH EQUIPMENT ALFALFA (PRODUCTION ONLY) (50 Acres)**  
 SOUTHERN SAN JOAQUIN VALLEY (2016)

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Weed: Roundup Power	Feb		ATV	Equipment Operator Labor	0.08	hour
			ATV Sprayer System 30'	Roundup PowerMax	2.00	Pint
Semi-Permanent Drain	Mar			Make Semi-Permanent Drains	1.00	Acre
Insect: Aphid/Weevil	Mar		ATV Sprayer System 30'	Equipment Operator Labor	0.08	hour
				Warrior II	1.50	FlOz
Irrigate - 10X Flood	Apr		ATV	Irrigation Labor	0.18	hour
			ATV	Water SJV - S Alfalfa	6.83	AcIn
	May		ATV	Irrigation Labor	0.18	hour
			ATV	Water SJV - S Alfalfa	6.83	AcIn
	June		ATV	Irrigation Labor	0.36	hour
			ATV	Water SJV - S Alfalfa	12.23	AcIn
	July		ATV	Irrigation Labor	0.36	hour
			ATV	Water SJV - S Alfalfa	12.23	AcIn
	Aug		ATV	Irrigation Labor	0.36	hour
			ATV	Water SJV - S Alfalfa	12.23	AcIn
Sept		ATV	Irrigation Labor	0.18	hour	
		ATV	Water SJV - S Alfalfa	6.83	AcIn	
Oct		ATV	Irrigation Labor	0.18	hour	
		ATV	Water SJV - S Alfalfa	6.82	AcIn	
Weed: Roundup Power	May		ATV	Equipment Operator Labor	0.08	hour
			ATV Sprayer System 30'	Roundup PowerMax	2.00	Pint
Insect: Worms (Coragen)	July		ATV Sprayer System 30'	Equipment Operator Labor	0.08	hour
			ATV Sprayer System 30'	Coragen	3.50	FlOz
Tissue Sample (P&K)	Aug		ATV	Tissue Sample Analysis (P & K)	0.04	Each
			Nov	11-52-0 (P2O5)	200.00	Lb
Fertilize (11-52-0)				Air Application-Fertilizer	2.00	Cwt
Weeds: Chateau & Prowl	Dec		ATV	Equipment Operator Labor	0.08	hour
			ATV Sprayer System 30'	Chateau	4.00	Oz
Weeds: Gramoxone	Dec			Prowl H2O	1.00	Gal
				Gramoxone Max	1.50	Pint
Pickup Truck 1/2 Ton	Dec		Pickup 1/2 Ton	Equipment Operator Labor	0.14	hour
			ATV	Equipment Operator Labor	0.14	hour
Harvest – 9X	Mar		ATV	Swath & Rake Alfalfa	1.00	Acre
				Bale 125# bale	17.00	Bale
				Roadside Hay 125#	17.00	Bale
				Swath & Rake Alfalfa	1.00	Acre
	Apr			Bale 125# bale	17.00	Bale
				Roadside Hay 125#	17.00	Bale
	May			Swath & Rake Alfalfa	1.00	Acre
				Bale 125# bale	17.00	Bale
	June			Roadside Hay 125#	17.00	Bale
				Swath & Rake Alfalfa	1.00	Acre
	July			Bale 125# bale	17.00	Bale
				Roadside Hay 125#	17.00	Bale
	Aug			Swath & Rake Alfalfa	1.00	Acre
				Bale 125# bale	17.00	Bale
	Sept			Roadside Hay 125#	17.00	Bale
				Swath & Rake Alfalfa	1.00	Acre
	Oct			Bale 125# bale	17.00	Bale
				Roadside Hay 125#	17.00	Bale
	Nov			Swath & Rake Alfalfa	1.00	Acre
				Bale 125# bale	17.00	Bale
				Roadside Hay 125#	17.00	Bale