
UNIVERSITY OF CALIFORNIA – COOPERATIVE EXTENSION

2015

SAMPLE COSTS TO ESTABLISH AND PRODUCE

ALFALFA HAY

In The Sacramento Valley and Northern San Joaquin Valley
Flood Irrigation



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Flood Irrigated-2015

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INTRODUCTION

Sample costs to establish an alfalfa stand and produce alfalfa hay using flood irrigation in the Sacramento Valley and northern San Joaquin Valley are shown in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on the production practices considered typical for this crop and region, but will not apply to every farm situation. Sample costs for labor, materials, equipment and custom services are based on current figures. “Your Costs” columns in Tables 2, 3, 5 and 6 are provided for entering your farm costs. Table 1 shows the summary of costs for flood irrigated alfalfa per acre over four years. Tables 2-4 show costs per acre for establishing an alfalfa stand. Tables 5-11 show costs for producing alfalfa.

The hypothetical farm operation, production practices, overhead, and calculations are described under assumptions. For additional information or an explanation of the calculations used in the study contact the Department of Agricultural and Resource Economics, University of California, Davis, 530-752-4651, destewart@ucdavis.edu.

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

ASSUMPTIONS

The assumptions refer to Tables 1 through 11 and pertain to sample costs to establish an alfalfa stand, and produce alfalfa for hay in the Sacramento Valley and northern San Joaquin Valley using flood irrigation. Practices described represent production practices and materials considered typical of an alfalfa stand in the region. Costs, materials, and practices in this study will not be applicable to all situations. Establishment and cultural practices vary among growers within the region. **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 3,000 non-contiguous acres of field, row, and tree crops of which 600 acres are in alfalfa (440 in production and 160 being established) and the remaining 2,400 acres are planted to other crops such as almonds, corn, grains, processing tomatoes, sunflowers and dry beans. For this study the 160 acres of alfalfa land is owned and operated by the grower.

Stand Establishment Operating Costs (Tables 2-4)

Tables 2 to 4 show the costs associated with ground preparation, fertilizer, planting, weed control, equipment, labor, and establishing a flood irrigated alfalfa stand. Land preparation, and planting are done in the fall. The establishment year ends after the herbicide application in the fall at the 3-5 trifoliolate leaf stage.

Land Preparation. Stand establishment begins with a stubble disc and roller to incorporate the residue from the previous crop. The ground is chiseled to a depth of 18 to 24 inches to fracture the soil to improve water infiltration and root growth. The field is disced to break up large clods, creating better seed-to-soil contact for good seed germination. Laser leveling is performed by a custom operator once every seven cropping years. Therefore, one-seventh of this cost is included in the establishment costs. The rest of the field is smoothed with a tri-plane. Borders/checks are pulled every 50 feet down the length of the field. Tractor mounted Global Positioning System, (GPS) is used for field operations and the costs are included in this study. Healthy alfalfa stands compete well against weeds, insects, and diseases, so it is important to spend time on land preparation to ensure a dense and vigorous stand.

Fertilization. Nitrogen (N) and phosphorus (P) as 11-52-0 at 200 pounds per acre of material and sulfur at 200 pounds per acre is applied by a custom operator in September during field work. Prior to planting, the PCA/CCA collects one soil sample per 20 acres and has it analyzed by a lab for phosphorous (P) and potassium (K) as shown in Tables 1, 2 and 3. This is especially important when alfalfa follows a crop like processing tomatoes where there may be high residual levels of phosphorus left over in the soil after harvest. This amount of sulfur is sufficient to supply crop needs for four to six years, and the phosphorus for one to two years. In this cost study the pre-plant fertilizer costs are charged to the establishment year and amortized over the 4 year life of the stand.

Planting. Alfalfa seed is planted with a Brillion seeder 1/4 inch or less deep at 25 pounds of seed per acre. The seed is planted in September or October and for this study the stand life is four years. Roundup Ready seed is used in this study at a cost of \$8.00 per pound (including the \$3.00 per pound tech fee) that comes coated with a specific Rhizobial inoculant for nitrogen fixation. The field is ring rolled after planting to firm the seed bed. For selecting an appropriate variety with specific characteristic that are best adapted to your region, view the listed varieties at the UC Alfalfa & Forage website at <http://alfalfa.ucdavis.edu/%2Bproducing/variety/index.aspx>

or the National Alfalfa Forage Alliance Alfalfa Variety Leaflet at <https://www.alfalfa.org/varietyLeaflet.php>

Irrigation. In this study water for seed germination is sprinkled immediately after planting and then again two weeks later with a total of 6 acre-inches. Water is pumped from a well into lines and through a booster pump into the main lines that are attached to the sprinkler lines running the length of the field every 50-60 feet apart. Water and pumping costs are \$90 per acre foot, (\$7.50 per acre inch).

Pest Management. The pesticides, rates, and application practices mentioned in this cost study are listed in the *UC IPM 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 <http://ipm.ucdavis.edu/>. **Pest control costs can 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. The adjuvants in this study are not included as a cost in all applications.

Pest Control Adviser/Certified Crop Advisor (PCA/CCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition the PCA/CCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. It is assumed in this study that PCA/CCA services are provided by an Agricultural Company.

Weeds. With Roundup Ready alfalfa planted, the broad spectrum post-emergent herbicide Roundup PowerMax is used for weed control. Weed control with Roundup PowerMax is used in late fall at the 3-5 trifoliate leaf stage when weeds are less than 4 inches tall.

Production Operating Costs

(Tables 5-11)

The production costs are shown in Tables 5-11. Tables 5 and 6 show the production costs associated with equipment, pest control, irrigation, labor, and harvesting alfalfa.

Irrigation. Irrigation costs include water costs, pumping and labor expenses. From April to September, (twice in July) 7 irrigations totaling 3.5 acre-feet, (42 inches) of water are applied through the flood system. The actual water requirement will vary each year based on soil, climatic, and plant physiological factors. Water is pumped into a ditch and syphon tubes are used to pull water from the ditch into the alfalfa checks between the borders, flooding the checks. The head ditch and tail levee are made in April before the first irrigation.

Fertilization. Once the stand is established, plant tissue samples should be taken from the fourth or fifth cutting toward the end of the second production year to determine the levels of phosphorus, potassium, sulfur and other micro nutrients needed by the alfalfa in the following years of the stand life. Costs shown in Tables 5 and 6 are for the analysis based on plant samples collected by the PCA/CCA. In this study, at the end of year two (beginning of year three), 11-52-0 at 200 pounds per acre is actually applied in January for a total of 400 pounds of P per acre for the total life of the four year stand. Subsequent micro-nutrient fertilizers are applied as needed from tissue analysis and PCA/CCA recommendations. Summer tissue samples are omitted in year three and four (year 4, end of the stand life).

Pest Management during Production Years

Weeds. In Year 1 of the production stage, Roundup PowerMax is used in February. In year 2, Roundup is applied in December. In year 3, Roundup is tank mixed with the herbicide Velpar and applied in December. In year 4, Roundup is applied in January, and then again in June for summer grasses. All herbicides are applied with an ATV pulled sprayer. Pre-emergence or contact herbicides with different active ingredients should be rotated with Roundup as needed during production years to combat weed species shift and resistance.

Insects. Several insect species attack alfalfa, but weevils (Egyptian and alfalfa), 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) is applied in March. Worms, alfalfa caterpillar and armyworms are controlled in July and August with insecticide (Coragen and Belt) applications.

Vertebrate Pest Control. Pocket gophers and meadow mice are the main vertebrate pests that can cause damage in alfalfa stands. . Control is usually trapping or poison bait, depending on the pest causing the damage, applied by hand or mechanically. Flood irrigations deter rodents and most growers do not treat unless the populations are severe enough to cause economic loss. Rodent pests are not treated in this study.

Harvest. In this study, the alfalfa is harvested by the grower for hay seven times per year; April, May, June, July (twice), August, and September. 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. All harvest operations are performed inside of the head ditch and tail levee. Once the hay has dried to the correct moisture content, it is baled into 100 to 125 pound small bales or 1,300 pounds for large bales. The bales are picked up with a bale wagon that moves them from the field and roadsides them (picks up bales and puts in stacks). Using the growers equipment the costs are \$37/ton including road siding. For this study we are using 1300 lb bales. The moisture content of alfalfa growing in the field is generally between 75% and 83%. Optimum moisture for raking is 35% to 40%. The optimum moisture content for baling large 1300 pound bales is 14%.

Custom Harvest. Some harvesting companies swath, rake, bale, and roadside the harvested alfalfa for a single fee based on tonnage per acre. Custom operations can be as much as \$36/ton for swathing, raking and baling with an additional \$14/ton roadside charges for a total of \$50/ton.

Yields. The crop is assumed to yield 7.0 tons of hay per acre at 90% dry matter (DM). Annual yields range from 5.0 to 9.0 tons of hay per acre in this region on flood irrigation (averaging 7.0 tons).

Returns. A price of \$285 per ton for premium hay is based on current USDA California 2014 averages over all grades for the Sacramento 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. For this study Table 7 shows grower returns over a range of yields and prices.

Pickups/ATV. The ½ ton pickup is used for irrigation, on road transportation and farm work. The ¾ ton pickup is for business purposes as needed. The ATV is used for pesticide applications, in-field gopher scouting and off road transportation.

Labor, Equipment and Interest

Labor. Labor rates of \$17.00 per hour for machine operators and \$13.60 for general labor includes payroll overhead of 36%. The basic hourly wages are \$12.50 for machine operators and \$10.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for field crops 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, 2014. Labor costs for operations involving machinery are 20% higher than the operation time given in Tables 2 and 5 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 the 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. Prices for on-farm delivery of diesel and gasoline are \$3.88 and \$3.39 per gallon, respectively. The costs are based on October, 2014 prices. Energy Information Administration, Department of Energy (DOE) weekly data. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. The fuel, lube, and repair costs per acre for each operation in Tables 1 and 4 are determined by multiplying the total hourly operating cost in Table 9 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

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 5.75% 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 2014.

Risk. Production risks 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 the profitability and economic viability of alfalfa production.

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. A portion of the overhead costs in the establishment year is allocated to the previous crop.

Property Taxes. Counties charge a base property tax rate of 1% 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% of the average value of the property.

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 0.843% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$1,643 for the entire farm.

Office Expense. 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 telephone.

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

Field Supervisors' Salary. Supervisor salaries for alfalfa include insurance, payroll taxes, benefits and bonuses. One third of the supervisors' time is allocated to alfalfa. The costs used in this study are \$42.50 per acre.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. A portion 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 and is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). The capital recovery costs are 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 the estimated value of an investment at the end of its useful life. For farm machinery the value is a percentage of the new cost of the investment (Boehlje and Eidman 1984). The value is calculated from equations developed by ASAE (American Society of Agricultural Engineers), based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE, by the annual hours of use in the 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.

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 and equipment life.

Interest Rate. An interest rate of 4.75% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic rate suggested by a farm lending agency as of January 2014.

Tools. Includes shop equipment/tools and other tools used on the farm and does not recognize any specific inventory.

Shop Building. A shop building is used for equipment maintenance and repair, parts and supply storage, a bathroom, and houses the farm's office. The building encompasses 8,000 square feet, has a concrete floor, and is wired and plumbed as needed to meet building codes.

Irrigation System. The established permanent irrigation system consists of wells, pumps, buried mainline and alfalfa valves which are included in the land purchase price. The cost for the 600 acres is based on a quarter section (160 acres) with one-quarter mile runs. There are two 18-inch mainlines each approximately 2,640 feet long with 10 or 12-inch alfalfa valves every 50 feet and a quarter mile intertie line (connects two mainlines) with 12-inch PVC. A ditch is pulled using a tractor and ditcher, at the head of the field and syphon tubes are used to flood the checks. A drain is made using a tractor and 3-point blade, for the excess water to leave the field.

The sprinkler irrigation system consists of pipes & risers, main and laterals lines, valve openers/bonnets and booster pumps owned by grower and shown under non-cash overhead.

Land. Cropland with district water suitable for alfalfa production typically ranges in value among counties from \$5,000 to \$12,000 per acre. The land in this study is owned by the grower and cost \$8,000 per acre.

Hay Barn. The open barn with a metal roof covers 5,000 square feet and is 20 feet high. The building's ten support poles are on concrete piers with a natural floor (ground).

Fuel Tanks. Two 5,000-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

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 Costs shown in Table 2 represents the establishment cost per acre. For this study, the cost is \$821 per acre or \$131,360 for the 160 acres. The alfalfa stand establishment cost is amortized over the 4-year stand life.

Equipment. Although, farm equipment is purchased new or used, the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% 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
TABLE 1. SUMMARY OF COSTS FOR ALFALFA- PER ACRE OVER YEARS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Operations	Establishment- Year	Year-1	Years-2	Year-3	Year-4
Pre-Plant:					
Land Prep (Combined)	95				
TOTAL PRE-PLANT COSTS	99				
Cultural:					
Soil Sample	4				
Plant-Roll-Cover Seed	222				
Irrigate-Sprinkler2X	106				
Irrigate-Flood7X		315	315	315	315
Irrigation Labor	27	122	122	122	122
Ditch/tail drain		31	31	31	31
Weed Control	7	7	7	65	14
Insect Control		61	61	61	61
Tissue Samples			11		
Fertilizer	119			85	
Farm Trucks	35	37	37	37	37
TOTAL CULTURAL COSTS	615	573	583	715	580
Harvest:					
Harvest (All operations)		270	270	270	270
TOTAL HARVEST COSTS		270	270	270	270
Interest on Operating Capital at 5.75%	3	13	13	19	13
TOTAL OPERATING COSTS/ACRE	619	855	866	1,004	862
CASH OVERHEAD COSTS/ACRE	203	208	208	208	208
TOTAL CASH COSTS/ACRE	822	1,063	1,073	1,212	1,070
NON-CASH OVERHEAD COSTS/ACRE	434	751	751	751	751
TOTAL COSTS/ACRE	1,255	1,814	1,824	1,963	1,821
TOTAL COSTS/TON		259	261	280	260

UC COOPERATIVE EXTENSION
TABLE 2. COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Pre-Plant:								
Soil Samples	0.00	0	0	0	0	4	4	
Stubble Disc	0.13	3	9	4	0	0	15	
Chisel/Rip & Roll	0.12	3	8	4	0	0	15	
Laser Level 7% Ac	0.00	0	0	0	0	12	12	
Tri-Plane 2X	0.24	5	12	5	0	0	22	
Fertilize 11-52-0	0.00	0	0	0	98	21	119	
Finish Disc & Roll 2X	0.19	4	10	6	0	0	19	
Pull Border/Checks	0.14	3	7	2	0	0	12	
TOTAL PRE-PLANT COSTS	0.84	17	46	21	98	37	218	
Cultural:								
Plant-Roundup Ready Seed	0.33	7	7	3	200	0	217	
Roll-Cover Seed	0.10	2	2	1	0	0	5	
Sprinkler Irrigate 2X	2.00	41	17	3	45	0	106	
Irrigation Labor	0.00	27	0	0	0	0	27	
Weed Control-Roundup PowerMax	0.05	1	0	0	6	0	7	
Service Truck	0.25	5	3	1	0	0	9	
1/2 Ton Pickup	0.37	7	3	2	0	0	12	
3/4 Ton Pickup (Farm use)	0.40	8	5	2	0	0	14	
TOTAL CULTURAL COSTS	3.49	98	37	11	251	0	397	
Interest on Operating Capital at 5.75%							3	
TOTAL OPERATING COSTS/ACRE	4	115	83	32	349	37	619	
CASH OVERHEAD:								
Office Expense							50	
Supervisor Salary							43	
Liability Insurance							1	
Miscellaneous Costs							20	
Property Taxes							81	
Property Insurance							7	
Investment Repairs							2	
TOTAL CASH OVERHEAD COSTS/ACRE							203	
TOTAL CASH COSTS/ACRE							821	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost		Capital Recovery		
Fuel Tanks Overhead		4		0		0		
Shop Tools		7		1		1		
Hay Barn/Pole Barn		25		2		2		
Land 160 Acres		8,000		380		380		
GPS Sending Unit		2		0		0		
GPS Receiving Unit		1		0		0		
Sprinkler Pipe		11		1		1		
Pipe Main Line 10" 1/2 Mile		9		1		1		
Shop 8,000 sqft		53		4		4		
Syphon Tubes 1.5" (400)		1		0		0		
Equipment		388		45		45		
TOTAL NON-CASH OVERHEAD COSTS		8,500		434		434		
TOTAL COSTS/ACRE							1,255	

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TABLE 3. MATERIAL AND INPUT COSTS TO ESTABLISH ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Fertilizer:					98
11-52-0	200.00	Lb	0.37	74	
Elemental Sulfur	200.00	Lb	0.12	24	
Custom:					37
Soil Test P	1.00	Each	2.00	2	
Soil Test K	1.00	Each	2.00	2	
Laser Level	0.07	Acre	165.00	12	
Ground Application	2.00	Acre	10.50	21	
Seed:					200
Alfalfa Seed RR	25.00	Lb	5.00	125	
Seed Tech Fee	25.00	Lb	3.00	75	
Herbicide:					6
Roundup PowerMax	2.00	Pint	2.75	6	
Irrigation:					45
Water-Alfalfa-Pumped	6.00	AcIn	7.50	45	
Labor					115
Equipment Operator Labor	5.19	Hrs.	17.00	88	
Irrigation Labor	2.00	Hrs	13.60	27	
Machinery					115
Fuel-Gas	2.17	Gal	3.79	8	
Fuel-Diesel	19.20	Gal	3.88	74	
Lube					12
Machinery Repair					20
Interest on Operating Capital @ 5.75%					3
TOTAL OPERATING COSTS/ACRE					619

UC COOPERATIVE EXTENSION
TABLE 4. WHOLE FARM ANNUAL EQUIPMENT COSTS-ESTABLISHMENT YEAR
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
14	Irrigation Pipe Trailer #1	2,141	25	65	147	1	11	159
14	Irrigation Pipe Trailer #2	2,141	25	65	147	1	11	159
14	260HP4WD Tractor	341,906	10	100,994	35,619	187	2,214	38,020
14	205HP Crawler	233,353	10	68,929	24,310	127	1,511	25,949
14	Disc - Finish 25'	65,000	10	11,495	7,391	32	382	7,806
14	95HP2WD Tractor	60,035	10	17,733	6,254	33	389	6,676
14	Chisel - Heavy 26'	51,218	10	9,057	5,824	25	301	6,151
14	Triplane - 16'	38,000	10	6,720	4,321	19	224	4,564
14	Ring roller - 25'	29,000	10	5,128	3,298	14	171	3,483
14	Border-Ridger	19,625	10	3,702	2,213	10	117	2,339
14	Rice Roller-18'	15,552	10	2,750	1,768	8	92	1,868
14	Booster Pump #2	11,000	10	1,945	1,251	5	65	1,321
14	Booster Pump #1	11,000	10	1,945	1,251	5	65	1,321
14	ATV Sprayer System	9,700	10	1,715	1,103	5	57	1,165
14	Brillion Seeder 12'	17,235	7	4,397	2,407	9	108	2,525
14	Service Truck	47,000	5	21,064	6,950	29	340	7,319
14	Disc - Stubble 18'	45,000	5	14,658	7,656	25	298	7,980
14	Pickup 3/4 Ton	32,000	5	14,342	4,732	20	232	4,983
14	Pickup 1/2 Ton	28,000	5	12,549	4,140	17	203	4,360
14	ATV	8,500	5	3,809	1,257	5	62	1,324
TOTAL		1,067,406	-	303,063	122,039	578	6,852	129,469
60% of New Cost*		640,444	-	181,838	73,223	347	4,111	77,681

*Used to reflect a mix of new and used equipment

UC COOPERATIVE EXTENSION
TABLE 5. COSTS PER ACRE TO PRODUCE ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Operation	Operation	Cash and Labor Costs per Acre						Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent			
Cultural:									
Weeds-Roundup/Velpar	0.05	1	0	0	63	0	65		
Fertilizer 11-52-0	0.00	0	0	0	74	11	85		
Insects-Aphids/Weevil-Warrior II	0.05	1	0	0	8	0	9		
Irrigation-Ditch/Tail Levee	0.38	8	17	6	0	0	31		
Irrigate-Flood 7X	0.00	0	0	0	315	0	315		
Insects-Worms Coragen	0.05	1	0	0	21	0	22		
Insects-Worms Belt SC	0.05	1	0	0	28	0	30		
Irrigation Labor	0.00	122	0	0	0	0	122		
Pickup 1/2 Ton	0.47	10	4	2	0	0	16		
Pickup 3/4 Ton	0.40	8	5	2	0	0	14		
Service Truck	0.20	4	2	1	0	0	7		
TOTAL CULTURAL COSTS	1.65	156	29	11	509	11	715		
Harvest:									
Harvest-Swathing	0.75	15	26	16	0	0	57		
Harvest-Raking	0.60	12	5	4	0	0	21		
Harvest-Baling	0.93	19	35	39	7	0	100		
Harvest-Roadsiding	0.93	19	33	40	0	0	92		
TOTAL HARVEST COSTS	3.22	66	98	99	7	0	270		
Interest on Operating Capital at 5.75%									19
TOTAL OPERATING COSTS/ACRE	5	222	127	110	516	11	1,004		
CASH OVERHEAD:									
Office Expense									50
Miscellaneous Costs									20
Supervisor Salary									43
Liability Insurance									1
Property Taxes									85
Property Insurance									7
Investment Repairs									2
TOTAL CASH OVERHEAD COSTS/ACRE									208
TOTAL CASH COSTS/ACRE									1,211
NON-CASH OVERHEAD:									
		Per Producing Acre		Annual Cost		Capital Recovery			
Fuel Tanks Overhead		4		0		0			0
Shop Tools		7		1		1			1
Hay Barn/Pole Barn		25		2		2			2
Land 160 Acres		8,000		380		380			380
GPS Sending Unit		2		0		0			0
GPS Receiving Unit		1		0		0			0
Sprinkler Pipe		11		1		1			1
Pipe Main Line 10" 1/2 Mile		9		1		1			1
Shop 8,000 sqft		53		4		4			4
Establishment Costs 160 Ac		821		230		230			230
Irrigation Pipe Trailer (5)		4		0		0			0
Syphon Tubes 1.5" (400)		1		0		0			0
Equipment		1,094		131		131			131
TOTAL NON-CASH OVERHEAD COSTS		10,031		751		751			751
TOTAL COSTS/ACRE									1,962

UC COOPERATIVE EXTENSION
TABLE 6. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Hay	7	Ton	285	1,995	
OPERATING COSTS					
Fertilizer:					74
11-52-0	200.00	Lb	0.37		74
Custom:					21
Ground Application	1.00	Acre	10.50		11
Herbicide:					63
Roundup PowerMax	2.00	Pint	2.75		6
Velpar L	4.00	Pint	14.41		58
Insecticide:					57
Warrior II	1.50	FLOz	5.25		8
Coragen	2.00	FLOz	10.25		21
Belt SC	3.00	FLOz	9.40		28
Irrigation:					315
Water-Alfalfa-Pumped	42.00	AcIn	7.50		315
Miscellaneous:					7
Bale Twine	0.98	Acre	7.00		7
Labor					222
Equipment Operator Labor	5.84	Hrs	17.00		99
Irrigation Labor	9.00	Hrs	13.60		122
Machinery					248
Fuel-Gas	2.56	Gal	3.79		10
Fuel-Diesel	32.75	Gal	3.88		127
Lube					21
Machinery Repair					90
Interest on Operating Capital @ 5.75%					19
TOTAL OPERATING COSTS/ACRE				1,015	
TOTAL OPERATING COSTS/TON				145	
NET RETURNS ABOVE OPERATING COSTS				980	
CASH OVERHEAD COSTS					
Office Expense					50
Miscellaneous Costs					20
Supervisor Salary					43
Liability Insurance					1
Property Taxes					85
Property Insurance					7
Investment Repairs					2
TOTAL CASH OVERHEAD COSTS/ACRE				208	
TOTAL CASH OVERHEAD COSTS/TON				30	
TOTAL CASH COSTS/ACRE				1,222	
TOTAL CASH COSTS/TON				175	
NET RETURNS ABOVE CASH COSTS				703	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Fuel Tanks Overhead					0
Shop Tools					1
Hay Barn/Pole Barn					2
Land 160 Acres					380
GPS Sending Unit					0
GPS Receiving Unit					0
Sprinkler Pipe					1
Pipe Main Line 10" 1/2 Mile					1
Shop 8,000 sqft					4
Establishment Costs 160 Ac					230
Irrigation Pipe Trailer (5)					0
Syphon Tubes 1.5" (400)					0
Equipment					131
TOTAL NON-CASH OVERHEAD COSTS/ACRE				751	
TOTAL NON-CASH OVERHEAD COSTS/TON				107	
TOTAL COST/ACRE				1,973	
TOTAL COST/TON				282	
NET RETURNS ABOVE TOTAL COST				22	

UC COOPERATIVE EXTENSION
TABLE 7. MONTHLY COSTS PER ACRE TO PRODUCE ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

	DEC 14	JAN 15	FEB 15	MAR 15	APR 15	MAY 15	JUN 15	JUL 15	AUG 15	SEP 15	Total
Cultural:											
Weeds-Roundup PowerMax	65										65
Fertilizer 11-52-0		85									85
Insects-Aphids/Weevil-Warrior II				9							9
Irrigation-Ditch/Tail Levee					12			7		12	31
Irrigate-Flood 7X					45	45	45	90	45	45	315
Insects-Worms Coragen								22			22
Insects-Worms Belt SC									30		30
Irrigation Labor										122	122
Pickup 1/2 Ton	2	2	2	2	2	2	2	2	2	2	16
Pickup 3/4 Ton	1	1	1	1	1	1	1	1	1	1	14
Service Truck	1	1	1	1	1	1	1	1	1	1	7
TOTAL CULTURAL COSTS	68	88	4	13	60	49	56	100	93	183	715
Harvest:											
Harvest-Swathing					8	8	8	16	8	8	57
Harvest-Raking					3	3	3	6	3	3	21
Harvest-Baling					14	14	14	29	14	14	100
Harvest-Roadsiding					13	13	13	26	13	13	92
TOTAL HARVEST COSTS	0	0	0	0	39	39	39	77	39	39	270
Interest on Operating Capital @ 5.75%	0	1	1	1	1	2	2	3	4	5	19
TOTAL OPERATING COSTS/ACRE	69	89	4	14	100	89	97	180	135	226	1,004
CASH OVERHEAD											
Office Expense										50	50
Miscellaneous Costs										20	20
Supervisor Salary	4	4	4	4	4	4	4	4	4	4	43
Liability Insurance										1	1
Property Taxes		43						43			85
Property Insurance		4						4			7
Investment Repairs	0	0	0	0	0	0	0	0	0	0	2
TOTAL CASH OVERHEAD COSTS	4	51	4	4	4	4	4	51	4	75	208
TOTAL CASH COSTS/ACRE	73	140	9	18	105	93	101	231	140	301	1,211

UC COOPERATIVE EXTENSION
TABLE 8. RANGING ANALYSIS - ALFALFA
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

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

	YIELD (TON)						
	4.00	5.00	6.00	7.00	8.00	9.00	10.00
OPERATING COSTS/ACRE:							
Cultural	715	715	715	715	715	715	715
Harvest	154	193	231	270	308	347	385
Interest on Operating Capital @ 5.75%	17	18	19	19	20	21	21
TOTAL OPERATING COSTS/ACRE	886	926	965	1,004	1,043	1,082	1,121
TOTAL OPERATING COSTS/TON	221.59	185.10	160.77	143.41	130.37	120.23	112.12
CASH OVERHEAD COSTS/ACRE							
	214	214	214	214	214	214	214
TOTAL CASH COSTS/ACRE	1,101	1,140	1,179	1,218	1,257	1,296	1,335
TOTAL CASH COSTS/TON	275.17	227.96	196.49	174.02	157.15	144.04	133.55
NON-CASH OVERHEAD COSTS/ACRE							
	751	751	751	751	751	751	751
TOTAL COSTS/ACRE	1,852	1,891	1,930	1,969	2,008	2,047	2,086
TOTAL COSTS/TON	463.00	378.00	322.00	281.00	251.00	227.00	209.00

Net Return per Acre above Operating Costs

PRICE (\$/ton)	YIELD (Ton /acre)						
	4.00	5.00	6.00	7.00	8.00	9.00	10.00
Hay							
200.00	-86	74	235	396	557	718	879
225.00	14	199	385	571	757	943	1,129
250.00	114	324	535	746	957	1,168	1,379
275.00	214	449	685	921	1,157	1,393	1,629
300.00	314	574	835	1,096	1,357	1,618	1,879
325.00	414	699	985	1,271	1,557	1,843	2,129
350.00	514	824	1,135	1,446	1,757	2,068	2,379

Net Return per Acre above Cash Costs

PRICE (\$/ton)	YIELD (Ton /acre)						
	4.00	5.00	6.00	7.00	8.00	9.00	10.00
Hay							
200.00	-301	-140	21	182	343	504	665
225.00	-201	-15	171	357	543	729	915
250.00	-101	110	321	532	743	954	1,165
275.00	-1	235	471	707	943	1,179	1,415
300.00	99	360	621	882	1,143	1,404	1,665
325.00	199	485	771	1,057	1,343	1,629	1,915
350.00	299	610	921	1,232	1,543	1,854	2,165

Net Return per Acre above Total Costs

PRICE (\$/ton)	YIELD (Ton /acre)						
	4.00	5.00	6.00	7.00	8.00	9.00	10.00
Hay							
200.00	-1,052	-891	-730	-569	-408	-247	-86
225.00	-952	-766	-580	-394	-208	-22	164
250.00	-852	-641	-430	-219	-8	203	414
275.00	-752	-516	-280	-44	192	428	664
300.00	-652	-391	-130	131	392	653	914
325.00	-552	-266	20	306	592	878	1,164
350.00	-452	-141	170	481	792	1,103	1,414

UC COOPERATIVE EXTENSION
TABLE 9. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
15	Rear Blade - 8'	8,000	15	768	722	4	44	769
15	Ditcher - V	8,631	12	1,195	884	4	49	937
15	205HP Crawler	233,353	10	68,929	24,310	127	1,511	25,949
15	150HP4WD Tractor	163,954	10	48,429	17,080	90	1,062	18,232
15	Swather 16'	148,000	10	26,173	16,829	73	871	17,774
15	Baler1300# PTO	145,000	10	25,642	16,488	72	853	17,413
15	Rake 20'	32,500	10	5,747	3,696	16	191	3,903
15	37HP 4WD Tractor	19,697	10	5,818	2,052	11	128	2,190
15	ATV Sprayer System	9,700	10	1,715	1,103	5	57	1,165
15	Bale Wagon 1300# Attm	148,625	8	31,320	19,454	76	900	20,430
15	Service Truck	47,000	5	21,064	6,950	29	340	7,319
15	Pickup 3/4 Ton	32,000	5	14,342	4,732	20	232	4,983
15	Pickup 1/2 Ton	28,000	5	12,549	4,140	17	203	4,360
15	ATV	8,500	5	3,809	1,257	5	62	1,324
TOTAL		1,032,960	-	267,502	119,697	548	6,502	126,747
60% of New Cost*		619,776	-	160,501	71,818	329	3,901	76,048

*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								
Fuel Tanks Overhead	10,975	20	0	862	5	55	220	1,142
Shop Tools	20,000	20	2,000	1,509	9	110	400	2,028
Hay Barn/Pole Barn	75,000	20	0	5,891	32	375	1,500	7,798
Land 160 Acres	1,280,000	20	1,280,000	60,800	1,079	12,800	0	74,679
Sprinkler Pipe	33,865	20	3,387	2,555	16	186	677	3,434
Shop 8,000 sqft	160,000	20	0	12,568	67	800	3,200	16,636
Syphon Tubes 1.5" (400)	2,400	20	100	185	1	13	25	224
GPS Sending Unit	5,895	10	590	707	3	32	118	860
GPS Receiving Unit	1,995	10	200	239	1	11	40	291
Pipe Main Line 10" 1/2 Mile	26,892	10	2,690	3,224	12	148	250	3,634
Irrigation Pipe Trailer (5)	10,705	10	2,500	1,168	6	66	200	1,440
Establishment Costs 160 Ac	131,360	4	0	36,830	55	657	0	37,542
TOTAL INVESTMENT	1,759,087	-	1,291,467	126,539	1,286	15,253	6,630	149,708

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Office Expense	160	Acre	50.00	8,000
Miscellaneous Costs	160	Acre	20.00	3,200
Supervisor Salary	160	Acre	42.50	6,800
Liability Insurance	160	Acre	0.5665	91

ANNUAL EQUIPMENT COSTS
UC COOPERATIVE EXTENSION
TABLE 10. HOURLY EQUIPMENT COSTS
 SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Yr	Description	Alfalfa Hay	Total	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel		
15	150HP4WD Tractor	194	1600	6.41	0.03	0.40	9.43	33.78	43.20	50.04
15	37HP 4WD Tractor	106	1600	0.77	0.00	0.05	1.58	7.05	8.63	9.45
15	205HP Crawler	38	1600	9.12	0.05	0.57	13.13	46.16	59.29	69.02
15	Service Truck	32	1000	4.17	0.02	0.20	3.17	11.64	14.81	19.20
15	Pickup 1/2 Ton	75	400	6.21	0.03	0.30	4.18	9.48	13.66	20.20
15	Pickup 3/4 Ton	64	400	7.10	0.03	0.35	4.09	11.37	15.46	22.94
15	ATV	31	400	1.89	0.01	0.09	1.20	3.79	4.99	6.98
15	Baler1300# PTO	149	300	32.98	0.14	1.71	31.85	0.00	31.85	66.67
15	Swather 16'	132	300	33.66	0.15	1.74	19.42	31.04	50.46	86.01
15	Bale Wagon 1300# Attm	164	250	46.69	0.18	2.16	38.68	32.20	70.88	119.91
15	Rake 20'	96	250	8.87	0.04	0.46	4.60	0.00	4.60	13.97
15	Rear Blade - 8'	27	200	2.16	0.01	0.13	1.21	0.00	1.21	3.52
15	Ditcher - V	35	166	3.19	0.01	0.18	2.40	0.00	2.40	5.79
15	ATV Sprayer System	31	150	4.41	0.02	0.23	2.61	0.00	2.61	7.27

UC COOPERATIVE EXTENSION
TABLE 11. OPERATIONS WITH EQUIPMENT & MATERIALS
SACRAMENTO VALLEY & NORTHERN SAN JOAQUIN VALLEY-2015

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit	
Weeds-Roundup PowerMax	Dec		ATV	Equipment Operator Labor	0.06	hour	
				Roundup PowerMax	2.00	Pint	
Fertilizer 11-52-0	Jan		ATV Sprayer System	Velpar L	4.00	Pint	
				11-52-0	200.00	Lb	
Insects-Aphids/Weevil	Mar		ATV	Ground Application	1.00	Acre	
				Equipment Operator Labor	0.06	hour	
				Warrior II	1.50	FIOz	
Irrigation-Ditch/Drain	Apr	205HP Crawler	ATV Sprayer System	Ditcher - V	Equipment Operator Labor	0.16	hour
	July	205HP Crawler	Ditcher - V	Ditcher - V	Equipment Operator Labor	0.10	hour
	Sept	150HP4WD Tractor	Rear Blade - 8'	Equipment Operator Labor	0.20	hour	
Irrigate-Flood 7X	Apr			Water-Alfalfa-Pumped	6.00	AcIn	
	May			Water-Alfalfa-Pumped	6.00	AcIn	
	June			Water-Alfalfa-Pumped	6.00	AcIn	
	July 2X			Water-Alfalfa-Pumped	12.00	AcIn	
	Aug			Water-Alfalfa-Pumped	6.00	AcIn	
	Sept			Water-Alfalfa-Pumped	6.00	AcIn	
Insects-Worms Coragen	July		ATV	Equipment Operator Labor	0.06	hour	
				Coragen	2.00	FIOz	
Insects-Worms Belt SC	Aug		ATV Sprayer System	ATV	Equipment Operator Labor	0.06	hour
				Belt SC	3.00	FIOz	
Irrigation Labor	Sept		ATV Sprayer System	Irrigation Labor	9.00	hours	
Pickup 1/2 Ton	Sept		Pickup 1/2 Ton	Equipment Operator Labor	0.56	hour	
Pickup 3/4 Ton	Sept		Pickup 3/4 Ton	Equipment Operator Labor	0.48	hour	
Service Truck	Sept		Service Truck	Equipment Operator Labor	0.24	hour	
Harvest-Swathing	Apr		Swather 16'	Equipment Operator Labor	0.13	hour	
	May		Swather 16'	Equipment Operator Labor	0.13	hour	
	June		Swather 16'	Equipment Operator Labor	0.13	hour	
	July		Swather 16'	Equipment Operator Labor	0.13	hour	
	July		Swather 16'	Equipment Operator Labor	0.13	hour	
	Aug		Swather 16'	Equipment Operator Labor	0.13	hour	
	Sept		Swather 16'	Equipment Operator Labor	0.13	hour	
Harvest-Raking	Apr	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	May	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	June	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	July	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	July	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	Aug	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
	Sept	37HP 4WD Tractor	Rake 20'	Equipment Operator Labor	0.10	hour	
Harvest-Baling	Apr	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	May	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	June	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	July	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	July	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	Aug	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
	Sept	150HP4WD Tractor	Baler1300# PTO	Equipment Operator Labor	0.16	hour	
				Bale Twine	0.14	Acre	
Harvest-Roadsiding	Apr		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	May		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	June		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	July		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	July		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	Aug		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	
	Sept		Bale Wagon 1300# Attm	Equipment Operator Labor	0.16	hour	