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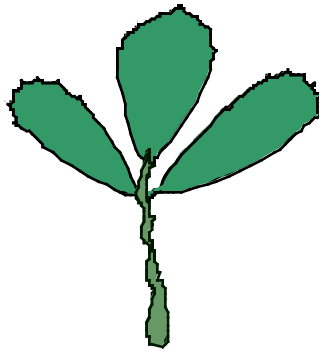
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1998

UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

SAMPLE COSTS TO  
ESTABLISH AN ALFALFA STAND AND PRODUCE

~ *ALFALFA HAY* \_



**SACRAMENTO VALLEY  
Flood Irrigated**

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# UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

## 1998 SAMPLE COSTS TO ESTABLISH AN ALFALFA STAND AND PRODUCE ALFALFA HAY Sacramento Valley Flood Irrigated

### INTRODUCTION

The detailed costs to establish an alfalfa stand and produce alfalfa hay in the Sacramento Valley of California are presented in this study. The hypothetical farm used in this report consists of 2,900 acres of which 400 acres are in alfalfa hay production.

This study consists of assumptions for establishing an alfalfa hay stand and producing alfalfa hay and ten tables. It is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices detailed in this study may not be applicable to every situation. A blank, *Your Cost*, column is provided to enter your actual costs on Table 1 Costs Per Acre to Establish An Alfalfa Hay Stand and Table 4 Costs Per Acre To Produce Alfalfa Hay.

Tables included:

Table 1.	Costs Per Acre To Establish An Alfalfa Stand
Table 2.	Costs And Returns Per Acre To Establish An Alfalfa Stand
Table 3.	Monthly Cash Costs Per Acre To Establish An Alfalfa Stand
Table 4.	Costs Per Acre To Produce Alfalfa Hay
Table 5.	Costs And Returns Per Acre To Produce Alfalfa Hay
Table 6.	Monthly Cash Costs Per Acre To Produce Alfalfa Hay
Table 7.	Whole Farm Annual Equipment Overhead Costs For Alfalfa Hay Establishment And Production
Table 8.	Whole Farm Annual Investment And Business Overhead Costs
Table 9.	Hourly Equipment Costs
Table 10.	Ranging Analysis

This and other costs studies can be obtained through the Department of Agricultural and Resource Economics, U.C. Davis (530 752-1515), or from selected county Cooperative Extension offices. For an explanation of calculations or assumptions used in this study refer to the attached General Assumptions or call the Department of Agricultural and Resource Economics, Cooperative Extension, University of California, Davis, California, (530 752-3589) or the farm advisor in the county of interest.

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# UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

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## SAMPLE COSTS TO ESTABLISH AN ALFALFA STAND AND PRODUCE ALFALFA HAY Sacramento Valley Flood Irrigated

### ASSUMPTIONS

**Land.** This report is based on a 2,900 acre field and row crop farm of which 300 acres are producing alfalfa hay, another 100 acre stand of alfalfa is being established, and the remaining 2,500 acres are planted to field corn, sugar beets, processing tomatoes, and wheat. Other rotational crops that might also be planted on Sacramento Valley farms might include safflower, sunflowers, and dry beans.

**Rent.** Land in this study is leased on a share-rent basis with the land owner receiving 21% of the gross returns and the grower keeps the remaining share. Rental contracts and rates for land suitable for alfalfa production can range widely in Sacramento Valley. Previous land rental agreements for alfalfa in Sacramento Valley ranged from 15 to 33% of gross revenues while current rates vary from 18 to 25%. The land has developed wells, pumps, and permanent underground pipelines necessary for crop production and these are considered in the land rent. District water is also available for irrigation. Rent appears as a cash overhead cost in Tables 1-7.

**Labor.** Basic hourly wages for workers are \$8.12 per hour for machine operators and \$5.75 per hour for non-machine workers. Adding 34% for SDI, FICA, insurance and other benefits raises the total labor costs to \$10.88 per hour for machine operators and \$7.71 per hour non-machine labor. The labor for operations involving machinery is 20% higher than the operation time to account for the additional time involved in equipment set up, moving, maintenance and repair.

**Irrigation System.** An irrigation district supplies water, although growers supplement this with well water in some areas. The amount of water used to irrigate alfalfa will vary in the Sacramento Valley. Irrigation districts in the Valley were surveyed for water pricing and the cost of pumping well water was calculated. District and well water costs were combined to obtain an average cost for water. The cost of irrigation water for this study is \$19.31 per acre-foot.

The permanent irrigation system consists of wells, pumps and motors, and buried mainline. This part of the system is already in place when the land is rented. A side roll wheel line sprinkler system is used during stand establishment except for the pre-irrigation. It is estimated that 2 quarter mile sections of wheel line are needed to irrigate the alfalfa acreage efficiently. The cost of the wheel line sprinklers are shown in Table 8 under Annual Investment Costs and under Non-Cash Overhead Costs in Tables 1, 2, 4, and 5.

During production years the stand is flood irrigated. Water is pumped through alfalfa valves at the head of the field and flows down the alfalfa check between borders. Eight acre-inches are applied by flood during the pre-irrigation and six acre-inches are sprinkled on the new stand. Applied water will vary year to year in the mature alfalfa stand, but in this study four acre-feet are used. Successful water management and irrigation scheduling requires careful observation of soil and plant conditions. Proper management of irrigation can provide for strong vegetative growth and influence insect and disease pest pressures.

## Stand Establishment Cultural Practices and Material Inputs

Tables 1-3 show the costs associated with ground preparation, planting and growing an alfalfa stand until the first production year. Alfalfa may be either spring or fall planted. In this study, the stand is prepared and planted in the fall and the establishment year ends with the first hay cutting in April of the following year.

**Land Preparation.** Stand establishment begins with discing down the previous crop residue. The ground is ripped to a depth of 20 to 30 inches to fracture any soil compaction and improve water infiltration. Nutrients are spread and disced to incorporate them into the soil. Discing also helps to break up large clods of dirt, creating better seed-to-soil contact for good germination. After the field is leveled using a triplane, borders are pulled and water is run in the checks to irrigate for planting and to germinate weeds. Once any weeds have sprouted and the ground is firm enough to run equipment on, the field is cultivated. Just prior to seeding, the fields are harrowed and rolled to remove any high or low spots caused by the pre-irrigation and cultivation.

Ripping, discing, landplaning, cultivating, and floating are performed with a 250 HP crawler, while a 110 HP wheel tractor is used to set up the borders. A 62 HP wheel tractor is used for the rolling the field, planting, rolling, raking, and baling operations. The post-emergent herbicide is applied using an ATV with a small sprayer. Preplant fertilizers are custom spread by a commercial fertilizer company.

**Planting.** Alfalfa seed is planted at a depth of 1/4 inch or less using a seeder at a rate of 20 pounds of seed per acre. Two irrigations are applied through wheel line sprinklers immediately after planting.

**Fertilization.** Several soil nutrients are spread on the field before the alfalfa is planted in order to adjust for deficiencies that commonly occur in the soils across the region. Growers should apply fertilizer or soil amendments only after soil tests determine unacceptable pH or nutrient levels. Sulfur (popcorn) is applied at a rate of 250 pounds per acre and  $P_2O_5$  (in the form of 18-46-0) is spread at 200 pounds per acre of material, after the field has been ripped and disced in September. This is equivalent to 250 pounds of sulfur, 80 pounds of  $P_2O_5$ , and 32 pounds of N per acre. Spreading fertilizer is accomplished by custom application. Once applied the ground is disced to incorporate fertilizers into the soil.

**Irrigation.** Up to four irrigation are done in the establishment year, one is preplant and the other is after seeding. Since planting occurs in the early Fall, winter rains may (but not always) provide much of the needed moisture until regular irrigations begin in the following production year. Eight acre-inches of water are flooded onto the bare ground during September. This irrigation is intended to provide moisture for crop germination and to settle the ground and sprout weeds for control before planting. Areas that continually hold water can weaken alfalfa plants, increase their susceptibility to insects, weeds, and diseases and lower yields. The remaining six acre-inches are applied after planting through 1 to 2 sprinklers irrigations.

**Weed Control.** Grass and broadleaf weeds can compete heavily with a seedling alfalfa stand during the establishment year. Planting time (fall or spring) can be a critical factor for managing weeds in different areas. In establishing this stand, one post-emergent herbicide mix of Envy- (2,4-DB amine) and Gramoxone- is applied in January. An ATV and small sprayer are used to minimize damage to the young plants from the wheel tracks.

**Establishment Costs.** The cost to establish an alfalfa stand is the sum of the cash expenses required to prepare the land, plant and grow the alfalfa through the first year until a yield is produced, interest on operating capital, cash overhead, minus any returns. In this case, it is only through the first year up to the first harvest. Establishment cost per acre is the Accumulated Net Cash Cost/Acre in Tables 1, 2, and 3. The establishment cost equals \$321 per acre or \$96,300 for the 300 acre stand. To obtain stand establishment cost for an average production year, the Net Total Cost/Acre for the establishment year in Table 1 is divided by 4 years. This becomes “Alfalfa Stand Establishment” under Non-Cash Cost in Tables 4, 5, 6, and 8. The annual production cost in the study represents an average year's production cost from the second through the fourth year.

## **Production Cultural Practices and Material Inputs**

**Vertebrate Pest Control.** Alfalfa is attractive to many rodents and stands can suffer serious damage by the foraging of these pests. Several species of pocket gophers (*Thomomys spp.*) and ground squirrels (*Spermophilus spp.*) are the main vertebrate pests which cause problems in alfalfa stands. Control strategies depend on the animal causing the damage. Poison bait is most commonly used to control gophers and squirrels; it can be applied in several methods depending on conditions. In this study, vertebrate pest treatment occurs in March with the use of poison bait.

**Irrigation.** The price of irrigation includes water cost and labor expense. Irrigations begin in April and continue until September. Four acre-feet of water are applied using flood irrigation in each check. While in this study water is applied in seven irrigations over six months, actual water needs will vary considerably due to soil, plant physiological, and climatic factors. To avoid stressing plants or creating conditions favorable for disease and weed problems, growers need to schedule irrigations based on plant requirements.

**Fertilization.** Alfalfa should only be fertilized based on a soil or plant tissue test that has determined a need. Phosphorous and sulfur are essential for good alfalfa production in this region, but are applied only as a need occurs. In this study, no fertilizers are applied during the production years of the stand.

**Weed Control.** A variety of weeds germinate after fall rains arrive and the stand become dormant. Soil residual herbicides (Treflan– and Gramoxone– ) for control of winter germinating weeds are applied in two treatments during January to established alfalfa stands. Gramoxone– and Treflan– are used to treat all of the acreage. Summer grass control is usually not needed on the entire acreage and in this study, only 25% of the alfalfa fields are treated with an herbicide. This treatment consists of one application of Poast– during June.

**Insect Control.** Several insect species attack alfalfa, but Egyptian alfalfa weevil (*Hypera postica*), alfalfa caterpillar (*Colias eurytheme*), and armyworms (*Spodoptera spp.*) are the major pests in this study that are assumed to cause economic damage. However, several species of aphids and other insects can cause damage that may require treatment. Monitoring pest populations is essential for good control. Field sweeps coupled with recommended threshold guidelines can help growers determine when or if to treat.

Both adults and juvenile weevils feed on plants, though it is in the larval stage that damage is most severe. Weevils are presumed to reach population levels requiring one treatment for control. In this study, they are sprayed with Imidan– mixed with Pounce– (for aphids). The first treatment covers 100% of the acreage and is applied by aircraft in March.

Worms are injurious to plants only in their larval state, but have multiple generations during the growing season. Plant damage caused by armyworms is characterized by skeletonization of leaves, marked by the large veins remaining. Alfalfa caterpillars on the other hand defoliate large sections of leaves, but also eat the veins. The armyworm spray consists of one application of Lannate– in July and alfalfa caterpillars are treated once with Javelin– in August.

The pesticides and rates mentioned in this cost study are listed in the [UC IPM Alfalfa Pest Management Guidelines](#) and [Integrated Pest Management For Alfalfa Hay](#). Written recommendations are required for many pesticides and are made by licensed pest control advisors. For information and pesticide use permits, contact the local county Agricultural Commissioner's office. Contact your local farm advisor for advice on production practices.

**Equipment Cash Costs.** Equipment costs are fall into three categories; capital recovery, cash overhead, and operating costs. The cash overhead and capital recovery costs will be discussed in later sections. The operating costs consist of fuel, lubrication, and repairs.

Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. The fuel and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time (Operation Time) for a given operation to account for fueling, moving equipment, and setup time. Prices for on-farm delivery of diesel and gasoline are \$0.78 and \$1.22 per gallon, respectively.

**Harvest.** Harvesting is a crucial operation for alfalfa hay. Timing of harvest can have a drastic impacts on stand vigor, hay quality and yield, and pest populations. Growers have often based cutting decisions on market considerations or the number of blooming plants. But time and number of blooms is strongly affected by many factors which may not denote optimum plant maturity. Research suggests that a more reliable indicator for harvest timing may be plant bud regrowth. This is a measure of bud growth at the crown as the plant begins to store nutrients in the roots. While growers will always harvest hay when demand or price is high in order to maximize returns, when the market is poor and harvest considerations are based largely on agronomic factors, plant bud regrowth may be a better gauge to use. See [UC IPM Alfalfa Pest Management Pest Guidelines](#) for more information.

In this study, hay is harvested seven times in established stands; once in the months of April, May, June, July, and September, and twice in August. Harvest can go into October depending on weather. In this study, the grower has their alfalfa custom harvested. Alfalfa is cut with a swather and left to dry for several days before it is turned and windrowed by a rake. Once the hay has dried to the correct moisture content it is baled by a baler into 90 to 120 pound bales. The bales are then picked up with a balewagon which moves them from the field to the roadsides and stacks them.

Since the farm has its hay custom harvested, there are no costs incurred for owning this equipment. If a grower harvested their hay using their own equipment, harvest expense (the custom harvest charge) should be subtracted from harvest costs in Table 4 and all equipment for harvest operations should be added to the investment costs in Table 7. A cash harvesting cost based on owned equipment would then be added to harvest costs in Table 4.

Growers may choose to own swathers, rakes, balers and tractors, and balewagons, purchased either new or used, or hire a custom harvester to perform the harvest. Many factors are important in deciding which harvesting option a grower uses. These considerations and appropriate method of analysis is discussed in Acquiring Alfalfa Hay Harvest Equipment: A Financial Analysis of Alternatives (Blank, et. al.).

**Yields.** The crop is assumed to yield seven tons of hay per acre from seven cuttings per year once the stand is established. Annual yields can vary from five to 11 tons per acre in this region.

**Returns.** An estimated price of a \$100 per ton of hay is used to calculate net returns above costs. Returns may range from \$70 to \$160 per ton; the \$100 used in the cost study is, at best, an estimate taking into consideration current situations. Additionally, in some areas, alfalfa going into dormancy may be grazed with livestock with a fee charged per head. Income from this source may help growers increase their return per acre, but is not assumed in this study. Table 10 indicates the effects on grower returns based on varying yields and prices.

**Risk.** Risks associated with alfalfa hay production are not assigned a production cost. While this study makes an 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 hay production.

## Overhead Costs

**Cash Overhead.** Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, and investment repairs. Cash overhead costs are included in Tables 1, 2, 3 and 4.

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

*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 10.46% per year. This interest rate is the going market cost of borrowed funds. The interest cost of operations after the first harvest are discounted back to the first harvest month using a negative interest charge.

*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 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$870 for the entire farm or \$0.30 per acre.

*Office Expense:* Office and business expenses are estimated at \$30 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Non-cash Overhead.** Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. This study shows the current purchase price for new equipment and then adjusts the price to 60% of new cost to indicate a mix of new and used equipment. Annual ownership costs for equipment and investments are shown in the non-cash overhead section of Tables 1, 2, 4, and 5 as capital recovery costs on an annual per acre basis.

*Capital Recovery Costs.* Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). Put another way, it is equivalent to the annual payment on a loan for the investment with the downpayment 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 calculation for annual capital recovery costs is as follows.

$$\frac{\text{Purchase Price} - \text{Salvage Value}}{\text{Capital Recovery Factor}} + \frac{\text{Salvage Value} \times \text{Interest Rate}}$$

*Salvage Value.* Salvage value is an estimate of the remaining market value of an investment at the end of its useful life. It is calculated differently for different investments. For farm machinery (e.g., tractors and implements) the remaining value is a percentage of the new cost of the investment. Salvage value is calculated as

$$\text{New Price} \times \% \text{Remaining Value}$$

Salvage value for other investments including irrigation systems, buildings, and miscellaneous equipment is zero. The salvage value for land is equal to the purchase price because land does not depreciate. Salvage value for investments can vary. The purchase price and salvage value for equipment and investments are shown in Table 7.

*Capital Recovery Factor.* Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. It is the function of the interest rate and years of life of the equipment.

*Interest Rate.* The interest rate of 7.81% used to calculate capital recovery cost is the United States Department of Agriculture-Economic Reporting Service's (USDA-ERS) ten year average of California's agricultural sector long-run real rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector, not including inflation. In other words, the next best alternative use for these resources is in another agricultural enterprise.



**Acknowledgment.** Appreciation is expressed to the cooperators who provided information for this study.

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Table 1.

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND  
 SACRAMENTO VALLEY - 1998

Labor Rate: \$10.88/hr. machine labor      Interest Rate: 10.46%  
 \$7.71/hr. non-machine labor      Yield per Acre: 1.0 Ton

Operation	Cash and Labor Costs per Acre						Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost	
<b>Cultural:</b>							
Disc 2X	0.26	3	6	0	0	10	
Subsoil	0.40	5	8	0	0	14	
Disc	0.26	3	6	0	0	9	
Triplane 3X	0.51	7	11	0	0	18	
Pull Borders	0.10	1	1	0	0	2	
Fertilize - Preplant	0.00	0	0	45	6	51	
Open Ditch	0.05	1	1	0	0	1	
Pre-irrigation	1.25	10	0	13	0	23	
Cultivate	0.08	1	2	0	0	3	
Harrow & Ring Roll Ground	0.07	1	1	0	0	2	
Plant Alfalfa	0.25	3	2	49	0	54	
Ring Roll	0.08	1	0	0	0	1	
Irrigate - Sprinkler	1.25	10	0	10	0	19	
Weed Control - Winter Dormant	0.05	1	0	35	0	36	
Insect Control - Weevils/Aphid	0.00	0	0	28	8	36	
Rodent Control	0.22	5	1	6	0	12	
Irrigate	1.25	10	0	10	0	19	
Pickup Truck Use	0.10	4	2	0	0	5	
<b>TOTAL CULTURAL COSTS</b>	<b>6.18</b>	<b>65</b>	<b>42</b>	<b>196</b>	<b>13</b>	<b>316</b>	
<b>Harvest:</b>							
Swath & Rake Hay	0.00	0	0	0	13	13	
Bale Hay	0.00	0	0	0	14	14	
Roadside Hay	0.00	0	0	0	5	5	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>31</b>	
Interest on operating capital @ 10.46%							17
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>65</b>	<b>42</b>	<b>196</b>	<b>44</b>	<b>363</b>	

U.C. COOPERATIVE EXTENSION

Table 1. Continued

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
CASH OVERHEAD:								
Liability Insurance						0		
Office Expense						30		
Field Sanitation						1		
Share Rent @ 21% Of Gross Returns						21		
Property Taxes						2		
Property Insurance						2		
Investment Repairs						2		
						-----		
TOTAL CASH OVERHEAD COSTS						57		
TOTAL CASH COSTS/ACRE						421		
NON-CASH OVERHEAD:								
Investment	Per producing Acre	-- Annual Cost --		Capital Recovery - 7.81% Interest Rate				
-----		-----		-----				
Pipe - Wheel Lines	12		2			2		
Fuel Tanks & Pumps	7		1			1		
Fuel Wagon	1		0			0		
Truck Tractor	17		2			2		
Trailer - Pipe	1		0			0		
Shop Building	22		2			2		
Shop Tools	5		0			0		
Storage Building	9		1			1		
Closed Mix System	1		0			0		
Tool Carrier	5		1			1		
Forklift	4		1			1		
Implement Carrier	3		0			0		
Equipment	295		38			38		
-----		-----		-----				
TOTAL NON-CASH OVERHEAD COSTS		383		48		48		
TOTAL COSTS/ACRE						468		



Table 2.Continued

U.C. COOPERATIVE EXTENSION  
 COSTS AND RETURNS PER ACRE TO ESTABLISH AN ALFALFA STAND  
 SACRAMENTO VALLEY - 1998

Labor Rate: \$10.88/hr. machine labor	Interest Rate: 10.46%
\$7.71/hr. non-machine labor	
-----	
CASH OVERHEAD COSTS:	
Liability Insurance	0
Office Expense	30
Field Sanitation	1
Share Rent @ 21% Of Gross Returns	21
Property Taxes	2
Property Insurance	2
Investment Repairs	2
	-----
TOTAL CASH OVERHEAD COSTS/ACRE	57
-----	
TOTAL CASH COSTS/ACRE	421
-----	
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate):	
Pipe - Wheel Lines	2
Fuel Tanks & Pumps	1
Fuel Wagon	0
Truck Tractor	2
Trailer - Pipe	0
Shop Building	2
Shop Tools	0
Storage Building	1
Closed Mix System	0
Tool Carrier	1
Forklift	1
Implement Carrier	0
Equipment	38
	-----
TOTAL NON-CASH OVERHEAD COSTS/ACRE	48
-----	
TOTAL COSTS/ACRE	468
-----	
NET RETURNS ABOVE TOTAL COSTS	-368
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Table 3.

U.C. COOPERATIVE EXTENSION  
MONTHLY CASH COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND  
SACRAMENTO VALLEY - 1998

Beginning SEP 97	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	TOTAL
Ending AUG 98	97	97	97	97	98	98	98	98	98	98	98	98	
<b>Cultural:</b>													
Disc 2X	10												10
Subsoil	14												14
Disc	9												9
Triplane 3X	18												18
Pull Borders	2												2
Fertilize - Preplant	51												51
Open Ditch	1												1
Pre-irrigation	23												23
Cultivate	3												3
Harrow & Ring Roll Ground		2											2
Plant Alfalfa		54											54
Ring Roll		1											1
Irrigate - Sprinkler		19											19
Weed Control													
- Winter Dormant					36								36
Insect Control													
- Weevils/Aphids							36						36
Rodent Control							12						12
Irrigate								19					19
Pickup Truck Use	1	1	1	1	1	1	1	1					5
<b>TOTAL CULTURAL COSTS</b>	<b>131</b>	<b>78</b>	<b>1</b>	<b>1</b>	<b>36</b>	<b>1</b>	<b>49</b>	<b>20</b>					<b>316</b>
<b>Harvest:</b>													
Swath & Rake Hay								13					13
Bale Hay								14					14
Roadside Hay								5					5
<b>TOTAL HARVEST COSTS</b>								<b>31</b>					<b>31</b>
Interest on oper. capital	1	2	2	2	2	2	3	3					17
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>132</b>	<b>79</b>	<b>3</b>	<b>3</b>	<b>39</b>	<b>3</b>	<b>51</b>	<b>54</b>					<b>363</b>
<b>OVERHEAD:</b>													
Liability Insurance					0								0
Office Expense	4	4	4	4	4	4	4	4					30
Field Sanitation					1								1
Share Rent @ 21% Of Gross Returns									21				21
Property Taxes					1						1		2
Property Insurance					1						1		2
Investment Repairs	0	0	0	0	0	0	0	0	0	0	0	0	2
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>21</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>57</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>136</b>	<b>83</b>	<b>6</b>	<b>6</b>	<b>45</b>	<b>7</b>	<b>55</b>	<b>58</b>	<b>21</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>421</b>

Table 4.

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO PRODUCE ALFALFA HAY  
 SACRAMENTO VALLEY - 1998

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre				Total Cost	Your Cost
		Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent		
<b>Cultural:</b>							
Weed Control - Dormant 2X	0.28	4	1	56	0	61	
Insect Control - Weevil/Aphids	0.00	0	0	28	8	36	
Rodent Control	0.22	5	1	6	0	12	
Irrigate - 7X	8.75	67	0	77	0	145	
Weed Control - Summer 25% Of Acreage	0.05	1	0	5	0	6	
Insect Control - Armyworms 2X	0.00	0	0	60	15	75	
Pickup Truck Use	0.10	5	2	0	0	7	
Truck Use	0.10	3	1	0	0	4	
ATV Use	0.10	1	0	0	0	1	
<b>TOTAL CULTURAL COSTS</b>	<b>9.60</b>	<b>86</b>	<b>6</b>	<b>234</b>	<b>23</b>	<b>348</b>	
<b>Harvest:</b>							
Swath & Rake 7X	0.00	0	0	0	88	88	
Bale Hay 7X	0.00	0	0	0	94	94	
Roadside Hay 7X	0.00	0	0	0	35	35	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>217</b>	<b>217</b>	
Interest on operating capital @ 10.46%							-2
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>86</b>	<b>6</b>	<b>234</b>	<b>240</b>	<b>563</b>	
<b>CASH OVERHEAD:</b>							
Liability Insurance							0
Office Expense							30
Field Sanitation							1
Share Rent @ 21% Of Gross Returns							147
Supervisor Salary							16
Property Taxes							2
Property Insurance							2
Investment Repairs							1
<b>TOTAL CASH OVERHEAD COSTS</b>							<b>199</b>
<b>TOTAL CASH COSTS/ACRE</b>							<b>762</b>

U.C. COOPERATIVE EXTENSION

Table 4.Continued

=====								
	Operation	Cash and Labor Costs per Acre						
Operation	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost	
-----								
NON-CASH OVERHEAD:								
	Per producing Acre	-- Annual Cost --						
Investment		Capital Recovery - 7.81% Interest Rate						
-----	-----	-----						
Alfalfa Stand Establishment	321			97			97	
Fuel Tanks & Pumps	7			1			1	
Fuel Wagon	1			0			0	
Shop Building	22			2			2	
Shop Tools	5			0			0	
Storage Building	9			1			1	
Forklift	4			1			1	
Closed Mix System	1			0			0	
Tool Carrier	5			1			1	
Truck Tractor	17			2			2	
Trailer - Lowbed	3			0			0	
Pipe - Wheel Lines	12			2			2	
Equipment	47			7			7	
	-----			-----			-----	
TOTAL NON-CASH OVERHEAD COSTS	454			113			113	
-----								
TOTAL COSTS/ACRE							875	
=====								



U.C. COOPERATIVE EXTENSION  
 Table 5. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA HAY  
 SACRAMENTO VALLEY - 1998

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa Hay	7.00	Ton	100.00	700	
TOTAL GROSS RETURNS FOR ALFALFA				700	
OPERATING COSTS					
Herbicide:					
Treflan TR-10	20.00	Lb	1.45	29	
Gramoxone Extra	4.00	Pint	6.83	27	
Poast	0.38	Pint	14.08	5	
Insecticide:					
Pounce 3.2 EC	6.00	Oz	2.09	13	
Imidan 70W	1.33	Lb	7.67	10	
Lannate 90 SP	1.00	Lb	27.03	27	
Javelin WG	1.50	Lb	14.80	22	
Custom:					
Air Application	3.00	Acre	7.50	23	
Swath & Rake Hay	7.00	Ton	12.50	88	
Bale Hay	7.00	Ton	13.50	94	
Roadside Hay	7.00	Ton	5.00	35	
Adjuvant:					
Surfactant	3.00	Pint	5.60	17	
Rodenticide:					
Rodent Bait	2.00	Lb	2.94	6	
Water:					
Irrigation	4.00	AcFt	19.31	77	
Labor (machine)	1.50	Hrs	10.88	16	
Labor (non-machine)	9.02	Hrs	7.71	70	
Fuel - Gas	1.80	Gal	1.22	2	
Fuel - Diesel	1.42	Gal	0.78	1	
Lube				0	
Machinery repair				2	
Interest on operating capital @ 10.46%				-2	
TOTAL OPERATING COSTS/ACRE				563	
NET RETURNS ABOVE OPERATING COSTS				137	

U.C. COOPERATIVE EXTENSION

Table 5.Continued

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa Hay	7.00	Ton	100.00	700	
TOTAL GROSS RETURNS FOR ALFALFA				700	
CASH OVERHEAD COSTS:					
Liability Insurance				0	
Office Expense				30	
Field Sanitation				1	
Share Rent @ 21% Of Gross Returns				147	
Supervisor Salary				16	
Property Taxes				2	
Property Insurance				2	
Investment Repairs				1	
TOTAL CASH OVERHEAD COSTS/ACRE				199	
TOTAL CASH COSTS/ACRE				762	
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate):					
Alfalfa Stand Establishmant				97	
Fuel Tanks & Pumps				1	
Fuel Wagon				0	
Shop Building				2	
Shop Tools				0	
Storage Building				1	
Forklift				1	
Closed Mix System				0	
Tool Carrier				1	
Truck Tractor				2	
Trailer - Lowbed				0	
Pipe - Wheel Lines				2	
Equipment				7	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				113	
TOTAL COSTS/ACRE				875	
NET RETURNS ABOVE TOTAL COSTS				-175	

Table 6.

U.C. COOPERATIVE EXTENSION  
 MONTHLY CASH COSTS PER ACRE TO PRODUCE ALFALFA HAY  
 SACRAMENTO VALLEY - 1998

Beginning JAN 98	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 98	98	98	98	98	98	98	98	98	98	98	98	98	
<b>Cultural:</b>													
Weed Control - Dormant 2X	61												61
Insect Control													
- Weevil/Aphids			36										36
Rodent Control			12										12
Irrigate - 7X				21	21	21	40	21	21				145
Weed Control													
- Summer 25% Of Acreage						6							6
Insect Control													
- Armyworms 2X							40	35					75
Pickup Truck Use	1	1	1	1	1	1	1	1	1				7
Truck Use	0	0	0	0	0	0	0	0	0				4
ATV Use	0	0	0	0	0	0	0	0	0				1
<b>TOTAL CULTURAL COSTS</b>	<b>62</b>	<b>1</b>	<b>49</b>	<b>23</b>	<b>22</b>	<b>28</b>	<b>82</b>	<b>58</b>	<b>22</b>				<b>348</b>
<b>Harvest:</b>													
Swath & Rake 7X				13	13	13	13	25	13				88
Bale Hay 7X				14	14	14	14	27	14				94
Roadside Hay 7X				5	5	5	5	10	5				35
<b>TOTAL HARVEST COSTS</b>				<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>62</b>	<b>31</b>				<b>217</b>
Interest on oper. Capital*	1	1	1	1	2	-3	-2	-2	-1				-2
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>63</b>	<b>2</b>	<b>50</b>	<b>55</b>	<b>55</b>	<b>56</b>	<b>110</b>	<b>118</b>	<b>53</b>				<b>563</b>
<b>OVERHEAD:</b>													
Liability Insurance	0												0
Office Expense	3	3	3	3	3	3	3	3	3	3	3	3	30
Field Sanitation				1									1
Share Rent													
@ 21% Of Gross Returns					147								147
Supervisor Salary	1	1	1	1	1	1	1	1	1	1	1	1	16
Property Taxes	1						1						2
Property Insurance	1						1						2
Investment Repairs	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>6</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>151</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>199</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>69</b>	<b>6</b>	<b>54</b>	<b>60</b>	<b>206</b>	<b>60</b>	<b>116</b>	<b>122</b>	<b>57</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>762</b>

\* Postharvest operation costs are discounted back to the time of the first harvest

Table 7.

U.C. COOPERATIVE EXTENSION  
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS  
 SACRAMENTO VALLEY - 1998

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Non-Cash Over.		Cash Overhead			Total
			Yrs Life	Salvage Value	Capital Recovery	Insur- ance	Taxes	
<b>EQUIPMENT FOR ESTABLISHMENT YEARS ONLY:</b>								
98	110 HP 2WD Tractor	70050	10	20692	8909	324	454	9686
98	250 HP Crawler	176963	10	52272	22506	817	1146	24469
98	Brillion Seeder	8379	7	2138	1358	37	53	1448
98	Disc - Border	1035	12	143	128	4	6	138
98	Disc - Offset 26'	25071	12	3472	3109	102	143	3354
98	Disc - Stubble 14'	36036	12	4991	4469	146	205	4820
98	Harrow - Spike 32'	9891	12	1370	1227	40	56	132
98	Ringroller - 32'	7132	12	988	884	29	41	954
98	Spinner Spreader	1973	10	349	267	8	12	287
98	Subsoiler - 8'	8022	10	1419	1086	34	47	1167
98	Triplane - 16'	20109	12	2785	2494	82	114	2690
98	V-Ditcher	4505	15	451	503	18	25	546
	Subtotal:	369166		91070	46940	1641	2302	49691
<b>EQUIPMENT FOR PRODUCTION YEARS ONLY:</b>								
98	ATV	3861	5	1730	666	20	28	714
	Subtotal:	3861	5	1730	666	20	28	714
<b>EQUIPMENT FOR ESTABLISHMENT AND PRODUCTION YEARS:</b>								
98	62 HP 2WD Tractor	32677	10	9652	4156	151	212	4518
98	ATV & Pull Sprayer	9413	10	941	1325	37	52	1414
98	Bait Applicator	2235	12	310	277	9	13	299
98	Pickup - 1/2 Ton	19305	5	8652	3330	100	140	3570
98	Pickup - 1/2 Ton	19305	5	8652	3330	100	140	3570
98	Pickup - 3/4 Ton	21000	5	9412	3623	108	152	3883
98	Pickup - 3/4 Ton	21000	5	9412	3623	108	152	3883
98	Truck - 2 Ton	24882	5	11152	4293	128	180	4601
98	Truck - 2 Ton	24882	5	11152	4293	128	180	4601
	Subtotal:	174699		69335	28250	869	1221	30339
TOTAL		547726		162135	75856	2530	3551	80744
60% of New Cost *		328636		97281	45514	1518	2131	48446

• Used to reflect a mix of new and used equipment.

Table 8.

U.C. COOPERATIVE EXTENSION  
 WHOLE FARM ANNUAL INVESTMENT AND BUSINESS OVERHEAD COSTS  
 SACRAMENTO VALLEY - 1998

ANNUAL INVESTMENT COSTS

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Description	Price	Yrs Life	Salvage Value	Capital Recovery	----- Cash Overhead -----			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Closed Mix System	3987	10	399	561	16	22	200	799
Alfalfa Stand Establishment	96300	4		28952	343	482	0	29777
Forklift	12305	10	1231	1732	48	68	615	2463
Fuel Tanks & Pumps	19835	20	1984	1947	78	109	397	2531
Fuel Wagon	1975	10	198	278	8	11	40	337
Pipe - Wheel Lines	35193	10	3519	4955	138	194	352	5638
Shop Building	65216	25	6522	5919	256	359	652	7185
Shop Tools	13072	20	1307	1283	51	72	131	1538
Storage Building	26308	20	2631	2583	103	145	526	3357
Tool Carrier	15118	15	1512	1689	59	83	756	2588
Trailer - Lowbed	7695	15	769	860	30	42	103	1035
Truck Tractor	48849	15	4885	5458	192	269	377	6296
<b>TOTAL INVESTMENT</b>	<b>345853</b>		<b>24957</b>	<b>56219</b>	<b>1322</b>	<b>1854</b>	<b>4149</b>	<b>63544</b>

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ANNUAL BUSINESS OVERHEAD COSTS

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Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Field Sanitation	2900.00	Acre	0.65	1885
Liability Insurance	2900.00	Acre	0.30	870
Office Expense	2900.00	Acre	30.00	87000
Share Rent @ 21% Of Gross Returns	300.00	Acre	147.00	44100
Supervisor Salary	2900.00	Acre	15.69	45501

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U.C. COOPERATIVE EXTENSION  
 HOURLY EQUIPMENT COSTS  
 SACRAMENTO VALLEY - 1998

Table 9.

Yr Description	Actual Hours Used	COSTS PER HOUR						Total Oper.	Total Costs/Hr.
		Capital Recovery	- Cash Overhead -			Operating Fuel & Lube			
			Insur- ance	Taxes	Repairs				
98 110 HP 2WD Tractor	1179.5	4.53	0.16	0.23	3.10	5.73	8.83	13.75	
98 250 HP Crawler	1198.5	11.27	0.41	0.57	4.47	13.01	17.48	29.73	
98 62 HP 2WD Tractor	1152.9	2.16	0.08	0.11	1.45	2.73	4.18	6.53	
98 ATV	274.9	1.45	0.04	0.06	0.25	1.40	1.65	3.20	
98 ATV & Pull Sprayer	187.0	4.25	0.12	0.17	0.00	0.00	0.00	4.54	
98 Bait Applicator	67.2	2.47	0.08	0.11	0.84	0.00	0.84	3.51	
98 Brillion Seeder	171.0	4.76	0.13	0.18	1.78	0.00	1.78	6.86	
98 Disc - Border	166.0	0.46	0.02	0.02	0.16	0.00	0.16	0.66	
98 Disc - Offset 26'	166.0	11.24	0.37	0.52	3.88	0.00	3.88	16.00	
98 Disc - Stubble 14'	166.0	16.15	0.53	0.74	5.57	0.00	5.57	23.00	
98 Harrow - Spike 32'	164.7	4.47	0.15	0.21	1.10	0.00	1.10	5.92	
98 Pickup - 1/2 Ton	274.9	7.27	0.22	0.31	1.24	3.51	4.75	12.54	
98 Pickup - 1/2 Ton	274.9	7.27	0.22	0.31	1.24	3.51	4.75	12.54	
98 Pickup - 3/4 Ton	274.9	7.91	0.24	0.33	1.35	4.21	5.56	14.03	
98 Pickup - 3/4 Ton	274.9	7.91	0.24	0.33	1.35	4.21	5.56	14.03	
98 Ringroller - 32'	164.7	3.22	0.11	0.15	0.79	0.00	0.79	4.27	
98 Spinner Spreader	100.0	1.60	0.05	0.07	0.75	0.00	0.75	2.47	
98 Subsoiler - 8'	166.0	3.93	0.12	0.17	1.79	0.00	1.79	6.01	
98 Triplane - 16'	250.0	5.98	0.20	0.27	3.00	0.00	3.00	9.46	
98 Truck - 2 Ton	274.9	9.37	0.28	0.39	2.12	4.21	6.33	16.37	
98 Truck - 2 Ton	274.9	9.37	0.28	0.39	2.12	4.21	6.33	16.37	
98 V-Ditcher	166.0	1.82	0.06	0.09	1.37	0.00	1.37	3.34	

Table 10.

U.C. COOPERATIVE EXTENSION  
RANGING ANALYSIS  
SACRAMENTO VALLEY - 1998

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALFALFA HAY

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	YIELD (TON/ACRE)						
	4	5	6	7	8	9	10
-----							
OPERATING COSTS/ACRE:							
Cultural Cost	348	348	348	348	348	348	348
Harvest Cost	124	155	186	217	248	279	310
Interest on operating capital	-1	-1	-2	-2	-2	-3	-3
TOTAL OPERATING COSTS/ACRE	471	501	532	563	593	624	655
TOTAL OPERATING COSTS/TON	118	100	89	80	74	69	65
CASH OVERHEAD COSTS/ACRE	199	199	199	199	199	199	199
TOTAL CASH COSTS/ACRE	670	701	731	762	793	823	854
TOTAL CASH COSTS/TON	168	140	122	109	99	91	85
NON-CASH OVERHEAD COSTS/ACRE	113	113	113	113	113	113	113
TOTAL COSTS/ACRE	783	814	845	875	906	936	967
TOTAL COSTS/TON	196	163	141	125	113	104	97

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NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ALFALFA HAY

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PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Alfalfa	4	5	6	7	8	9	10
70.00	-191	-151	-112	-73	-33	6	45
80.00	-151	-101	-52	-3	47	96	145
90.00	-111	-51	8	67	127	186	245
100.00	-71	-1	68	137	207	276	345
110.00	-31	49	128	207	287	366	445
120.00	9	99	188	277	367	456	545
130.00	49	149	248	347	447	546	645

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U.C. COOPERATIVE EXTENSION

Table 10. Continued

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ALFALFA HAY

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Alfalfa	4	5	6	7	8	9	10
70.00	-390	-351	-311	-272	-233	-193	-154
80.00	-350	-301	-251	-202	-153	-103	-54
90.00	-310	-251	-191	-132	-73	-13	46
100.00	-270	-201	-131	-62	7	77	146
110.00	-230	-151	-71	8	87	167	246
120.00	-190	-101	-11	78	167	257	346
130.00	-150	-51	49	148	247	347	446

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ALFALFA HAY

PRICE (DOLLARS/TON)	YIELD (TON/ACRE)						
Alfalfa	4	5	6	7	8	9	10
70.00	-503	-464	-425	-385	-346	-306	-267
80.00	-463	-414	-365	-315	-266	-216	-167
90.00	-423	-364	-305	-245	-186	-126	-67
100.00	-383	-314	-245	-175	-106	-36	33
110.00	-343	-264	-185	-105	-26	54	133
120.00	-303	-214	-125	-35	54	144	233
130.00	-263	-164	-65	35	134	234	333