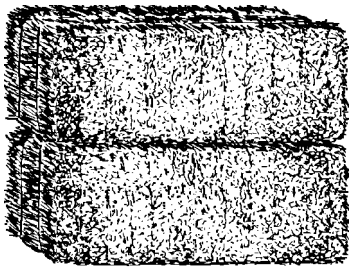
1998
UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

SAMPLE COSTS TO ESTABLISH AND PRODUCE

~ *ALFALFA* ~



SAN LUIS OBISPO COUNTY

by

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Establishment and Production Costs for Alfalfa
San Luis Obispo County - 1998

INTRODUCTION

Detailed costs to establish and produce alfalfa in San Luis Obispo County is presented in this study. The hypothetical farm used in this report consists of 500 acres of which 200 acres are in alfalfa production.

We base this study on assumptions of production practices and costs that are considered typical for alfalfa establishment and production in San Luis Obispo County. These production practices and costs are an amalgamation of costs and practices obtained from a survey of growers and other agricultural institutions in the region. Sample costs given for labor, materials, equipment and contract services are based on 1998 prices. This study is intended as a guide. It can be used in making production decisions, determining potential returns, preparing budgets and evaluating production loans.

Costs are presented in eleven tables. All costs are presented on a per acre and per ton basis.

A blank ***Your Costs*** column is provided to enter your actual costs on **Tables 1**, **2, 6** and **7**.

For an explanation of calculations used for this study refer to the attached General Assumptions, call the Area Farm Management Economics Advisor, Eta Takele at the University of California Cooperative Extension, Moreno Valley, California, (909) 683-6491 ext. 243 or call the San Luis Obispo County Agronomy Farm Advisor, Michael Smith, (805) 237-3100.

ASSUMPTIONS

The following is a description of the assumptions used in the preparation of this study.

1. PRODUCTION AREA AND LAND RENT

Land: Areas that produce alfalfa in San Luis Obispo County are located inland, principally in the Paso Robles, Shandon and San Miguel region.

The site for the hypothetical farm is characterized by small rolling hills and intermediate areas of level ground. The farm is 500 acres in size, of which 200 acres produce alfalfa. The remaining acreage is used for Sudan grass or cereal grain production.

Growers in the region use a system of staggered establishment of alfalfa. In this study we assume that growers will establish 40 acres per year.

In San Luis Obispo County land can be both rented or leased for alfalfa production. Rent or lease varies depending on the contribution of the landlord. In some cases, the landlord may supply land with well developed wells or other inputs. In this study, we used share renting with the landowner receiving 20% of gross returns for the supply of land only.

2. IRRIGATION: SYSTEM AND WATER USE

Growers in the Paso Robles region obtain water from wells located on their property. Each well has an electric pump with a minimum of 1000 gallons per minute pumping capacity. For the study of 200 acres of alfalfa, we used three wells. Irrigation is done using aluminum sprinkler pipes. Each pipe is 30 feet in length. Pipes are spaced in rows 50 feet apart, giving each pipe an irrigation coverage area of 1500 square feet. Therefore, each irrigated acre uses 29 sprinkler pipes.

Each farm owns sprinkler pipes to cover 10 to 20 acres at one time. For this study, we assumed the farm owns pipes for 20 acres. Pipes are moved manually to irrigate all the alfalfa fields.

The cost of water is a result of pumping costs. An average Pacific Gas & Electric charge for the electric pumps is included in the irrigation operating costs. Investment costs for drilling the wells and related irrigation equipment such as pumps and pipes are shown in **Tables 1, 4, 6** and **9**.

3. ESTABLISHMENT CULTURAL PRACTICES

Land Preparation: Primary tillage and planting operations which include discing, ripping, landplaning and ringrolling of the field are performed from July through September. All operations requiring equipment are performed with two 62 HP four wheel drive tractors.

Irrigation: During the establishment period, the field is pre-irrigated with approximately 5.25 acre inches of water. This is done to wet the soil for ease of machinery use in land preparation. Immediate irrigation after planting follows to start germination of seeds and the development of the alfalfa stand before the winter rains begin.

Post-plant irrigation is done in one-half acre inch sets until the crop emerges from the soil. A representative post-plant irrigation routine might include eight irrigation sets. However, the actual amount may vary with the onset of the winter rainy season.

Planting: We assumed a seeding rate of 25 pounds per acre of semi-dormant alfalfa seed. Planting is performed with a 62 HP four wheel drive tractor and a Grain Drill. The cost of seed is approximately $3.00 per pound.

The optimum time to plant is considered to be in mid-September. This allows the alfalfa stand to develop a strong root system before the first winter frost and to be ready for harvesting in the spring.

Weed Control: A pre-plant herbicide for controlling weeds such as Eptam or Balan is sprayed prior to planting and is incorporated into the soil. This operation is done after discing and land planing. The herbicide is used to treat the various broad leaf and grass weeds common to the area. In this study, Eptam is used at a rate of 3.4 pints per acre.

Following emergence from the soil, the alfalfa stand is sprayed with a post-emergent herbicide, 2-4-DB, at a rate of 1.25 pints per acre to control mustard or wild radish.

Fertilization: Fertilization starts during the land preparation prior to ripping of the soil. It is incorporated into the soil through a discing operation. About 600 pounds of Treble Super Phosphate fertilizer is applied during stand establishment.

Establishment Cost: The establishment period for an alfalfa stand is about six months. During this time the crop is allowed to grow and develop a strong root system. Once alfalfa becomes established, it can be harvested from four to five years. For this study, the Total Accumulated Net Cash Cost on **Table 1**, represents the establishment cost. The cost is ***$486*** per acre or ***$19,440*** for 40 acres. The establishment cost is spread over 5 productive years.

4. CULTURAL PRACTICES AND PRODUCTION INPUTS

Irrigation: During production, a field will normally be irrigated two times between each cutting. We assume that a total of 48 acre inches of water per year is used on the mature alfalfa stand. But the actual amounts applied and timing of sets will vary due to weather conditions.

Weed Control: Weeds are controlled with herbicide application once a year prior to the first cutting. A broad spectrum of herbicide, such as Velpar, is used to treat various broad leaf and grass weeds common to the area. In this study, we included Velpar applied at a rate of 3 pints per acre.

Fertilization: Fertilization is generally not needed after establishment.

Insecticide: The primary pest of alfalfa in the Paso Robles region is the Egyptian Alfalfa Weevil. Other insect pests include Lygus Bug and Aphids. Insect control is done before the first cutting in April. In this study, we included Furidan applied at a rate of 1 pint per acre.

Pesticides, rates, and cultural practices mentioned in this cost study are listed in the ***University of California Integrated Pest Management Guidelines***. Written recommendations are required for many pesticide applications and are made by licensed pest control advisors. For information and pesticide use permits, contact the Agricultural Commissioner's office in either Paso Robles or San Luis Obispo. For additional production information contact the San Luis Obispo County agronomy farm advisor.

5. HARVEST:

The process of alfalfa harvest includes cutting, raking, baling and storing using a swather, a rake, a baler and a bale pickup wagon. Growers in the area generally have their own harvest equipment.

Alfalfa harvest consists of four to five cuttings each year. The interval between cuttings ranges between 30 to 35 days. Harvesting is done in segments known as strip cutting. The first harvest is in April, and the last in August or September of the same year.

Yield per cutting will vary throughout the year. In this study, we assume that first cutting will account for 15%, second cutting for 30%, third cutting for 30%, fourth cutting for 15% and fifth cutting for 10% of the total harvest of 7 tons per acre.

Alfalfa hay produced in the region is mostly consumed by the local horse industry.

6. YIELDS & RETURNS

Yields: County average yields for alfalfa in San Luis Obispo over the past seven years have ranged from 5.40 to 7.45 tons per acre **(Table A.)** In this study, we used an alfalfa yield of 7 tons per acre based on information provided by participating growers.

Returns: Alfalfa price in San Luis Obispo has ranged from $100 per ton to $131 per ton (**Table A.)** In this study, a price of $140 per ton is used, based on information provided by participating growers. An additional $50 per acre income is generated from leasing alfalfa stands to sheep ranchers towards the end of every year. This often replaces a sixth cutting.

Table A. Average Yield and Price for Alfalfa, San Luis Obispo County, 1990 - 1996 [1/]

Year	Production Per Acre (Tons)	Value Per Unit ($ / Ton)
1990	5.40	122.00
1991	5.50	100.00
1992	5.30	100.00
1993	6.60	115.00
1994	7.20	131.00
1995	7.00	118.00
1996	7.45	126.00
Average	6.35	116.00

[1/] San Luis Obispo County Department of Agriculture Annual Report, 1990 - 1996

Returns, as shown in **Table 11**, will vary and the yields and prices used in this cost study are only estimates taking into consideration of current situations.

7. RISK

Risks associated with alfalfa establishment and 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 the profitability and economic viability of alfalfa production. Risk is caused by various sources of uncertainty which include production, price, and financing. Examples of these risks are insect damage, severe frost, disease, a decrease in price, and increase in interest rates. Because of the risk involved, access to information on production practices, prices, and markets is crucial.

8. LABOR

The hourly wage for workers is $7.45 per hour for machine operators and $5.95 for manual labor. This is based on wages paid by growers in this study. Growers also pay for benefits including, Workers Compensation, Social Security, Medicare, insurance, and other possible benefits. In this study, growers surveyed showed that benefits increased labor wages by 34%. This brings the labor rate to $10.00 per hour for machine workers and $8.00 for non-machine workers.

Labor hours for machinery operation include time for equipment setup, moving, maintenance and repair. Therefore an additional 20% is added on machinery hours to account for such activities.

9. CASH OVERHEAD

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, and equipment repairs. Cash overhead costs are found in **Tables 1 through 4** and **6 through 9.**

Property Taxes: Counties charge a base property tax of 1% on 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 at 1% of average value of the property. Average value for equipment, buildings and improvements equals new cost plus salvage value divided by 2 on a per acre basis.

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 9.50% per year. A nominal interest rate is the going market cost of borrowed funds.

Insurance: Insurance for farm investments varies depending on 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 assets over their useful life. Liability insurance covers accidents on the farm and costs $895 for the entire farm.

Office Expense: Office and business expenses are estimated at $5 per acre. These expenses include office supplies, telephones, computer, fax, bookkeeping, accounting, legal fees, etc..

10. NON-CASH OVERHEAD

Non-cash overhead is comprised of depreciation and interest charged on equipment and other investments. Typically, farm equipment in San Luis Obispo County is a mix of old and new. In this study, current purchase price for new equipment is reduced by 40% to reflect the mix of new and used equipment. Annual equipment and investment costs are shown in **Tables 1, 2, 4, 6, 7 and 9.** They represent the per acre depreciation and interest costs for each investment on an annual basis.

Depreciation: Depreciation is a reduction in market value of investments due to wear, obsolescence, and age, and is on a straight line basis. Annual depreciation is calculated as purchase price minus salvage value divided by years of ownership of the investment, purchase price and years of life are shown in **Tables 4 and 9.**

Interest On Investment: Interest charges for use of capital in alfalfa production is calculated by multiplying the value of land and the average investment in equipment, buildings, and improvements (described in **Tables 4 and 9**) by the real cost of capital in current dollars. Real cost of capital used in this study is the long run average of 4%. Average investment for equipment, building and improvements equals new cost plus salvage value divided by 2.

11. EQUIPMENT CASH COSTS

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, operating costs consist of fuel, lubrication, and repairs.

In allocating equipment costs on a per acre basis, hourly charges are calculated first and shown in **Tables 5 and 10**. 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 PTO hp, and type of fuel used. Fuel and repair cost per acre for each operation in **Tables 1 and 6** is determined by multiplying total hourly operating cost in **Tables 5 and 10** 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 implements to account for setup and minor maintenance. Prices for on-farm delivery of diesel and gasoline are $0.75 and $0.99 per gallon.

12. ADDENDUM

1. Due to rounding, totals may be slightly different from the sum of components.

2. Per acre equipment costs in **Tables 1 and 6** reflect both value and level of use (hours and years of use) of the machinery complement. Therefore this cost could be different from the per acre value of the machinery complement in **Tables 5 and 10.**

REFERENCES:

1. American Society of Agricultural Engineers. 1992. ***American Society of Agricultural Engineers Standards Yearbook***. St. Joseph, MI.

2. Blank, Steve, Karen Klonsky, Kim Norris, and Steve Orloff. 1992. *Acquiring alfalfa hay equipment: A financial analysis of alternatives*. Giannini Information Series No. 92-1. Univ. of California, Oakland, CA.

3. Boelje, Michael D., and Vernon R. Eidman. 1984. ***Farm Management.*** John Wiley and Sons. New York, NY.

4. Takele, Etaferahu, M. Smith, D. Walton, P. Zellman***. Sample Costs to Produce Barley, Dryland and Conventional Tillage Conditions, San Luis Obispo County 1995/96***. 1996. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.

5. Takele, Etaferahu, M. Smith, D. Walton, P. Zellman***. Sample Costs to Produce Garbanzo , Dryland and Conventional Tillage Conditions, San Luis Obispo***. ***County 1995/96.*** 1996. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.

6. Takele, Etaferahu, M. Smith, D. Walton, P. Zellman***. Sample Costs to Produce Wheat , Dryland and Conventional Tillage Conditions, San Luis Obispo***. ***County 1995/96***. 1996. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.

7. Frosheiser, F.I., R.D. Munson, M.C. Wilson. *Alfalfa Analyst*. Leaflet 2884. 1972, Reprinted 1980. UC DANR. Oakland, CA.

8. Lehman, W.F. 1979. *Alfalfa Production in the Low Desert Valleys Areas of California*. Leaflet 21097. UC DANR. Oakland, CA.

Table 1. COSTS PER ACRE TO ESTABLISH ALFALFA BY TYPE OF OPERATION
San Luis Obispo County
Labor Rate: $10.00/hr. machine labor Interest Rate: 9.50%
$ 8.00/hr. non-machine labor Yield per Acre:

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Preplant:							
Pre-Irrigate	1.00	8.00	0.00	14.70	0.00	22.70	
Disc	0.20	2.40	1.86	0.00	0.00	4.26	
Fertilizer	0.11	1.28	0.66	132.00	0.00	133.95	
Rip 2x's	1.03	12.38	5.28	0.00	0.00	17.66	
Pre-plant Herbicide	0.11	1.28	0.66	19.55	0.00	21.50	
Disc 2x's	0.40	4.80	3.72	0.00	0.00	8.52	
Landplane	0.30	3.54	1.54	0.00	0.00	5.08	
Ringroll	0.11	1.38	0.79	0.00	0.00	2.17	
TOTAL PREPLANT COSTS	3.26	35.07	14.50	166.25	0.00	215.82	
Cultural:							
Plant	0.15	1.85	2.09	75.00	0.00	78.94	
Ringroll	0.11	1.38	0.79	0.00	0.00	2.17	
Irrigate	8.00	64.00	0.00	11.20	0.00	75.20	
Post-emergent Herbicide	0.11	1.28	0.66	6.46	0.00	8.41	
Pickup Truck	0.57	6.84	3.97	0.00	0.00	10.81	
ATV	0.57	6.84	0.83	0.00	0.00	7.67	
Heavy Truck Use	0.57	6.84	5.23	0.00	0.00	12.07	
TOTAL CULTURAL COSTS	10.09	89.03	13.57	92.66	0.00	195.27	
Interest on operating capital @ 9.50%						14.10	
TOTAL OPERATING COSTS/ACRE		124.10	28.07	258.91	0.00	425.19	
TOTAL OPERATING COSTS/TON						0.00	
CASH OVERHEAD:							
Liability Insurance						1.79	
Office Expense						5.00	
Property Taxes						6.83	
Property Insurance						4.87	
Investment Repairs						42.81	
TOTAL CASH OVERHEAD COSTS						61.30	
TOTAL CASH COSTS/ACRE						**486.49**	
TOTAL CASH COSTS/TON						0.00	

NON-CASH OVERHEAD: Investment	Per Producing Acre	Annual Cost: Depreciation	Interest @ 4%	
Fuel Tanks & Pumps	70.00	3.15	1.54	4.69
Shop Building	120.00	4.32	2.64	6.96
Shop Tools	10.00	0.45	0.22	0.67
Hay Barn #1	70.00	2.52	1.54	4.06
Hay Barn #2	70.00	2.52	1.54	4.06
Wells	382.50	11.48	8.41	19.89
Pumps	180.00	5.40	3.96	9.36
Pipes	108.00	3.24	2.38	5.62
Valves	16.25	0.49	0.36	0.84
Equipment	215.23	17.84	4.74	22.58
TOTAL NON-CASH OVERHEAD COSTS	1241.98	51.41	27.32	78.73
TOTAL COSTS/ACRE				565.22
TOTAL COSTS/TON				0.00

Table 2. COMPONENTS OF COSTS PER ACRE TO ESTABLISH ALFALFA
San Luis Obispo County

Labor Rate: $10.00/hr. machine labor
$ 8.00/hr. non-machine labor
Interest Rate: 9.50%
Yield per Acre:

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa	0.00			0.00	
TOTAL GROSS RETURNS FOR ALFALFA				0.00	
OPERATING COSTS					
Water:					
Water	9.25	AcIn	2.80	25.90	
Fertilizer:					
Super Treble Phosphate	600.00	Lb	0.22	132.00	
Herbicide:					
Eptam	3.40	Pint	5.75	19.55	
2, 4 DB	1.25	Pint	5.17	6.46	
Seed:					
Semi-Dormant	25.00	Lb	3.00	75.00	
Labor (machine)	5.21	hrs	10.00	52.10	
Labor (non-machine)	9.00	hrs	8.00	72.00	
Fuel - Gas	1.80	gal	0.99	1.78	
Fuel - Diesel	10.23	gal	0.75	7.67	
Lube				1.42	
Machinery repair				17.17	
Interest on operating capital @ 9.50%				14.10	
TOTAL OPERATING COSTS/ACRE				425.19	
TOTAL OPERATING COSTS/TON				0.00	
NET RETURNS ABOVE OPERATING COSTS				-425.19	
CASH OVERHEAD COSTS:					
Liability Insurance				1.79	
Office Expense				5.00	
Property Taxes				6.83	
Property Insurance				4.87	
Investment Repairs				42.81	
TOTAL CASH OVERHEAD COSTS/ACRE				61.30	
TOTAL CASH COSTS/ACRE				486.49	
TOTAL CASH COSTS/TON				0.00	
NON-CASH OVERHEAD COSTS (DEPRECIATION & INTEREST):					
Fuel Tanks & Pumps				4.69	
Shop Building				6.96	
Shop Tools				0.67	
Hay Barn #1				4.06	
Hay Barn #2				4.06	
Wells				19.89	
Pumps				9.36	
Pipes				5.62	
Valves				0.84	
Equipment				22.58	
TOTAL NON-CASH OVERHEAD COSTS / ACRE				78.73	
TOTAL COSTS/ACRE				565.22	
TOTAL COSTS/TON				0.00	
NET RETURNS ABOVE TOTAL COSTS				-565.22	

Table 3. MONTHLY CASH COSTS PER ACRE TO ESTABLISH ALFALFA
San Luis Obispo County

Beginning : Jan 98 Ending : Dec 98	JAN 98	FEB 98	MAR 98	APR 98	MAY 98	JUN 98	JUL 98	AUG 98	SEP 98	OCT 98	NOV 98	DEC 98	TOTAL
Preplant:													
Pre-Irrigate							22.70						22.70
Disc							4.26						4.26
Fertilizer								133.95					133.95
Rip 2x's								17.66					17.66
Pre-plant Herbicide								21.50					21.50
Disc 2x's								8.52					8.52
Landplane									5.08				5.08
Ringroll									2.17				2.17
TOTAL PREPLANT COSTS							26.96	181.62	7.24				215.82
Cultural:													
Plant									78.94				78.94
Ringroll									2.17				2.17
Irrigate										75.20			75.20
Post-emergent Herbicide										8.41			8.41
Pickup Truck							1.80	1.80	1.80	1.80	1.80	1.80	10.81
ATV							1.28	1.28	1.28	1.28	1.28	1.28	7.67
Heavy Truck Us							2.01	2.01	2.01	2.01	2.01	2.01	12.07
TOTAL CULTURAL COSTS							5.09	5.09	86.20	88.70	5.09	5.09	195.27
Interest on operating capital							0.25	1.73	2.47	3.17	3.21	3.25	14.10
TOTAL OPERATING COSTS/ACRE							32.30	188.44	95.91	91.87	8.31	8.35	425.19
TOTAL OPERATING COSTS/TON							0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERHEAD:													
Liability Insurance	1.79												1.79
Office Expense	5.00												5.00
Property Taxes		3.42					3.42						6.83
Property Insurance		2.44					2.44						4.87
Investment Repairs	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	42.81
TOTAL CASH OVERHEAD COSTS	10.36	9.42	3.57	3.57	3.57	3.57	9.42	3.57	3.57	3.57	3.57	3.57	61.30
TOTAL CASH COSTS/ACRE	10.36	9.42	3.57	3.57	3.57	3.57	41.72	192.01	99.48	95.44	11.87	11.91	486.49
TOTAL CASH COSTS/TON	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4. WHOLE FARM EQUIPMENT LIST, PRICES, AND ANNUAL INVESTMENT AND BUSINESS OVERHEAD COSTS TO ESTABLISH ALFALFA
San Luis Obispo County

ANNUAL EQUIPMENT COSTS

Description	Price	Years Life	Non-Cash Overhead Depreciation	Non-Cash Overhead Interest	Cash Overhead Insurance	Cash Overhead Taxes	Total
98 62 HP 4WD Tractor #1	30,140	14	1,938	663	118	166	2,885
98 62 HP 4WD Tractor #2	30,140	14	1,938	663	118	166	2,885
98 ATV	3,861	7	496	85	15	21	618
98 Disc - 21' #1	16,510	15	991	363	65	91	1,509
98 Disc - 21' #2	16,510	15	991	363	65	91	1,509
98 Grain Drill - 20'	18,000	15	1,080	396	71	99	1,646
98 Pickup 3/4 Ton	22,650	7	2,912	498	89	125	3,624
98 Ring Roller - 20'	8,000	21	343	176	31	44	594
98 Ripper - 3 Shank	1,957	12	147	43	8	11	208
98 Scraper - 10'	2,270	16	128	50	9	12	199
98 Truck 2 Ton	29,200	7	3,754	642	115	161	4,672
98 Weed Sprayer 200 Gallon	3,282	10	295	72	13	18	399
TOTAL	182,520		15,012	4,015	716	1,004	20,747
60% of New Cost *	109,512		9,007	2,409	429	602	12,448

* New equipment costs reduced by 40% to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Cash Overhead Depreciation	Cash Overhead Interest	Non-Cash Overhead Insurance	Non-Cash Overhead Taxes	Non-Cash Overhead Repairs	Total
INVESTMENT								
Fuel Tanks & Pumps	35,000	20	1,575	770	137	193	35	2,710
Hay Barn #1	14,000	25	504	308	55	77	700	1,644
Hay Barn #2	14,000	25	504	308	55	77	700	1,644
Shop Building	60,000	25	2,160	1,320	235	330	600	4,645
Shop Tools	5,000	20	225	110	20	28	100	482
Pipes	21,600	30	648	475	85	119	1,080	2,407
Pumps	90,000	30	2,700	1,980	353	495	4,500	10,028
Valves	8,125	30	244	179	32	45	407	906
Wells	191,250	30	5,738	4,208	750	1,052	9,563	21,310
TOTAL INVESTMENT	438,975		14,297	9,657	1,721	2,414	17,685	45,775

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	1	Farm	895	895
Office Expense	500	Acre	5	2,500

Table 5. HOURLY EQUIPMENT COSTS TO ESTABLISH ALFALFA
San Luis Obispo County

Yr	Description	Actual Hours Used	COSTS PER HOUR							
			Non-Cash Overhead		Cash Overhead			Operating		
			Depreciation	Interest	Insurance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
98	62 HP 4WD Tractor #1	775.10	1.50	0.51	0.09	0.13	1.51	2.63	4.14	6.37
98	62 HP 4WD Tractor #2	779.10	1.49	0.51	0.09	0.13	1.51	2.63	4.14	6.36
98	ATV	285.00	1.05	0.18	0.03	0.04	0.70	0.76	1.46	2.76
98	Disc - 21' #1	140.00	4.25	1.56	0.28	0.39	4.74	0.00	4.74	11.21
98	Disc - 21' #2	160.00	3.71	1.36	0.24	0.34	4.74	0.00	4.74	10.40
98	Grain Drill - 20'	76.80	8.44	3.09	0.55	0.77	9.03	0.00	9.03	21.89
98	Pickup 3/4 Ton	285.00	6.13	1.05	0.19	0.26	4.11	2.85	6.96	14.59
98	Ring Roller - 20'	115.00	1.79	0.92	0.16	0.23	2.30	0.00	2.30	5.40
98	Ripper - 3 Shank	206.40	0.43	0.13	0.02	0.03	0.56	0.00	0.56	1.17
98	Scraper - 10'	148.00	0.52	0.20	0.04	0.05	0.65	0.00	0.65	1.46
98	Truck 2 Ton	285.00	7.90	1.35	0.24	0.34	7.01	2.16	9.17	19.01
98	Weed Sprayer 200 Gallon	119.80	1.48	0.36	0.06	0.09	1.64	0.00	1.64	3.64

Table 6. COSTS PER ACRE TO PRODUCE ALFALFA BY TYPE OF OPERATION
San Luis Obispo County

Labor Rate: $10.00/hr. machine labor
$ 8.00/hr. non-machine labor

Interest Rate: 9.50%
Yield per Acre: 7.00 Tons

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Herbicide	0.11	1.28	0.66	29.40	0.00	31.35	
Insecticide Treatment	0.11	1.28	0.66	11.88	0.00	13.83	
Irrigate	12.00	96.00	0.00	134.40	0.00	230.40	
Pickup Truck Use	0.57	6.84	3.97	0.00	0.00	10.81	
ATV Use	0.57	6.84	0.83	0.00	0.00	7.67	
Heavy Truck Use	0.57	6.84	5.23	0.00	0.00	12.07	
TOTAL CULTURAL COSTS	13.92	119.09	11.36	175.68	0.00	306.12	
Harvest:							
Mow Alfalfa	1.07	12.84	17.87	0.00	0.00	30.71	
Rake Alfalfa	0.58	7.00	4.69	0.00	0.00	11.69	
Bale Alfalfa	0.93	11.16	13.08	0.00	0.00	24.24	
Pickup Alfalfa w/ Bale Wagon	0.55	6.64	12.83	0.00	0.00	19.48	
TOTAL HARVEST COSTS	3.14	37.64	48.48	0.00	0.00	86.12	
Postharvest:							
Stack Hay	1.38	16.50	5.28	0.00	0.00	21.78	
TOTAL POSTHARVEST COSTS	1.38	16.50	5.28	0.00	0.00	21.78	
Interest on operating capital						13.49	
TOTAL OPERATING COSTS/ACRE		173.23	65.12	175.68	0.00	427.52	
TOTAL OPERATING COSTS/TON						61.07	
CASH OVERHEAD:							
Liability Insurance						1.79	
Office Expense						5.00	
Land Rent						206.00	
Property Taxes						13.72	
Property Insurance						9.78	
Investment Repairs						42.49	
TOTAL CASH OVERHEAD COSTS						278.78	
TOTAL CASH COSTS/ACRE						706.30	
TOTAL CASH COSTS/TON						100.90	

NON-CASH OVERHEAD: Investment	Per Producing Acre	Annual Cost: Depreciation	Interest @ 4%	
Fuel Tanks & Pumps	70.00	3.15	1.54	4.69
Shop Tools	10.00	0.60	0.22	0.82
Shop Building	120.00	5.40	2.64	8.04
Hay Barn #1	70.00	2.52	1.54	4.06
Hay Barn #2	70.00	2.52	1.54	4.06
Wells	382.50	11.48	8.41	19.89
Pumps	180.00	5.40	3.96	9.36
Alfalfa Establishment	486.00	87.48	10.69	98.17
Pipes	108.00	3.24	2.38	5.62
Valves	16.25	0.49	0.36	0.84
Equipment	981.30	64.93	21.59	86.51
TOTAL NON-CASH OVERHEAD COSTS	2494.05	187.21	54.87	242.06
TOTAL COSTS/ACRE				948.36
TOTAL COSTS/TON				135.48

Table 7. COMPONENTS OF COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA
San Luis Obispo County

Labor Rate: $10.00/hr. machine labor
$ 8.00/hr. non-machine labor
Interest Rate: 9.50%
Yield per Acre: 7.00 Tons

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa	7.00	Ton	140.00	980.00	
Sheep Grazing	1.00	Acre	50.00	50.00	
TOTAL GROSS RETURNS FOR ALFALFA				1030.00	
OPERATING COSTS					
Herbicide:					
Velpar	3.00	Pint	9.80	29.40	
Insecticide:					
Furidan	1.00	Pint	11.88	11.88	
Water:					
Water	48.00	AcIn	2.80	134.40	
Labor (machine)	7.72	hrs	10.00	77.23	
Labor (non-machine)	12.00	hrs	8.00	96.00	
Fuel - Gas	1.80	gal	0.99	1.78	
Fuel - Diesel	16.83	gal	0.75	12.63	
Lube				2.17	
Machinery repair				48.52	
Interest on operating capital @ 9.50%				13.49	
TOTAL OPERATING COSTS/ACRE				427.52	
TOTAL OPERATING COSTS/TON				61.07	
NET RETURNS ABOVE OPERATING COSTS				602.48	
CASH OVERHEAD COSTS:					
Liability Insurance				1.79	
Office Expense				5.00	
Land Rent				206.00	
Property Taxes				13.72	
Property Insurance				9.78	
Investment Repairs				42.49	
TOTAL CASH OVERHEAD COSTS/ACRE				278.78	
TOTAL CASH COSTS/ACRE				706.30	
TOTAL CASH COSTS/TON				100.90	
NON-CASH OVERHEAD COSTS (DEPRECIATION & INTEREST):					
Fuel Tanks & Pumps				4.69	
Shop Tools				0.82	
Shop Building				8.04	
Hay Barn #1				4.06	
Hay Barn #2				4.06	
Wells				19.89	
Pumps				9.36	
Alfalfa Establishment				98.17	
Pipes				5.62	
Valves				0.84	
Equipment				86.51	
TOTAL NON-CASH OVERHEAD COSTS /ACRE				242.06	
TOTAL COSTS/ACRE				948.36	
TOTAL COSTS/TON				135.48	
NET RETURNS ABOVE TOTAL COSTS				81.64	

Table 8. MONTHLY CASH COSTS PER ACRE TO PRODUCE ALFALFA
San Luis Obispo County

Beginning : MAR 98 Ending : FEB 98	MAR 98	APR 98	MAY 98	JUN 98	JUL 98	AUG 98	SEP 98	OCT 98	NOV 98	DEC 98	JAN 99	FEB 99	TOTAL
Cultural:													
Herbicide	31.35												31.35
Insecticide Treatment	13.83												13.83
Irrigate		38.40	38.40	38.40	38.40	38.40	38.40						230.40
Pickup Truck Use	1.54	1.54	1.54	1.54	1.54	1.54	1.54						10.81
ATV Use	1.10	1.10	1.10	1.10	1.10	1.10	1.10						7.67
Heavy Truck Use	1.72	1.72	1.72	1.72	1.72	1.72	1.72						12.07
TOTAL CULTURAL COSTS	49.54	42.76	42.76	42.76	42.76	42.76	42.76						306.12
Harvest:													
Mow Alfalfa		4.61	9.21	9.21	4.61	3.07							30.71
Rake Alfalfa		1.75	3.51	3.51	1.75	1.17							11.69
Bale Alfalfa		3.64	7.27	7.27	3.64	2.42							24.24
Pickup Alfalfa w/ Bale Wagon		2.93	5.86	5.80	2.93	1.95							19.48
TOTAL HARVEST COSTS		12.93	25.85	25.80	12.93	8.62							86.12
Postharvest:													
Stack Hay		3.27	6.53	6.53	3.27	2.18							21.78
TOTAL POSTHARVEST COSTS		3.27	6.53	6.53	3.27	2.18							21.78
Interest on oper. capital	0.39	0.86	1.45	2.05	2.52	2.94	3.28						13.49
TOTAL OPERATING COSTS/ACRE	49.93	59.82	76.60	77.15	61.48	56.50	46.04						427.52
TOTAL OPERATING COSTS/TON	7.13	8.55	10.94	11.02	8.78	8.07	6.58						61.07
OVERHEAD:													
Liability Insurance										1.79			1.79
Office Expense										5.00			5.00
Land Rent										206.00			206.00
Property Taxes					6.86							6.86	13.72
Property Insurance					4.89							4.89	9.78
Investment Repairs	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	42.49
TOTAL CASH OVERHEAD COSTS	3.54	3.54	3.54	3.54	14.67	3.54	3.54	3.54	3.54	216.33	3.54	14.67	278.78
TOTAL CASH COSTS/ACRE	53.47	63.36	80.14	80.69	76.14	60.04	49.58	3.54	3.54	216.33	3.54	14.67	706.30
TOTAL CASH COSTS/TON	7.64	9.05	11.45	11.53	10.88	8.58	7.08	0.51	0.51	30.90	0.51	2.10	100.90

Table 9. WHOLE FARM ANNUAL EQUIPMENT LIST, PRICES, AND ANNUAL INVESTMENT AND BUSINESS OVERHEAD COSTS TO PRODUCE ALFALFA
San Luis Obispo County

ANNUAL EQUIPMENT COSTS

Description	Price	Years Life	Non-Cash Overhead Depreciation	Non-Cash Overhead Interest	Cash Overhead Insurance	Cash Overhead Taxes	Total
98 62 HP 4WD Tractor #1	30,140	14	1,938	663	118	166	2,885
98 62 HP 4WD Tractor #2	30,140	14	1,938	663	118	166	2,885
98 Disc - 21' #1 ◇	16,510	15	991	363	65	91	1,509
98 Disc - 21' #2 ◇	16,510	15	991	363	65	91	1,509
98 Grain Drill - 20' ◇	18,000	15	1,080	396	71	99	1,646
98 Ring Roller - 20' ◇	8,000	21	343	176	31	44	594
98 Ripper - 3 Shank ◇	1,957	12	147	43	8	11	208
98 Scraper - 10' ◇	2,270	16	128	50	9	12	199
98 Alfalfa Baler	49,500	13	3,427	1,089	194	272	4,982
98 Alfalfa Bale Wagon	96,500	18	4,825	2,123	378	531	7,857
98 Alfalfa Swather	50,500	11	4,132	1,111	198	278	5,719
98 Alfalfa Twin Rake	14,500	21	621	319	57	80	1,077
98 ATV	3,861	7	496	85	15	21	618
98 Hay Squeeze	25,000	15	1,500	550	98	138	2,286
98 Pickup 3/4 Ton	22,650	7	2,912	498	89	125	3,624
98 Truck 2 Ton	29,200	7	3,754	642	115	161	4,672
98 Weed Sprayer 200 Gallon	3,282	10	295	72	13	18	399
TOTAL	418,520		29,517	9,207	1,641	2,302	42,668
60% of New Cost *	251,112		17,710	5,524	985	1,381	25,601

* New equipment costs reduced by 40% to reflect a mix of new and used equipment.
◇ These equipment's are used in establishment, but not in production of alfalfa. However costs are calculated on their overall use in the farm.

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Cash Overhead Depreciation	Cash Overhead Interest	Non-Cash Overhead Insurance	Non-Cash Overhead Taxes	Non-Cash Overhead Repairs	Total
INVESTMENT								
Fuel Tanks & Pumps	35,000	20	1,575	770	137	193	700	3,375
Hay Barn #1	14,000	25	504	308	55	77	70	1,014
Hay Barn #2	14,000	25	504	308	55	77	700	1,644
Shop Building	60,000	20	2,700	1,320	235	330	1,200	5,785
Shop Tools	5,000	15	300	110	20	28	250	707
Alfalfa Establishment	19,440	5	3,499	428	76	107	0	4,110
Pipes	21,600	30	648	475	85	119	1,080	2,407
Pumps	90,000	30	2,700	1,980	353	495	4,500	10,028
Valves	8,125	30	244	179	32	45	407	906
Wells	191,250	30	5,738	4,208	750	1,052	9,563	21,310
TOTAL INVESTMENT	45,815		18,411	10,085	1,792	2,521	18,470	51,286

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent	200	Acre	206	41,200
Liability Insurance	1	Farm	895	895
Office Expense	500	Acre	5	2,500

Table 10. HOURLY EQUIPMENT COSTS TO PRODUCE ALFALFA
San Luis Obispo County

Yr	Description		Actual Hours Used	COSTS PER HOUR							
				Non-Cash Overhead		Cash Overhead			Operating		
				Depreciation	Interest	Insurance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
98	62 HP 4WD Tract#2		816.00	1.42	0.49	0.09	0.12	1.51	2.63	4.14	6.26
98	62 HP 4WD Tractor		814.40	1.43	0.49	0.09	0.12	1.51	2.63	4.14	6.26
98	Disc - 21' #1	◇	140.00	4.25	1.56	0.28	0.39	4.74	0.00	4.74	11.21
98	Disc - 21' #2	◇	160.00	3.71	1.36	0.24	0.34	4.74	0.00	4.74	10.40
98	Grain Drill - 20'	◇	76.80	8.44	3.09	0.55	0.77	9.03	0.00	9.03	21.89
98	Ring Roller - 20'	◇	115.00	1.79	0.92	0.16	0.23	2.30	0.00	2.30	5.40
98	Ripper - 3 Shank	◇	206.40	0.43	0.13	0.02	0.03	0.56	0.00	0.56	1.17
98	Scraper - 10'	◇	148.00	0.52	0.20	0.04	0.05	0.65	0.00	0.65	1.46
98	Alfalfa Baler		186.00	11.05	3.51	0.63	0.88	9.52	0.00	9.52	25.59
98	Alfalfa Bale Wagon		110.70	26.14	11.50	2.05	2.88	23.18	0.00	23.18	65.75
98	Alfalfa Swather		214.00	11.58	3.11	0.56	0.78	12.16	0.00	12.16	28.19
98	Alfalfa Twin Rake		116.70	3.20	1.64	0.29	0.41	3.49	0.00	3.49	9.03
98	ATV		285.00	1.05	0.18	0.03	0.04	0.70	0.76	1.46	2.76
98	Hay Squeeze		302.50	2.97	1.09	0.19	0.27	0.04	3.45	3.49	8.02
98	Pickup 3/4 Ton		285.00	6.13	1.05	0.19	0.26	4.11	2.85	6.96	14.59
98	Truck 2 Ton		285.00	7.90	1.35	0.24	0.34	7.01	2.16	9.17	19.01
98	Weed Sprayer 200		42.80	4.14	1.01	0.18	0.25	1.64	0.00	1.64	7.23

◇ These equipment's are used in establishment, but not in production of alfalfa.
However costs are calculated on their overall use in the farm.

Table 11. ANALYSIS OF COSTS AND RETURNS* AT A RANGE OF PRICES AND YIELDS
San Luis Obispo County

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALFALFA

	YIELD (TON/ACRE)						
	5.50	6.00	6.50	7.00	7.50	8.00	8.50
OPERATING COSTS/ACRE:							
Cultural Cost	306.12	306.12	306.12	306.12	306.12	306.12	306.12
Harvest Cost	67.67	73.82	79.97	86.12	92.27	98.42	104.57
Postharvest Cost	21.78	21.78	21.78	21.78	21.78	21.78	21.78
Interest on operating capital	12.86	13.06	13.27	13.49	13.71	13.92	14.12
TOTAL OPERATING COSTS/ACRE	408.43	414.78	421.14	427.52	433.88	440.24	446.59
TOTAL OPERATING COSTS/TON	74.26	69.13	64.79	61.07	57.85	55.03	52.54
CASH OVERHEAD COSTS/ACRE	278.78	278.78	278.78	278.78	278.78	278.78	278.78
TOTAL CASH COSTS/ACRE	687.21	693.56	699.92	706.30	712.66	719.02	725.37
TOTAL CASH COSTS/TON	124.95	115.59	107.68	100.90	95.02	89.88	85.34
NON-CASH OVERHEAD COSTS/ACRE	242.06	242.06	242.06	242.06	242.06	242.06	242.06
TOTAL COSTS/ACRE	929.27	935.62	941.98	948.36	954.72	961.08	967.43
TOTAL COSTS/TON	168.96	155.94	144.92	135.48	127.30	120.14	113.82

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ALFALFA

PRICE	YIELD (TON/ACRE)						
($ PER TON)	5.50	6.00	6.50	7.00	7.50	8.00	8.50
125	329.07	385.22	441.36	497.48	553.62	609.76	665.91
130	356.57	415.22	473.86	532.48	591.12	649.76	708.41
135	384.07	445.22	506.36	567.48	628.62	689.76	750.91
140	411.57	475.22	538.86	602.48	666.12	729.76	793.41
145	439.07	505.22	571.36	637.48	703.62	769.76	835.91
150	466.57	535.22	603.86	672.48	741.12	809.76	878.41
155	494.07	565.22	636.36	707.48	778.62	849.76	920.91

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ALFALFA

PRICE	YIELD (TON/ACRE)						
($ PER TON)	5.50	6.00	6.50	7.00	7.50	8.00	8.50
125	50.29	106.44	162.58	218.70	274.84	330.98	387.13
130	77.79	136.44	195.08	253.70	312.34	370.98	429.63
135	105.29	166.44	227.58	288.70	349.84	410.98	472.13
140	132.79	196.44	260.08	323.70	387.34	450.98	514.63
145	160.29	226.44	292.58	358.70	424.84	490.98	557.13
150	187.79	256.44	325.08	393.70	462.34	530.98	599.63
155	215.29	286.44	357.58	428.70	499.84	570.98	642.13

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ALFALFA

PRICE	YIELD (TON/ACRE)						
($ PER TON)	5.50	6.00	6.50	7.00	7.50	8.00	8.50
125	-191.77	-135.62	-79.48	-23.36	32.78	88.92	145.07
130	-164.27	-105.62	-46.98	11.64	70.28	128.92	187.57
135	-136.77	-75.62	-14.48	46.64	107.78	168.92	230.07
140	-109.27	-45.62	18.02	81.64	145.28	208.92	272.57
145	-81.77	-15.62	50.52	116.64	182.78	248.92	315.07
150	-54.27	14.38	83.02	151.64	220.28	288.92	357.57
155	-26.77	44.38	115.52	186.64	257.78	328.92	400.07

* Returns include $ 50 / acre grazing income.

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