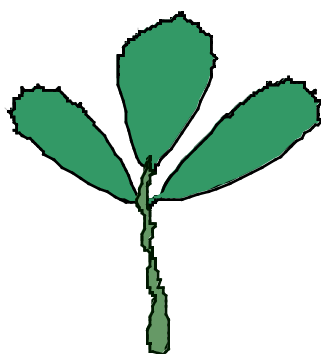

1998

UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

SAMPLE COSTS
ESTABLISH AN ALFALFA STAND AND PRODUCE

~ *ALFALFA HAY* ~



SAN JOAQUIN VALLEY
50 Acre Planting

Prepared by:

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UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

1998

SAMPLE COSTS TO ESTABLISH AN ALFALFA STAND AND PRODUCE ALFALFA HAY San Joaquin Valley 50 Acre Planting

INTRODUCTION

The detailed costs to establish an alfalfa stand and produce alfalfa hay in San Joaquin Valley of California are presented in this study. The hypothetical farm used in this report consists of 50 acres in alfalfa hay production.

This study consists of Assumptions for Establishing an Alfalfa Hay Stand and Producing Alfalfa Hay and nine 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 Table 2 Costs Per Acre To Produce Alfalfa Hay and Table 3 Costs And Returns 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, Investment And Business Overhead Costs For Alfalfa Hay Establishment And Production |
| Table 8. | Hourly Equipment Costs For Alfalfa Hay Production |
| Table 9. | Ranging Analysis |

This and other 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

1998 SAMPLE COSTS TO ESTABLISH AN ALFALFA STAND AND PRODUCE ALLFALFA HAY San Joaquin Valley 50 Acre Planting

ASSUMPTIONS

Land. This report is based on 50 acres of land all of which is planted to alfalfa hay. The land is owned by the grower and is valued at \$5,000 per acre. A description of annual land cash and non-cash costs appear in the annual investment section of Table 7.

Irrigation System. An irrigation district supplies water, though growers supplement this with well water in some areas. The amount of water used to irrigate alfalfa will vary in the San Joaquin 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 cost study is \$26.40 per acre-foot.

The permanent irrigation system consists of buried mainline that goes to alfalfa valves at the head of the fields. This part of the system is already in place when the land is purchased. Eight acre-inches are applied immediately after planting and 10 inches are applied in February.

Water is run through the mainlines to the alfalfa valves at the head of the field and flows down the alfalfa check between borders. Applied water will vary year to year, but in this study five acre-feet are used annually in production years. Successful water management and irrigation scheduling requires careful observation of water conditions of the soil and plant. Proper management of irrigation can provide for strong vegetative growth and influence insect and disease pest pressures.

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 \$10.72 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.

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. The alfalfa stand is prepared and planted in the fall and the establishment year ends with the sale of the first hay cutting in April of the following year.

Land Preparation. Stand establishment begins by discing down the previous crops residue. The ground is chiseled to a depth of 18 to 24 inches to fracture any soil compaction and improve water infiltration. The fields are laser leveled to remove high and low spots and create the proper slope required for efficient

irrigation. Borders are pulled creating a basin for running irrigation water between. A preplant fertilizer is spread followed by an herbicide application and the fields are disced and harrowed to incorporate both into the soil. The final discing also helps to break up large clods of dirt, creating better seed-to-soil contact for good germination.

All of the land preparation operations are contracted out to commercial companies or neighboring growers. Fertilizers and pesticides are custom applied by commercial fertilizer and pesticide suppliers.

Planting. Alfalfa seed is planted at a depth of 1/4 inch or less at a rate of 30 pounds of seed per acre. The stand is custom planted for the owner for a fee. The planted stand receives an irrigation immediately after planting to germinate the stand.

Fertilization. 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. Applications of fertilizer or soil amendments should be made only after soil tests determine unacceptable pH and nutrient levels. Nitrogen, phosphorus, and potassium are applied in the form of 6-20-20 at 500 pounds per acre of material prior to planting in September. This is equivalent to 30 pounds of N, 100 pounds of P₂O₅, and 100 pounds of K₂O and per acre. Potassium may need to be applied preplant in deficient areas of the San Joaquin Valley, particularly the eastside of Stanislaus and Merced Counties. Once applied the ground is disced to incorporate fertilizers into the soil.

Irrigation. Three irrigation are made in the establishment year after seeding. Since planting occurs in the Fall, winter rains may (but not always) provide much of the needed moisture until regular irrigations begin in the following year. Eight acre-inches of water are flooded onto the planted fields in September or early October. In the late Winter, alfalfa made need one or two applications for a total of 10 acre-inches prior to harvest depending on conditions. Leveling removes high and low spots so that standing water will not form during flood irrigation. Poorly managed irrigations can weaken alfalfa plants and increase their susceptibility to insects, weeds, diseases, resulting in lower yields.

Weed Control. A variety of grasses and broadleaf weeds can compete heavily with a seedling stand of alfalfa 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 pre-emergent herbicide (Eptam) is applied in September before planting and a second, post-emergent treatment (Pursuit) is made in December. Both treatments are custom ground applied.

Establishment Cost. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing alfalfa through the first hay harvest minus any returns from production. The *Total Accumulated Net Cash Cost* in the third year shown in Table 1, represents the establishment cost per acre. For this study, the cost is \$430 per acre or \$21,500 for the 50 acre stand. Establishment cost is amortized over the remaining 3 years that the stand is assumed to be in production. Establishment cost is used to determine the non-cash overhead, orchard capital recovery expense for production years.

Production Cultural Practices and Material Inputs

Irrigation. The price of irrigation includes water cost and labor expense. Irrigation on established stands begins in April and continues through the season until October. Five acre-feet of water are applied annually. While in this study water is applied in ten irrigations over seven months, actual water needs will vary considerably due to soil, climatic factors, and plant physiological. To avoid stressing plants for water or creating conditions favorable for disease and weed problems, irrigations should be scheduled based on plant requirements.

Fertilization. Alfalfa should only be fertilized after either a soil or plant tissue test has determined a need. In this study, potassium is spread on half of the acreage as murate of potash at a rate of 200 pounds per acre in November.

Weed Control. A variety of weeds invade alfalfa as fall arrives and the stand become dormant. Soil residual herbicides (Velpar and Karmex) for control of winter weeds are applied during December to established alfalfa stands. A second, late winter herbicide (Treflan) treatment is made in January for summer grass or dodder control.

Insect Control. Several insect species attack alfalfa, but alfalfa weevil, several species of aphids, alfalfa caterpillar, and armyworms are the major pests in this study, that are assumed to cause economic damage. 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 adult and juvenile alfalfa weevils feed on plants, though it is in the larval stage that damage is most severe. Weevils and aphids are presumed to reach population levels requiring a single treatment for control. In this study, they are sprayed with an insecticide (Furadan) in March. The application covers 100% of the acreage and is sprayed by aircraft.

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 do also eat the veins. The worm spray consists of one application of an insecticide (Lannate) in July.

The pesticides and rates mentioned in this cost study are a few of those that are listed in the U.C. Pest Management Guidelines, Alfalfa 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 drastic impacts on stand vigor, hay quality, 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.

Hay is harvested seven times in the established stands; once in the months of April, May, June, July, August, and September. Alfalfa is cut with a self-propelled 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 into 125 pound bales. The bales are then picked up with a balewagon that moves them from the field and roadsides them in a stack.

All harvest operations are hired out to a custom harvester. Since the farm custom harvests its hay, there are no ownership costs for equipment. If a grower harvests their hay using their own equipment, harvest expense (custom harvest costs) should be subtracted from harvest costs in Table 1, 3, 4, and 5. The cash cost for operating grower owned equipment would be added to harvest costs in Table 1, 3, 4, and 5.

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.

Yields. The crop is assumed to yield seven tons of hay per acre over seven cuttings per year once the stand is established. Annual yield variations can range from six to eleven tons of hay per acre in this region.

Returns. An estimated price of a \$140 per ton of hay is used to calculate returns above several levels of cost. Returns may range from \$80 to \$170 per ton; the \$140 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 9 indicates the effects on grower returns based on varying yields and returns.

Risk. The risks associated with producing and marketing alfalfa hay 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 hay production. A market channel should be determined before alfalfa is planted and brought into production. Though, not used in this study, crop insurance is a risk management tool available to growers.

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 cost of postharvest operations are discounted back to the 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 \$455 for the entire farm or \$9.10 per acre.

Office Expense: Office and business expenses are estimated at \$20 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 50% of new cost to indicate a mix of new and used equipment. Annual ownership costs for equipment and investments are shown in Tables 1, 2, 4, and 5 as the capital recovery cost 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 certain 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 additional information for this study.

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Table 1.

U.C. COOPERATIVE EXTENSION
 COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| Operation | Operation Time (Hrs/A) | Labor Cost | Fuel, Lube & Repairs | Cash and Labor Material Cost | Custom/ Rent | Total Cost | Your Cost |
|----------------------------------------|-------------------------------|---------------|-------------------------|---------------------------------------------------------------------|-----------------|---------------|--------------|
| Cultural: | | | | | | | |
| Disc Stubble 2X | 0.00 | 0 | 0 | 0 | 15 | 15 | |
| Chisel Field | 0.00 | 0 | 0 | 0 | 15 | 15 | |
| Laser Level Field | 0.00 | 0 | 0 | 0 | 75 | 75 | |
| Border Preparation | 0.00 | 0 | 0 | 0 | 18 | 18 | |
| Fertilize - 6-20-20 | 0.00 | 0 | 0 | 60 | 4 | 64 | |
| Weed Control - Pre-plant | 0.00 | 0 | 0 | 19 | 6 | 25 | |
| Finish Disc 2X | 0.00 | 0 | 0 | 0 | 15 | 15 | |
| Plant | 0.00 | 0 | 0 | 78 | 12 | 90 | |
| Irrigate - Stand Establishment | 0.18 | 1 | 0 | 18 | 0 | 19 | |
| Weed Control - Post-emergent | 0.00 | 0 | 0 | 34 | 8 | 42 | |
| Irrigate - 2X | 0.36 | 3 | 0 | 22 | 0 | 25 | |
| Pickup Truck Use | 2.85 | 37 | 16 | 0 | 0 | 53 | |
| TOTAL CULTURAL COSTS | 3.39 | 41 | 16 | 231 | 168 | 455 | |
| Harvest: | | | | | | | |
| Harvest - Swathing | 0.00 | 0 | 0 | 0 | 10 | 10 | |
| Harvest - Raking | 0.00 | 0 | 0 | 0 | 4 | 4 | |
| Harvest - Baling | 0.00 | 0 | 0 | 0 | 17 | 17 | |
| Harvest - Roadsiding | 0.00 | 0 | 0 | 0 | 8 | 8 | |
| TOTAL HARVEST COSTS | 0.00 | 0 | 0 | 0 | 39 | 39 | |
| Interest on operating capital @ 10.46% | | | | | | 29 | |
| TOTAL OPERATING COSTS/ACRE | | 41 | 16 | 231 | 207 | 524 | |
| CASH OVERHEAD: | | | | | | | |
| Liability Insurance | | | | | | 9 | |
| Office Expense | | | | | | 20 | |
| Property Taxes | | | | | | 51 | |
| Property Insurance | | | | | | 36 | |
| TOTAL CASH OVERHEAD COSTS | | | | | | 116 | |
| TOTAL CASH COSTS/ACRE | | | | | | 640 | |
| NON-CASH OVERHEAD: | | | | | | | |
| <u>Investment</u> | <u>Per producing Acre</u> | | | <u>-- Annual Cost -- Capital Recovery - 7.81% Interest Rate</u> | | | |
| Land | 5000 | | | 390 | | 390 | |
| Equipment | 126 | | | 22 | | 22 | |
| TOTAL NON-CASH OVERHEAD COSTS | 5126 | | | 412 | | 412 | |
| TOTAL COSTS/ACRE | | | | | | 1052 | |

Table 2.

U.C. COOPERATIVE EXTENSION
 COSTS AND RETURNS PER ACRE TO ESTABLISH AN ALFALFA STAND
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| Quantity/Acre | Unit | Price or Cost/Unit | Value or Cost/Acre | Your Cost |
|----------------------------------------|--------|-----------------------|-----------------------|--------------|
| GROSS RETURNS | | | | |
| Alfalfa Hay | 1.50 | Ton | 140.00 | 210 |
| TOTAL GROSS RETURNS FOR ALFALFA | | | | 210 |
| OPERATING COSTS | | | | |
| Custom: | | | | |
| Stubble Discing | 1.00 | Acre | 15.00 | 15 |
| Chiseling | 1.00 | Acre | 15.00 | 15 |
| Laser Level | 1.00 | Acre | 75.00 | 75 |
| Border Discing | 1.00 | Acre | 18.00 | 18 |
| Spread Fertilizer | 1.00 | Acre | 4.00 | 4 |
| Ground Application | 1.00 | Acre | 6.00 | 6 |
| Finish Discing | 1.00 | Acre | 15.00 | 15 |
| Planting | 1.00 | Acre | 12.00 | 12 |
| Air Application | 1.00 | Acre | 8.00 | 8 |
| Swath Hay | 1.00 | Acre | 10.00 | 10 |
| Rake Hay | 1.00 | Acre | 4.00 | 4 |
| Bale Hay | 1.50 | Ton | 11.50 | 17 |
| Roadside Hay | 1.50 | Ton | 5.00 | 8 |
| Fertilizer: | | | | |
| 6-20-20 | 500.00 | Lb | 0.12 | 60 |
| Herbicide: | | | | |
| Eptam 7E | 3.50 | Pint | 5.54 | 19 |
| Pursuit DG | 1.40 | Oz | 20.10 | 28 |
| Seed: | | | | |
| Alfalfa Seed | 30.00 | Lb | 2.60 | 78 |
| Irrigation: | | | | |
| Water | 1.50 | AcFt | 26.40 | 40 |
| Adjuvant: | | | | |
| Adjuvant | 1.00 | Pint | 5.60 | 6 |
| Labor (machine) | 3.42 | hrs | 10.72 | 37 |
| Labor (non-machine) | 0.54 | hrs | 7.71 | 4 |
| Fuel - Gas | 8.55 | gal | 1.22 | 10 |
| Lube | | | | 2 |
| Machinery repair | | | | 4 |
| Interest on operating capital @ 10.46% | | | | 29 |
| TOTAL OPERATING COSTS/ACRE | | | | 524 |
| NET RETURNS ABOVE OPERATING COSTS | | | | -314 |

U.C. COOPERATIVE EXTENSION

Table 2. Continued

| | |
|-------------------------------------------------------------------|------------|
| CASH OVERHEAD COSTS: | |
| Liability Insurance | 9 |
| Office Expense | 20 |
| Property Taxes | 51 |
| Property Insurance | 36 |
| | ----- |
| TOTAL CASH OVERHEAD COSTS/ACRE | 116 |
| ----- | |
| TOTAL CASH COSTS/ACRE | 640 |
| MINUS TOTAL RETURNS | -210 |
| | ----- |
| NET CASH COSTS/ACRE (STAND ESTABLISHMENT COST) | 430 |
| ----- | |
| NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate): | |
| Land | 390 |
| Equipment | 22 |
| | ----- |
| TOTAL NON-CASH OVERHEAD COSTS/ACRE | 412 |
| ----- | |
| TOTAL COSTS/ACRE | 1052 |
| ----- | |
| NET RETURNS ABOVE TOTAL COSTS | -842 |
| ===== | |

Table 3.

U.C. COOPERATIVE EXTENSION
 MONTHLY CASH COSTS PER ACRE TO ESTABLISH AN ALFALFA STAND
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| Beginning AUG 97 | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | TOTAL |
|--------------------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Ending JUL 98 | 97 | 97 | 97 | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | |
| ----- | | | | | | | | | | | | | |
| Cultural: | | | | | | | | | | | | | |
| Disc Stubble 2X | 15 | | | | | | | | | | | | 15 |
| Chisel Field | 15 | | | | | | | | | | | | 15 |
| Laser Level Field | 75 | | | | | | | | | | | | 75 |
| Border Preparation | | 18 | | | | | | | | | | | 18 |
| Fertilize - 6-20-20 | | 64 | | | | | | | | | | | 64 |
| Weed Control - Pre-plant | | 25 | | | | | | | | | | | 25 |
| Finish Disc 2X | | 15 | | | | | | | | | | | 15 |
| Plant | | 90 | | | | | | | | | | | 90 |
| Irrigate - Stand Establishment | | 19 | | | | | | | | | | | 19 |
| Weed Control - Post-emergent | | | | | 42 | | | | | | | | 42 |
| Irrigate - 2X | | | | | | | 25 | | | | | | 25 |
| Pickup Truck Use | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 53 |
| | ----- | | | | | | | | | | | | |
| TOTAL CULTURAL COSTS | 111 | 237 | 6 | 6 | 48 | 6 | 31 | 6 | 6 | | | | 455 |
| ----- | | | | | | | | | | | | | |
| Harvest: | | | | | | | | | | | | | |
| Harvest - Swathing | | | | | | | | | 10 | | | | 10 |
| Harvest - Raking | | | | | | | | | 4 | | | | 4 |
| Harvest - Baling | | | | | | | | | 17 | | | | 17 |
| Harvest - Roadsiding | | | | | | | | | 8 | | | | 8 |
| | ----- | | | | | | | | | | | | |
| TOTAL HARVEST COSTS | | | | | | | | | 39 | | | | 39 |
| ----- | | | | | | | | | | | | | |
| Interest on oper. capital | 1 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 29 |
| | ----- | | | | | | | | | | | | |
| TOTAL OPERATING COSTS/ACRE | 112 | 240 | 9 | 9 | 51 | 9 | 34 | 10 | 49 | | | | 524 |
| ----- | | | | | | | | | | | | | |
| OVERHEAD: | | | | | | | | | | | | | |
| Liability Insurance | | | | | | 9 | | | | | | | 9 |
| Office Expense | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 20 |
| Property Taxes | 25 | | | | | | 25 | | | | | | 51 |
| Property Insurance | 18 | | | | | | 18 | | | | | | 36 |
| | ----- | | | | | | | | | | | | |
| TOTAL CASH OVERHEAD COSTS | 46 | 2 | 2 | 2 | 2 | 11 | 46 | 2 | 2 | | | | 116 |
| ----- | | | | | | | | | | | | | |
| TOTAL CASH COSTS/ACRE | 158 | 243 | 11 | 11 | 53 | 21 | 80 | 12 | 51 | | | | 640 |
| ===== | | | | | | | | | | | | | |

Table 4.

U.C. COOPERATIVE EXTENSION
 COSTS PER ACRE TO PRODUCE ALFALFA HAY
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| Operation | Operation Time (Hrs/A) | Labor Cost | Fuel, Lube & Repairs | Material Cost | Cash and Labor Costs per Acre Custom/ Rent | Total Cost | Your Cost |
|----------------------------------------|------------------------------|---------------|-------------------------|------------------|-----------------------------------------------------|---------------|--------------|
| Cultural: | | | | | | | |
| Insect Control - Aphids & Weevils | 0.00 | 0 | 0 | 11 | 8 | 19 | |
| Irrigate - 10X | 1.80 | 14 | 0 | 132 | 0 | 146 | |
| Insect Control - Worms | 0.00 | 0 | 0 | 12 | 8 | 20 | |
| Pickup Truck Use | 2.85 | 37 | 16 | 0 | 0 | 53 | |
| TOTAL CULTURAL COSTS | 4.65 | 51 | 16 | 156 | 16 | 238 | |
| Harvest: | | | | | | | |
| Harvest - Swathing - 7X | 0.00 | 0 | 0 | 0 | 70 | 70 | |
| Harvest - Raking - 7X | 0.00 | 0 | 0 | 0 | 28 | 28 | |
| Harvest - Baling - 7X | 0.00 | 0 | 0 | 0 | 81 | 81 | |
| Harvest - Roadsiding - 7X | 0.00 | 0 | 0 | 0 | 35 | 35 | |
| TOTAL HARVEST COSTS | 0.00 | 0 | 0 | 0 | 213 | 213 | |
| Postharvest: | | | | | | | |
| Fertilize - Potassium 50% Of Acreage | 0.00 | 0 | 0 | 8 | 2 | 10 | |
| Weed Control - Winter | 0.00 | 0 | 0 | 52 | 6 | 58 | |
| Weed Control - Late Winter | 0.00 | 0 | 0 | 23 | 8 | 31 | |
| TOTAL POSTHARVEST COSTS | 0.00 | 0 | 0 | 83 | 16 | 99 | |
| Interest on operating capital @ 10.46% | | | | | | | -18 |
| TOTAL OPERATING COSTS/ACRE | | 51 | 16 | 239 | 246 | 532 | |
| CASH OVERHEAD: | | | | | | | |
| Liability Insurance | | | | | | | 9 |
| Office Expense | | | | | | | 20 |
| Property Taxes | | | | | | | 53 |
| Property Insurance | | | | | | | 38 |
| TOTAL CASH OVERHEAD COSTS | | | | | | | 120 |
| TOTAL CASH COSTS/ACRE | | | | | | | 652 |

U.C. COOPERATIVE EXTENSION

Table 4. Continued

| ----- | | | |
|-------------------------------|-----------------------|-------------------------------------------------------------|-------|
| NON-CASH OVERHEAD: | | | |
| Investment | Per producing Acre | -- Annual Cost -- Capital Recovery - 7.81% Interest Rate | |
| ----- | ----- | ----- | |
| Land | 5000 | 390 | 390 |
| Establishment Cost | 410 | 159 | 159 |
| Equipment | 126 | 22 | 22 |
| ----- | ----- | ----- | ----- |
| TOTAL NON-CASH OVERHEAD COSTS | 5536 | 571 | 571 |
| ----- | | | |
| TOTAL COSTS/ACRE | | | 1223 |
| ===== | | | |

U.C. COOPERATIVE EXTENSION
 Table 5. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA HAY 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| | Quantity/Acre | Unit | Price or Cost/Unit | Value or Cost/Acre | Your Cost |
|--------------------------------------------------------------------------|---------------|------|-----------------------|-----------------------|--------------|
| GROSS RETURNS | | | | | |
| Alfalfa Hay | 7.00 | Ton | 140.00 | 980 | |
| OPERATING COSTS | | | | | |
| Insecticide: | | | | | |
| Furadan | 1.00 | Pint | 11.49 | 11 | |
| Lannate 90 SP | 0.50 | Lb | 24.67 | 12 | |
| Custom: | | | | | |
| Air Application | 3.00 | Acre | 8.00 | 24 | |
| Swath Hay | 7.00 | Acre | 10.00 | 70 | |
| Rake Hay | 7.00 | Acre | 4.00 | 28 | |
| Bale Hay | 7.00 | Ton | 11.50 | 81 | |
| Roadside Hay | 7.00 | Ton | 5.00 | 35 | |
| Spread Fertilizer | 0.50 | Acre | 4.00 | 2 | |
| Ground Application | 1.00 | Acre | 6.00 | 6 | |
| Irrigation: Water | 5.00 | AcFt | 26.40 | 132 | |
| Fertilizer:Muriate of Potash | 100.00 | Lb | 0.08 | 8 | |
| Herbicide: | | | | | |
| Velpar | 4.00 | Pint | 9.55 | 38 | |
| Karmex | 1.50 | Lb | 5.58 | 8 | |
| Treflan TR-10 | 20.00 | Lb | 1.13 | 23 | |
| Adjuvant:t | 1.00 | Pint | 5.60 | 6 | |
| Labor (machine) | 3.42 | hrs | 10.72 | 37 | |
| Labor (non-machine) | 1.80 | hrs | 7.71 | 14 | |
| Fuel - Gas | 8.55 | gal | 1.22 | 10 | |
| Lube | | | | 2 | |
| Machinery repair | | | | 4 | |
| Interest on operating capital @ 10.46% | | | | -18 | |
| TOTAL OPERATING COSTS/ACRE | | | | 532 | |
| NET RETURNS ABOVE OPERATING COSTS | | | | 448 | |
| CASH OVERHEAD COSTS: | | | | | |
| Liability Insurance | | | | 9 | |
| Office Expense | | | | 20 | |
| Property Taxes | | | | 53 | |
| Property Insurance | | | | 38 | |
| TOTAL CASH OVERHEAD COSTS/ACRE | | | | 120 | |
| TOTAL CASH COSTS/ACRE | | | | 652 | |
| NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate): | | | | | |
| Land | | | | 390 | |
| Establishment Cost | | | | 159 | |
| Equipment | | | | 22 | |
| TOTAL NON-CASH OVERHEAD COSTS/ACRE | | | | 571 | |
| TOTAL COSTS/ACRE | | | | 1223 | |
| NET RETURNS ABOVE TOTAL COSTS | | | | -243 | |

Table 6.

U.C. COOPERATIVE EXTENSION
 MONTHLY CASH COSTS PER ACRE TO PRODUCE ALFALFA HAY
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

| Beginning FEB 98 | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | TOTAL |
|----------------------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ending JAN 99 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 99 | |
| ----- | | | | | | | | | | | | | |
| Cultural: | | | | | | | | | | | | | |
| Insect Control | | | | | | | | | | | | | |
| - Aphids & Weevils | | 19 | | | | | | | | | | | 19 |
| Irrigate - 10X | | | 15 | 15 | 29 | 29 | 29 | 15 | 15 | | | | 146 |
| Insect Control - Worms | | | | | | 20 | | | | | | | 20 |
| Pickup Truck Use | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 53 |
| | | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| TOTAL CULTURAL COSTS | | 24 | 19 | 19 | 34 | 54 | 34 | 19 | 19 | 5 | 5 | 5 | 238 |
| ----- | | | | | | | | | | | | | |
| Harvest: | | | | | | | | | | | | | |
| Harvest - Swathing - 7X | | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | | | | 70 |
| Harvest - Raking - 7X | | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | | | 28 |
| Harvest - Baling - 7X | | | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | | | 81 |
| Harvest - Roadsiding - 7X | | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | | | 35 |
| | | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| TOTAL HARVEST COSTS | | | 30 | 30 | 30 | 30 | 30 | 30 | 30 | | | | 213 |
| ----- | | | | | | | | | | | | | |
| Postharvest: | | | | | | | | | | | | | |
| Fertilize | | | | | | | | | | | | | |
| - Potassium 50% Of Acreage | | | | | | | | | | 10 | | | 10 |
| Weed Control - Winter | | | | | | | | | | | 58 | | 58 |
| Weed Control - Late Winter | | | | | | | | | | | | 31 | 31 |
| | | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| TOTAL POSTHARVEST COSTS | | | | | | | | | | 10 | 58 | 31 | 99 |
| ----- | | | | | | | | | | | | | |
| Interest on oper. capital | | 0 | 1 | -4 | -3 | -3 | -2 | -2 | -2 | -1 | -1 | -1 | -18 |
| | | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| TOTAL OPERATING COSTS/ACRE | | 24 | 51 | 46 | 61 | 82 | 62 | 48 | 48 | 14 | 62 | 35 | 532 |
| ----- | | | | | | | | | | | | | |
| OVERHEAD: | | | | | | | | | | | | | |
| Liability Insurance | 9 | | | | | | | | | | | | 9 |
| Office Expense | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 20 |
| Property Taxes | | | | | | 26 | | | | | | 26 | 53 |
| Property Insurance | | | | | | 19 | | | | | | 19 | 38 |
| | | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| TOTAL CASH OVERHEAD COSTS | 9 | 2 | 2 | 2 | 2 | 47 | 2 | 2 | 2 | 2 | 2 | 47 | 120 |
| ----- | | | | | | | | | | | | | |
| TOTAL CASH COSTS/ACRE | 9 | 26 | 52 | 48 | 63 | 129 | 64 | 50 | 50 | 15 | 64 | 82 | 652 |
| ===== | | | | | | | | | | | | | |

* 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
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

ANNUAL EQUIPMENT COSTS

| ===== | | | | | | | | |
|-------|-------------------|-------|-------------|------------------|---------------------|-------------------|-------|-------|
| Yr | Description | Price | Yrs Life | Salvage Value | Capital Recovery | - Cash Overhead - | | Total |
| | | | | | | Insur- ance | Taxes | |
| 98 | Pickup 3/4 Ton | 21000 | 5 | 9412 | 3623 | 108 | 152 | 3883 |
| TOTAL | | 21000 | | 9412 | 3623 | 108 | 152 | 3883 |
| ===== | | | | | | | | |
| | 60% of New Cost * | 12600 | | 5647 | 2174 | 65 | 91 | 2330 |
| ----- | | | | | | | | |

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

ANNUAL INVESTMENT COSTS

| ===== | | | | | | | | | |
|------------------|--------------------|--------|-------------|------------------|---------------------|---------------------------|-------|---------|-------|
| Yr | Description | Price | Yrs Life | Salvage Value | Capital Recovery | ----- Cash Overhead ----- | | | Total |
| | | | | | | Insur- ance | Taxes | Repairs | |
| INVESTMENT | | | | | | | | | |
| | Establishment Cost | 21500 | 3 | | 7927 | 73 | 102 | 0 | 8103 |
| | Land | 250000 | 20 | 250000 | 19525 | 1782 | 2500 | 0 | 23808 |
| TOTAL INVESTMENT | | 270500 | | 250000 | 27452 | 1856 | 2603 | 0 | 31911 |
| ===== | | | | | | | | | |

ANNUAL BUSINESS OVERHEAD COSTS

| ===== | | | | |
|---------------------|----------------|------|----------------|---------------|
| Description | Units/ Farm | Unit | Price/ Unit | Total Cost |
| ----- | | | | |
| Liability Insurance | 50.00 | Acre | 9.10 | 455 |
| Office Expense | 50.00 | Acre | 20.00 | 1000 |
| ===== | | | | |

Table 8.

HOURLY EQUIPMENT ESTABLISHMENT COSTS

```

=====
----- COSTS PER HOUR -----
Actual      - Cash Overhead - ----- Operating -----
Hours      Insur-   Taxes   Repairs   Fuel &   Total   Total
Yr Description Used      Recovery  ance      Lube     Oper.   Costs/Hr.
-----
98 Pickup 3/4 Ton      284.5      7.64      0.23      0.32      1.35      4.21      5.56      13.75
=====
    
```

Table 9.

U.C. COOPERATIVE EXTENSION
 RANGING ANALYSIS
 50 ACRES
 SAN JOAQUIN VALLEY - 1998

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALFALFA HAY

```

-----
                                YIELD (TON/ACRE)
                                4      5      6      7      8      9      10
-----
OPERATING COSTS/ACRE:
Cultural Cost      238    238    238    238    238    238    238
Harvest Cost      164    181    197    213    230    247    263
Postharvest Cost   99     99     99     99     99     99     99

Interest on operating capital  -17    -17    -18    -18    -18    -19    -19

TOTAL OPERATING COSTS/ACRE      484    500    516    532    549    565    581
TOTAL OPERATING COSTS/TON      121    100     86     76     69     63     58

CASH OVERHEAD COSTS/ACRE      120    120    120    120    120    120    120

TOTAL CASH COSTS/ACRE      604    620    636    652    668    684    701
TOTAL CASH COSTS/TON      151    124    106     93     84     76     70

NON-CASH OVERHEAD COSTS/ACRE      571    571    571    571    571    571    571

TOTAL COSTS/ACRE      1175    1191    1207    1223    1239    1255    1271
TOTAL COSTS/TON      294    238    201    175    155    139    127
-----
    
```

U.C. COOPERATIVE EXTENSION

Table 9. Continued

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ALFALFA HAY

| PRICE (DOLLARS/TON) | YIELD (TON/ACRE) | | | | | | |
|------------------------|---------------------|-----|-----|-----|-----|-----|------|
| Alfalfa Hay | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 110.00 | -44 | 50 | 144 | 238 | 331 | 425 | 519 |
| 120.00 | -4 | 100 | 204 | 308 | 411 | 515 | 619 |
| 130.00 | 36 | 150 | 264 | 378 | 491 | 605 | 719 |
| 140.00 | 76 | 200 | 324 | 448 | 571 | 695 | 819 |
| 150.00 | 116 | 250 | 384 | 518 | 651 | 785 | 919 |
| 160.00 | 156 | 300 | 444 | 588 | 731 | 875 | 1019 |
| 170.00 | 196 | 350 | 504 | 658 | 811 | 965 | 1119 |

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ALFALFA HAY

| PRICE (DOLLARS/TON) | YIELD (TON/ACRE) | | | | | | |
|------------------------|---------------------|-----|-----|-----|-----|-----|-----|
| Alfalfa Hay | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 110.00 | -164 | -70 | 24 | 118 | 212 | 306 | 399 |
| 120.00 | -124 | -20 | 84 | 188 | 292 | 396 | 499 |
| 130.00 | -84 | 30 | 144 | 258 | 372 | 486 | 599 |
| 140.00 | -44 | 80 | 204 | 328 | 452 | 576 | 699 |
| 150.00 | -4 | 130 | 264 | 398 | 532 | 666 | 799 |
| 160.00 | 36 | 180 | 324 | 468 | 612 | 756 | 899 |
| 170.00 | 76 | 230 | 384 | 538 | 692 | 846 | 999 |

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ALFALFA HAY

| PRICE (DOLLARS/TON) | YIELD (TON/ACRE) | | | | | | |
|------------------------|---------------------|------|------|------|------|------|------|
| Alfalfa Hay | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 110.00 | -735 | -641 | -547 | -453 | -359 | -265 | -171 |
| 120.00 | -695 | -591 | -487 | -383 | -279 | -175 | -71 |
| 130.00 | -655 | -541 | -427 | -313 | -199 | -85 | 29 |
| 140.00 | -615 | -491 | -367 | -243 | -119 | 5 | 129 |
| 150.00 | -575 | -441 | -307 | -173 | -39 | 95 | 229 |
| 160.00 | -535 | -391 | -247 | -103 | 41 | 185 | 329 |
| 170.00 | -495 | -341 | -187 | -33 | 121 | 275 | 429 |

