UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES
COOPERATIVE EXTENSION
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UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

2020
SAMPLE COSTS TO ESTABLISH AND PRODUCE
ALFALFA HAY

INTERMOUNTAIN REGION – Siskiyou County
Scott Valley – Mixed Irrigation

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Intermountain Region– Siskiyou County, Scott Valley
Mixed Irrigation - 2020

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INTRODUCTION

Sample costs to establish and produce alfalfa in the Intermountain Region, Scott Valley are presented in this study. This analysis does not represent any single farm and is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on June 2020 figures. A blank column titled Your Costs is provided in Tables 1 and 2 for your convenience.

For an explanation of calculations used in the study, refer to the section titled Assumptions. For more information contact Donald Stewart, University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or destewart@ucdavis.edu. To discuss this study with a local extension advisor, contact your county cooperative extension office. ucanr.edu/County_Offices/.

Sample Cost of Production studies for many commodities are available and can be downloaded from the Department website, coststudies.ucdavis.edu. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A "costs and returns" study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region the study is based. The authors thank the farmer cooperators, UC Cooperative Extension and other industry representatives who provided information, assistance and expert advice. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices**. *The University is an affirmative action/equal opportunity employer.*

ASSUMPTIONS

The assumptions contain background in developing Tables 1 through 9 and pertain to sample costs to establish and produce alfalfa hay in the Intermountain Region of Scott Valley in Siskiyou County. The cultural practices shown represent operations and materials considered typical of alfalfa hay production in the region.

This study explains the annual costs associated with an ongoing operation, under the assumptions that the farm was operated this way in prior years and will continue in subsequent years. The costs, materials, and practices will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, insect and disease pressure.

Farm. The hypothetical farm consists of 560 contiguous acres. Establishment and production costs are based on 440 total acres of alfalfa in which, 80 acres are being established. Typically, a grower with this amount of alfalfa acreage will have several non-adjacent fields and the cultural practices may vary among fields. Additionally, extra costs may be incurred moving equipment between fields. Other crops are grown on 80 acres and the remaining 40 acres are lost in the corners of the center pivot irrigated field, or used as roads and farmstead. The grower will typically rotate out a portion (40 to 100 acres) of the alfalfa crop each year, produce a grain crop for 1 to 2 years, and then rotate back to alfalfa.

Establishment Operations

Land Preparation. The ground is chiseled or ripped to a depth of approximately 16 to 30 inches to fracture the soil, which improves water infiltration and root penetration. The field is disced twice to break up large clods, creating better seed-to-soil contact for seed germination. The land is then leveled with a landplane three times to remove high and low spots and firm the seedbed.

Fertilization. Prior to planting, fertilizers are spread and incorporated by discing. Sulfur is applied at a rate of 50 pounds per acre, phosphorus as 11-52-0 at 200 pounds per acre, or 104 pounds of P_20_5, and potassium as 0- 0-60 is applied at 250 pounds per acre. Many growers in Scott valley are applying less sulfur during establishment and are applying 50 lbs./Acre per year. The fertilizers are custom spread by a fertilizer company at a cost of $8.50 per acre. Growers should apply fertilizer or soil amendments after soil tests determine pH and nutrient levels. Plant tissue tests are recommended in subsequent years after planting.

Planting. Alfalfa in the intermountain region can be seeded in the fall or spring, but this study assumes a fall planting. In late August, alfalfa seed is planted at 20 pounds per acre at a depth of 1/4 to 1/2 inch. The grower plants with a grain drill and pulls a culti-packer for better seed-to-soil contact. Stand life in the region is six to eight years. This study assumes stand life of six years.

Irrigation. Irrigation of seedling alfalfa begins immediately after planting. Water is applied to the alfalfa by 12 wheel-line sprinklers and one center pivot irrigation system. Fields are irrigated four times between late August to mid-October, or until fall rain. A total of 4.5 acre-inches are applied after planting.

Pest Management. In the establishment years, pest management consists of herbicide treatment only. For information and specific pesticide use, contact your pest control advisor. Written recommendations are required for many pesticides and are written by licensed pest control advisors. Pesticide-use permits are available at the county Agricultural Commissioner's Office. The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC Integrated Pest Management Guidelines, Alfalfa,* found on the UC IPM website ipm.ucdavis.edu/PMG/selectnewpest.alfalfa-hay.html. Pesticides mentioned in the study are commonly used, but are not presented as a recommendation.

Weed Control. Grass and broadleaf weeds compete with the alfalfa seedlings during stand establishment. In early October a post emergence application of Raptor, at five ounces per acre, and Herbimax (a crop oil adjuvant), at one pint per acre, are applied by a custom applicator to control broadleaf weeds and grasses.

Harvest. August plantings will not produce a crop in the establishment year. The first harvest occurs in June of the following year.

Production Operations

Irrigation. Irrigation begins in April and continues into September. Twenty-four acre-inches of water at $57 per acre-foot, or $4.75 per acre-inch, are applied through wheel-line and center pivot sprinklers. Irrigation costs shown in the tables include the cost of the water and labor to move the wheel lines. No assumption is made about effective rainfall, runoff, and evaporation. Cost of water is about $114/Acre/year and the average applied water is about 24 inches (varies depending on the soil texture).

Fertilization. Phosphorus and sulfur are essential for alfalfa production in this region and are first applied in the establishment year. After the establishment year, phosphorus is applied annually in March at 104 pounds of P_2O_5 (75 pounds of 11-52-0) per acre. Most growers are now applying 25 lbs./Acre of sulfur per year. Two-hundred and fifty pounds of muriate of potash (0-0-60) per acre is custom applied annually. Additionally, one pound of sodium molybdate per acre is custom applied over the course of the stand, and one-fifth of this cost is allocated to each production year. The fertilizers are custom spread by a fertilizer company at a cost of $8.50 per acre. The nutritional program should be based on soil or plant tissue tests.

Pest Management. The pesticides and rates mentioned in this cost study are listed in UC *Integrated Pest Management Guidelines: Alfalfa*. See the above section on "Pest Management" for more information.

Weeds. Winter annual weeds first emerge in alfalfa fields in the fall as alfalfa becomes dormant. In February, TriCor 75DF (a residual herbicide) is custom applied at 0.67 pounds per acre (0.50 pounds active ingredient per acre), with Gramoxone (a contact herbicide) at 2 pints per acre, and Activator 90 (non-ionic adjuvant) at 16.0 fluid ounces per acre to control winter weeds. Summer grass control may be needed in some areas, but is less common and is not included.

Insects. Several insect species attack alfalfa hay, but alfalfa weevil (*Hypera postica*) is the only pest assumed to cause economic damage. Weevils are treated annually each year after the establishment year by a certified applicator with the insecticide Steward at 9.0 fluid ounces per acre.

Vertebrates. Pocket gophers (*Thomomys spp.*), ground squirrels (*Spermophilus spp.*), and meadow voles (*Microtus spp.*) cause problems in alfalfa. Meadow voles are controlled, using zinc phosphide rodent bait purchased from local commercial suppliers. Treatment is in March; 10 pounds of bait is applied to 25 percent of acres.

Harvest, Yields and Revenue

Harvest. Harvest equipment owned by the farm consists of a self-propelled swather, center-delivery rake, a self-propelled balewagon (harrowbed), two engine-driven pull-type balers, and a hay squeeze. Alfalfa is cut with the self-propelled swather, cured or dried in windrows for several days and then turned and two windrows are combined into one using a center-delivery rake. When dried to the correct moisture, the hay is baled with two small, pull-type balers. The balewagon collects the bales and moves them from the field to stacks. A hay squeeze is used to load stacked bales onto semi-trailers or store them in barns. If a grower has their hay custom harvested, replace the harvest costs used with the custom harvest charges.

Many factors are important in deciding which harvesting option a grower uses. The options are discussed in *"Acquiring Alfalfa Hay Harvest Equipment: A Financial Analysis of Alternatives"*. The publication can be found at http://giannini.ucop.edu/InfoSeries/921-HayEquip.pdf.

Yields. The alfalfa crop is assumed to yield 6.0 tons of hay per acre over three cuttings per year. Three cuttings are normally made in the Scott Valley, but occasionally four cuttings are made. Annual yields in the region typically range from 4 to 8 tons per acre.

Revenue. Based on the current market, an estimated price of $215 per ton of hay is used to calculate returns. Returns will vary during the season, depending upon market conditions. In some areas in the region, additional revenue is generated by charging a per head fee for grazing livestock on crop aftermath after the end of the production season. This study assumes that no additional revenue from grazing is received.

Ranging Analysis. Table 6 reflects a ranging analysis of returns based on various assumptions which is therefore, hypothetical in nature. The table shows a range of yields, 4.5 – 7.5 tons per acre over a range of prices, $155 - $275 per ton. Alfalfa producers target yields and prices such that in general, lower yields tend to be associated with higher prices. Therefore, the ranging analysis does not show the cases of very high yields with very high return prices or very low yields with very low return prices.

Equipment, Labor and Operating Interest

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by ASABE. Fuel and lubrication costs are also determined by ASABE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $2.90 and $3.20 per gallon, respectively. The cost includes a 13.0 percent sales tax on diesel and 2.25 percent sales tax on gasoline. Federal and state excise taxes on diesel ($0.36/gal) and gasoline ($0.47/gal) are refunded for on-farm use when filing the farm income tax return.

Lube and Repairs. The fuel, lube, and repair cost per acre for each operation in Table 1 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel and down time.

Pickups/UTV4WD. Costs for a ¾-ton pickup and a 1/2-ton pickup are included. The miles driven is assumed and not taken from any specific data. The UTV4WD is used for checking crops and irrigation.

Labor. Labor rates of $26.46 per hour for machine operators and $20.58 for irrigation and general labor includes payroll overhead of 46.98 percent. The basic hourly wages are $18 for machine operators and $14 for irrigation and general labor. The overhead includes the employer's share of federal and California state payroll taxes

(14.85%), workers' compensation insurance (15.71%) for field crops, and a percentage for other possible benefits (16.42%).

Workers' compensation costs will vary among growers, but the cost is based upon the average industry final rate as of January 2020. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

California Minimum Wage and Overtime Rules. In 2016, The California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for companies with more than 25 employees and will rise each year by $1.00 per hour until it reaches $15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes. The minimum wage rate increases $1.00 per hour each year to $15.00 per hour in 2023.

Recent California regulations also decrease the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. The regulations decrease the overtime threshold for agricultural workers from 60 hours per week and 10 hours per day by 5.0 hours per week and 0.5 hours per day each year until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. January 1st, 2019 (2022 for employers with 25 or fewer employees) employees will also be entitled to overtime for 8 hours on the seventh consecutive day of work. These regulations may cause increased cost of labor used on farms, whether as direct hires, as farm labor contractor employees or as a component of custom services.

Management/Supervisor Salaries. The grower manages the farming operation, so no cash cost is allocated to management. Returns above costs are considered a return to management.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly at a nominal rate of 5.25 percent per year until harvest, or until the hay is sold. A nominal interest rate is the typical market cost of borrowed funds. The interest rate will vary depending upon various factors. The rate is this study is considered a typical lending rate by a farm lending agency as of June 2020.

Risk. The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical, real-world practices, it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability. **It is important to realize that actual results may differ from the returns contained in this study**. Any returns above total costs are considered returns on risk and investment to management (or owners).

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 can include property taxes, interest on operating capital, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. Property taxes are calculated as 1 percent of the average value of the property and not influenced by the Williamson Act or additional county taxes. Average value equals new cost, plus salvage value divided by 2 on a per acre basis.

The Williamson Act. California Land Conservation Act has helped preserve agricultural and open space lands since 1965. Local governments and landowners enter into voluntary contracts to restrict enrolled lands to agricultural and open space uses in exchange for property tax reductions. The impact of the Williamson Act on property taxes will vary from year to year and property to property. This is due to how it is annually calculated and then compared to its Proposition 13 factored base year value. The lower of the two is used for the annual assessment. boe.ca.gov/proptaxes/pdf/lta19029.pdf
boe.ca.gov/proptaxes/faqs/changeinownership.htm

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. This provides coverage for property loss and is charged at 0.866 percent of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy fee of $1,291 is included as a cost for the entire farm. This is the cost of the basic policy and paperwork. Addition coverage will incur addition costs. A standard farm liability insurance policy will help cover the expenses for which the owner becomes legally obligated to pay for bodily injury claims on owned property and damages to another person's property as a result of a covered accident.

Crop Insurance. A significant number of growers purchase crop Insurance in this region. Due to variability in coverages, none is purchased. This is available to growers for unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, excessive heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50-85 percent of the approved average yield as established by verifiable production records from the farm. Actual insurance coverage is by unit, not by acre. rma.usda.gov/.

Office Expense. Various farm and office expenses are estimated at $30 per acre. This expense includes office supplies, internet, cell phones, computers and accounting.

Investment Repairs. Annual maintenance is calculated as 2 percent of the purchase price.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

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). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((Purchase Price – Salvage Value) x Capital Recovery Factor) + (Salvage Value x Interest Rate).

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASABE) based on equipment type and years of life. The life in years

is estimated by dividing the wear out life, as given by ASABE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate.

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

Interest Rate. An interest rate of 5.5 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2020.

Establishment Costs. The establishment cost is the sum of cash costs for land preparation, planting, production expenses, and cash overhead for establishing an alfalfa stand. For this study, the cost is $589 per acre, or $47,120 for the 80 acres. The establishment cost is amortized over the remaining six years of crop life.

Irrigation System: Irrigation systems are a mix of wheel line and center pivot, which is common in the area. This study assumes combinations of these systems with 395 acres sprinkler irrigated by twelve wheel-lines and the other 125 acres covered by a center pivot system. The center pivot system normally does not cover 35 acres in the corners, but in the Scott Valley fields tend to have irregular shapes and usually all 35 acres are not lost for production. In this study the 35 acres are considered non-crop acreage for simplicity sake. The life of the irrigation equipment is estimated at 30 years.

Land. Irrigated, good quality crop land in the Scott Valley typically ranges from $2,500 to $4,500 per acre. The land is valued at $3,500 per acre and $3,769 per producing acre. *Trends-2020.*

Equipment. Much of the equipment inventory on a typical alfalfa hay farm in the Intermountain Region has high hours of use which reduces its value. This study shows current purchase prices for new equipment with an adjustment of 40 percent of new value to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in the Whole Farm Annual Equipment, Investment, and Business Overhead Costs table. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

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Table 1. COSTS PER ACRE TO ESTABLISH ALFALFA

Intermountain Region Scott Valley– 2020

Operation	Equipment Time (Hrs./Ac)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Subsoil and Rip Ground	0.53	17	16	6	0	0	39	
Fertilize: Sulfur	0.00	0	0	0	4	9	12	
Fertilize: 11-52-0	0.00	0	0	0	28	9	36	
Fertilize: 0-0-60	0.00	0	0	0	105	9	114	
Disc & Roll 2x	0.30	10	9	3	0	0	22	
Triplane Field 3x	0.47	15	14	5	0	0	34	
Plant: 20 lbs./acre	0.25	8	2	2	73	0	85	
Irrigation: Water & Labor	0.00	12	0	0	21	0	34	
Weeds: Post-emergence	0.00	0	0	0	24	9	32	
Pickup 3/4-Ton	0.83	26	4	3	0	0	34	
Pickup 1/2-Ton	0..83	26	4	2	0	0	32	
UTV4WD	0.50	16	2	0	0	0	19	
TOTAL CULTURAL COSTS	3.72	130	52	22	255	34	493	
Interest on Operating Capital at 5.25%							7	
TOTAL OPERATING COSTS/ACRE	3.72	130	52	22	255	34	499	
CASH OVERHEAD:								
Liability Insurance							2	
Office Expenses							30	
Property Taxes							41	
Property Insurance							5	
Investment Repairs							11	
TOTAL CASH OVERHEAD COSTS/ACRE							90	
TOTAL CASH COSTS/ACRE							589	

NON-CASH OVERHEAD:	Per Producing Acre	Annual Cost Capital Recovery	
Fuel Tanks & Pumps	21	1	1
Hay Barns (2)	212	14	14
Land - Scott Valley (80 Ac)	3,769	207	207
Shop Building	115	8	8
Shop Tools	23	2	2
Wheel Line Sprinkler (2)	55	4	4
Center Pivot (1)	144	10	10
Equipment	249	30	30
TOTAL NON-CASH OVERHEAD COSTS	4,587	276	276
TOTAL COSTS/ACRE			865

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Table 2. MATERIAL AND CUSTOM COSTS PER ACRE – ESTABLISHMENT YEAR

Intermountain Region Scott Valley– 2020

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Fertilizer:				**136**	
Elemental Sulfur	25.00	Lb.	0.14	4	
Phosphorus 11-52-0	75.00	Lb.	0.37	28	
Potassium 0-0-60	250.00	Lb.	0.42	105	
Water:				**21**	
Water	4.50	AcIn	4.75	21	
Custom:				**34**	
Custom Material Application	4.00	Acre	8.50	34	
Herbicide:				**20**	
Raptor	5.00	FlOz	4.06	20	
Adjuvant:				**1**	
Herbimax	6.40	FlOz	0.23	1	
Seed:				**73**	
Seed - Alfalfa (Siskiyou)	20.00	Lb.	3.65	73	
Labor:				**130**	
Equipment Operator Labor	4.46	Hrs.	26.46	118	
Irrigation Labor	0.60	Hrs.	20.58	12	
Machinery:				**74**	
Fuel-Gas	0.75	Gal	3.20	11	
Fuel-Diesel	14.12	Gal	2.92	41	
Lube				8	
Machinery Repair				14	
Interest on Operating Capital @ 5.25%				7	
TOTAL OPERATING COSTS/ACRE				499	

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Table 3. MONTHLY CASH COSTS PER ACRE TO ESTABLISH ALFALFA

Intermountain Region Scott Valley– 2020

	JUL	AUG	SEP	OCT	Total
Cultural:					
Subsoil and Rip Ground	39				39
Fertilize: Sulfur	12				12
Fertilize: 11-52-0	36				36
Fertilize: 0-0-60	114				114
Disc & Roll 2x	22				22
Triplane Field 3x		34			34
Plant: 20 lbs./acre		85			85
Irrigation: Water & Labor			19	15	34
Weeds: Post-emergence				32	32
Pickup 3/4-Ton	8	8	8	8	34
Pickup 1/2-Ton	8	8	8	8	32
UTV4WD				19	19
TOTAL CULTURAL COSTS	239	136	35	82	493
Interest on Operating Capital @5.25%	1	2	2	2	7
TOTAL OPERATING COSTS/ACRE	240	138	37	85	499
CASH OVERHEAD					
Liability Insurance					2
Office Expense					30
Property Taxes			41		41
Property Insurance	5				5
Investment Repairs	3	3	3	3	11
TOTAL CASH OVERHEAD COSTS	8	3	44	3	90
TOTAL CASH COSTS/ACRE	248	140	81	87	589

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Table 4. COSTS PER ACRE TO PRODUCE ALFALFA

Intermountain Region Scott Valley– 2020

Operation	Equipment Time (Hrs./Ac)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Weeds: (TriCor 75DF/Gramoxone)	0.00	0	0	0	39	9	48	
Vertebrate: Rodent Bait - 25% of Acres	0.00	0	0	0	6	2	8	
Fertilize: Sulfur	0.00	0	0	0	4	9	12	
Fertilize: Potassium	0.00	0	0	0	105	9	114	
Fertilize: Sodium Molybdate	0.00	0	0	0	3	2	5	
Fertilize: 11-52-0	0.00	0	0	0	28	9	36	
Irrigation: Water & Labor	0.00	72	0	0	114	0	186	
Insects: Weevils (Steward EC)	0.00	0	0	0	25	9	34	
Pickup 3/4-Ton	0.83	26	4	3	0	0	34	
Pickup 1/2-Ton	0.83	26	4	2	0	0	32	
UTV4WD	0.50	16	2	0	0	0	19	
TOTAL CULTURAL COSTS	2.17	141	11	5	323	46	526	
Harvest:								
Swath Hay 3x	0.38	12	9	5	0	0	26	
Rake Hay 3x	0.25	8	2	2	0	0	12	
Bale Hay 3x (Small Baler #1)	0.28	9	3	3	0	0	14	
Bale Hay 3x (Small Baler #2)	0.28	9	3	3	0	0	14	
Roadside Hay 3x	0.45	14	10	13	0	0	37	
Load Hay 3x	0.15	5	3	2	0	0	9	
TOTAL HARVEST COSTS	1.78	57	30	26	0	0	112	
Interest on Operating Capital at 5.25%							14	
TOTAL OPERATING COSTS/ACRE	3.95	197	41	31	323	46	652	
CASH OVERHEAD:								
Liability Insurance							2	
Office Expenses							30	
Property Taxes							44	
Property Insurance							6	
Investment Repairs							11	
TOTAL CASH OVERHEAD COSTS/ACRE							93	
TOTAL CASH COSTS/ACRE							746	

NON-CASH OVERHEAD:	Per Producing Acre	Annual Cost Capital Recovery	
Fuel Tanks & Pumps	21	1	1
Hay Barns (2)	212	14	14
Land - Scott Valley (80 Ac)	3,769	207	207
Shop Building	115	8	8
Shop Tools	23	2	2
Wheel Line Sprinkler (2)	55	4	4
Center Pivot (1)	144	10	10
Establishment Cost	589	118	118
Equipment	409	50	50
TOTAL NON-CASH OVERHEAD COSTS	5,337	414	414
TOTAL COSTS/ACRE			1,160

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

Table 5. COSTS AND RETURNS PER ACRE TO PRODUCE ALFALFA

Intermountain Region Scott Valley– 2020

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Alfalfa Hay	6.00	Ton	215.00	1,290	
TOTAL GROSS RETURNS				1,290	
OPERATING COSTS					
Fertilizer:				**139**	
Elemental Sulfur	25.00	Lb.	0.14	4	
Potassium 0-0-60	250.00	Lb.	0.42	105	
Molybdenum	0.20	Lb.	15.00	3	
Phosphorus 11-52-0	75.00	Lb.	0.37	28	
Water:				**114**	
Water	24.00	AcIn	4.75	114	
Custom:				**46**	
Custom Material Application	5.45	Acre	8.50	46	
Rodenticide:				**6**	
ZP Rodent Bait AG (Aluminum Phosphide)	2.50	Lb.	2.26	6	
Insecticide:				**25**	
Steward EC	9.00	FlOz	2.79	25	
Herbicide:				**24**	
Gramoxone	2.00	Pint	4.77	10	
TriCor 75DF	0.67	Lb.	20.95	14	
Adjuvant:				**16**	
Activator 90 (Surfactant)	16.00	FlOz	0.97	16	
Labor:				**197**	
Equipment Operator Labor	4.74	Hrs.	26.46	125	
Irrigation Labor	3.50	Hrs.	20.58	72	
Machinery:				**72**	
Fuel-Gas	3.39	Gal	3.20	11	
Fuel-Diesel	10.23	Gal	2.92	30	
Lube				6	
Machinery Repair				25	
Interest on Operating Capital @ 5.25%				14	
TOTAL OPERATING COSTS/ACRE				652	
TOTAL OPERATING COSTS/TON				109	
NET RETURNS ABOVE OPERATING COSTS				638	
CASH OVERHEAD COSTS					
Liability Insurance				2	
Office Expenses				30	
Property Taxes				44	
Property Insurance				6	
Investment Repairs				11	
TOTAL CASH OVERHEAD COSTS/ACRE				93	
TOTAL CASH OVERHEAD COSTS/TON				16	
TOTAL CASH COSTS/ACRE				746	
TOTAL CASH COSTS/TON				124	
NET RETURNS ABOVE CASH COSTS				544	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Fuel Tanks & Pumps				1	
Hay Barns (2)				14	
Land - Scott Valley (80 Ac)				207	
Shop Building				8	
Shop Tools				2	
Wheel Line Sprinkler (2)				4	
Center Pivot (1)				10	
Establishment Costs				118	
Equipment				50	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				414	
TOTAL NON-CASH OVERHEAD COSTS/TON				69	
TOTAL COST/ACRE				1,160	
TOTAL COST/TON				193	
NET RETURNS ABOVE TOTAL COST				130	

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Table 6. MONTHLY CASH COSTS PER ACRE TO PRODUCE ALFALFA

Intermountain Region Scott Valley– 2020

	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
Cultural:									
Weed: (TriCor 75DF/Gramoxone)	48								48
Vertebrate: Rodent Bait - 25% of Acres		8							8
Fertilize: Sulfur		12							12
Fertilize: Potassium		114							114
Fertilize: Sodium Molybdate		5							5
Fertilize: 11-52-0		36							36
Irrigation: Water & Labor			25	25	25	59	29	25	186
Insects: Weevil (Steward EC)			34						34
Pickup 3/4-Ton	4	4	4	4	4	4	4	4	34
Pickup 1/2-Ton	4	4	4	4	4	4	4	4	32
UTV4WD	2	2	2	2	2	2	2	2	19
TOTAL CULTURAL COSTS	58	185	69	35	35	69	40	35	526
Harvest:									
Swath Hay 3x					9	9		9	26
Rake Hay 3x					4	4		4	12
Bale Hay 3X (Small Baler #1)					5	5		5	14
Bale Hay 3X (Small Baler #2)					5	5		5	14
Roadside Hay 3x					12	12		12	37
Load Hay 3x					3	3		3	9
TOTAL HARVEST COSTS	0	0	0	0	37	37	0	37	112
Interest on Operating Capital @5.25%	0	1	1	2	2	2	2	3	14
TOTAL OPERATING COSTS/ACRE	58	186	70	37	74	109	42	75	652
CASH OVERHEAD									
Liability Insurance								2	2
Office Expenses								30	30
Property Taxes								44	44
Property Insurance						6			6
Investment Repairs	1	1	1	1	1	1	1	1	11
TOTAL CASH OVERHEAD COSTS	1	1	1	1	1	4	1	78	93
TOTAL CASH COSTS/ACRE	60	187	72	38	76	116	44	153	746

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

Table 7. RANGING ANALYSIS

Intermountain Region Scott Valley– 2020

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALFALFA

	YIELD (TONS/ACRE)						
	4.50	5.00	5.50	6.00	6.50	7.00	7.50
OPERATING COSTS/ACRE:							
Cultural	526	526	526	526	526	526	526
Harvest	79	88	97	112	114	123	132
Interest on Operating Capital @ 5.25%	13	13	13	14	14	14	14
TOTAL OPERATING COSTS/ACRE	618	627	636	652	654	663	672
TOTAL OPERATING COSTS/TON	137.43	125.47	115.68	108.68	100.62	94.71	89.58
CASH OVERHEAD COSTS/ACRE	93	93	93	93	93	93	93
TOTAL CASH COSTS/ACRE	712	721	730	746	748	756	765
TOTAL CASH COSTS/TON	158.21	144.17	132.68	124.26	115.01	108.06	102.05
NON-CASH OVERHEAD COSTS/ACRE	414	414	414	414	414	414	414
TOTAL COSTS/ACRE	1,126	1,135	1,144	1,160	1,162	1,171	1,179
TOTAL COSTS/TON	250.00	227.00	208.00	193.00	179.00	167.00	157.00

Net Return per Acre Above Operating Costs for Alfalfa

PRICE ($/ton)	YIELD (tons/acre)						
Alfalfa	4.50	5.00	5.50	6.00	6.50	7.00	7.50
155.00	79	148	216	278	353	422	491
175.00	169	248	326	398	483	562	641
195.00	259	348	436	518	613	702	791
215.00	349	448	546	638	743	842	941
235.00	439	548	656	758	873	982	1,091
255.00	529	648	766	878	1,003	1,122	1,241
275.00	619	748	876	998	1,133	1,262	1,391

Net Return per Acre Above Cash Costs for Alfalfa

PRICE ($/ton)	YIELD (tons/acre)						
Alfalfa	4.50	5.00	5.50	6.00	6.50	7.00	7.50
155.00	-14	54	123	184	260	329	397
175.00	76	154	233	304	390	469	547
195.00	166	254	343	424	520	609	697
215.00	256	354	453	544	650	749	847
235.00	346	454	563	664	780	889	997
255.00	436	554	673	784	910	1,029	1,147
275.00	526	654	783	904	1,040	1,169	1,297

Net Return per Acre Above Total Costs for Alfalfa

PRICE ($/ton)	YIELD (tons/acre)						
Alfalfa	4.50	5.00	5.50	6.00	6.50	7.00	7.50
155.00	-429	-360	-291	-230	-154	-86	-17
175.00	-339	-260	-181	-110	-24	54	133
195.00	-249	-160	-71	10	106	194	283
215.00	-159	-60	39	130	236	334	433
235.00	-69	40	149	250	366	474	583
255.00	21	140	259	370	496	614	733
275.00	111	240	369	490	626	754	883

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Table 8. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND OVERHEAD COSTS

Intermountain Region Scott Valley– 2020

ANNUAL EQUIPMENT COSTS – ESTABLISHMENT YEAR

					Cash Overhead		
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
160 HP 4WD Tractor	157,000	15	30,565	14,277	83	938	15,298
62 HP 2WD Tractor	56,000	15	10,902	5,093	30	335	5,457
Grain Drill - 13'	24,000	10	4,244	2,854	13	141	3,008
Culti-packer - 13'	8,600	10	1,521	1,023	4	51	1,078
Offset Disc - 21'	32,500	10	5,747	3,865	17	191	4,073
Ring Roller - 21'	4,285	10	758	510	2	25	537
Triplane 16' X 30'	38,000	8	8,580	5,116	21	233	5,370
Subsoiler 5-Shank 10'	26,500	8	5,983	3,568	14	162	3,745
UTV4WD	8,600	8	3,001	1,049	5	58	1,112
Pickup 3/4-Ton 4WD/4Door	47,000	5	21,064	7,232	30	340	7,603
Pickup 1/2-Ton	32,000	5	14,342	4,924	21	232	5,176
TOTAL	434,485	-	106,708	49,511	240	2,706	52,457
40% of New Cost*	173,794	-	42,683	19,804	96	1,082	20,983

*Used to reflect a mix of new and used equipment

ANNUAL EQUIPMENT COSTS – PRODUCTION YEARS

					Cash Overhead		
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
62 HP 2WD Tractor	56,000	15	10,902	5,093	30	335	5,457
Swather - SP 16'	130,000	15	12,481	12,394	63	712	13,170
62 HP 2WD Tractor #2	55,000	12	13,751	5,542	30	344	5,917
Baler - Pull Type #1	66,000	10	10,893	7,910	34	384	8,329
Baler - Pull Type #2	66,000	10	10,893	7,910	34	384	8,329
Center Delivery Rake - 20'	32,500	10	5,747	3,865	17	191	4,073
Hay Squeeze (forklift w/ clamp)	47,000	10	7,757	5,633	24	274	5,931
Bale wagon	149,000	8	31,399	20,292	80	902	21,274
UTV4WD	8,600	8	3,001	1,049	5	58	1,112
Pickup 3/4-Ton 4WD/4Door	47,000	5	21,064	7,232	30	340	7,603
Pickup 1/2-Ton	32,000	5	14,342	4,924	21	232	5,176
TOTAL	689,100	-	142,232	81,844	368	4,157	86,369
40% of New Cost*	275,640	-	56,893	32,738	147	1,663	34,548

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Repairs	Total
INVESTMENT								
Land - Scott Valley (80 Ac)	301,520	40	301,520	16,584	267	3,015	0	19,866
Hay Barns (2)	110,000	30	7,700	7,462	52	589	2,200	10,303
Center Pivot (1)	75,000	30	7,500	5,057	295	413	1,500	7,264
Shop Building	60,000	30	4,200	4,070	28	321	1,200	5,620
Wheel Line Sprinkler (2)	28,364	30	1,985	1,924	664	152	567	3,307
Fuel Tanks & Pumps	10,975	30	932	742	41	60	220	1,063
Shop Tools	12,000	20	840	980	6	64	240	1,290
Establishment Cost	47,120	6	0	9,432	21	236	0	9,689
TOTAL INVESTMENT	644,979	-	324,677	46,252	1,374	4,848	5,927	58,401

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Costs
Liability Insurance	560.00	Acre	2.31	1,294
Office Expense	560.00	Acre	30.00	16,800

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Table 9-A. HOURLY EQUIPMENT COSTS-ESTASBLISHMENT

Intermountain Region Scott Valley– 2020

Description	Alfalfa Hours Used	Capital Recovery	Cash Overhead			Operating		
			Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr.
160 HP 4WD Tractor	114	5.36	0.03	0.35	6.68	27.11	33.80	39.54
Pickup 3/4-Ton 4WD/4-Door	67	7.23	0.03	0.34	3.13	5.33	8.46	16.07
Pickup 1/2-Ton	67	4.92	0.02	0.23	2.31	4.80	7.11	12.28
Subsoiler 5-Shank 10'	43	5.71	0.02	0.26	4.05	0.00	4.05	10.04
UTV4WD	40	1.68	0.01	0.09	0.81	4.80	5.61	7.39
Triplane 16' X 30'	37	5.46	0.02	0.25	3.90	0.00	3.90	9.63
Offset Disc- 21'	24	7.73	0.03	0.38	3.54	0.00	3.54	11.69
Ring Roller - 21'	24	1.02	0.00	0.05	0.33	0.00	0.33	1.40
62 HP 2WD Tractor	22	2.55	0.01	0.17	2.97	8.89	11.86	14.59
Grain Drill - 13'	20	7.61	0.03	0.38	4.35	0.00	4.35	12.37
Culti-packer - 13'	20	2.05	0.01	0.10	0.65	0.00	0.65	2.81

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Table 9-B. HOURLY EQUIPMENT COSTS-PRODUCTION

Intermountain Region Scott Valley– 2020

Description	Alfalfa Hours Used	Capital Recovery	Cash Overhead			Operating		
			Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr.
Pickup 3/4-Ton 4WD/4Door	67	7.23	0.03	0.34	3.13	5.33	8.46	16.07
Pickup 1/2-Ton	67	4.92	0.02	0.23	2.31	4.80	7.11	12.28
62 HP 2WD Tractor	46	2.55	0.01	0.17	2.97	8.89	11.86	14.59
Bale wagon	40	32.47	0.13	1.44	25.48	20.34	45.82	79.85
UTV4WD	40	1.68	0.01	0.09	0.81	4.80	5.61	7.39
Swather - SP 16'	33	24.79	0.13	1.42	11.43	22.03	33.46	59.80
62 HP 2WD Tractor #2	24	2.22	0.01	0.14	2.99	8.89	11.88	14.24
Baler - Pull Type #1	22	12.66	0.05	0.62	6.44	0.00	6.44	19.77
Baler - Pull Type #2	22	12.66	0.05	0.62	6.44	0.00	6.44	19.77
Center Delivery Rake - 20'	20	6.18	0.03	0.31	3.05	0.00	3.05	9.56
Hay Squeeze (forklift w/ clamp)	13	11.27	0.05	0.55	9.50	16.95	26.45	38.31

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Table 10-A. OPERATIONS WITH EQUIPMENT & MATERIALS-ESTABLISHMENT

Intermountain Region Scott Valley– 2020

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Subsoil and Rip	July	160 HP 4WD Tractor	Subsoiler 5-Shank 10'	Equipment Operator Labor	0.64	Hour
Fertilize: Sulfur	July			Elemental Sulfur	25.00	Lb.
				Custom Material Application	1.00	Acre
Fertilize: 11-52-0	July			Phosphorus 11-52-0	75.00	Lb.
				Custom Material Application	1.00	Acre
Fertilize: 0-0-60	July			Potassium 0-0-60	250.00	Lb.
				Custom Material Application	1.00	Acre
Disc & Roll 2x	July	160 HP 4WD Tractor	Offset Disc - 21'	Equipment Operator Labor	0.36	Hour
			Ring Roller 21'			
Triplane Field 3x	Aug	160 HP 4WD Tractor	Triplane 16'X30'	Equipment Operator Labor	0.56	Hour
Plant: 20 lbs./acre	Aug	62 HP 2WD Tractor	Grain Drill - 13'	Equipment Operator Labor	0.30	Hour
			Culti-packer - 13'	Seed - Alfalfa (Siskiyou)	20.00	Lb.
Irrigate	Sept			Irrigation Labor	0.30	Hour
				Water - Scott Valley	2.70	AcIn
	Oct			Irrigation Labor	0.30	Hour
				Water - Scott Valley	1.80	AcIn
Weeds: Post-emergence	Oct			Raptor	5.00	FlOz
				Herbimax	16.00	FlOz
				Custom Material Application	1.00	Acre
Pickup 3/4-Ton	Oct		Pickup 3/4-Ton 4WD/4-Door	Equipment Operator Labor	1.00	Hour
Pickup 1/2-Ton	Oct		Pickup 1/2-Ton	Equipment Operator Labor	1.00	Hour
UTV4WD	Oct		UTV4WD	Equipment Operator Labor	0.60	Hour

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Table 10-B. OPERATIONS WITH EQUIPMENT & MATERIALS-PRODUCTION

Intermountain Region Scott Valley– 2020

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Weeds: Herbicides	Feb			Custom Material Application	1.00	Acre
				Gramoxone	2.00	Pint
				TriCor 75DF	0.67	Lb.
				Activator 90 (Surfactant)	16.00	FlOz
Vertebrate: Bait	Mar			ZP Rodent Bait AG (Alum Phos)	2.50	Lb.
				Custom Material Application	0.25	Acre
Fertilize: Sulfur	Mar			Elemental Sulfur	25.00	Lb.
				Custom Material Application	1.00	Acre
Fertilize: Potassium	Mar			Potassium 0-0-60	250.00	Lb.
				Custom Material Application	1.00	Acre
Fertilize: Sodium	Mar			Molybdenum	0.20	Lb.
				Custom Material Application	0.20	Acre
Fertilize: 11-52-0	Mar			Phosphorus 11-52-0	75.00	Lb.
				Custom Material Application	1.00	Acre
Irrigation:	Apr			Irrigation Labor	0.50	Hour
				Water – Scott Valley	3.00	AcIn
	May			Irrigation Labor	0.50	Hour
				Water - Scott Valley	3.00	AcIn
	June			Irrigation Labor	0.50	Hour
				Water - Scott Valley	3.00	AcIn
	July			Irrigation Labor	0.50	Hour
				Water - Scott Valley	4.00	AcIn
	July			Irrigation Labor	0.50	Hour
				Water - Scott Valley	4.00	AcIn
	Aug			Irrigation Labor	0.50	Hour
				Water - Scott Valley	4.00	AcIn
	Sept			Irrigation Labor	0.50	Hour
				Water - Scott Valley	3.00	AcIn
Insects: Weevils	Apr			Custom Material Application	1.00	Acre
				Steward EC	9.00	FlOz
Pickup 3/4-Ton	Apr		Pickup 3/4-Ton 4WD/4Door	Equipment Operator Labor	1.00	Hour
Pickup 1/2-Ton	Apr		Pickup 1/2-Ton	Equipment Operator Labor	1.00	Hour
UTV4WD	Apr		UTV4WD	Equipment Operator Labor	0.60	Hour
Swath Hay 3x	June		Swather - SP 16'	Equipment Operator Labor	0.15	Hour
	July		Swather - SP 16'	Equipment Operator Labor	0.15	Hour
	Sept		Swather - SP 16'	Equipment Operator Labor	0.15	Hour
Rake Hay 3x	June	62 HP 2WD Tractor	Center Delivery Rake - 20'	Equipment Operator Labor	0.10	Hour
	July	62 HP 2WD Tractor	Center Delivery Rake - 20'	Equipment Operator Labor	0.10	Hour
	Sept	62 HP 2WD Tractor	Center Delivery Rake - 20'	Equipment Operator Labor	0.10	Hour
Bale Hay 3x (Small)	June	62 HP 2WD Tractor	Baler - Pull Type #1	Equipment Operator Labor	0.11	Hour
	July	62 HP 2WD Tractor	Baler - Pull Type #1	Equipment Operator Labor	0.11	Hour
	Sept	62 HP 2WD Tractor	Baler - Pull Type #1	Equipment Operator Labor	0.11	Hour
Bale Hay 3x (Small)	June	62 HP 2WD Tractor #2	Baler - Pull Type #2	Equipment Operator Labor	0.11	Hour
	July	62 HP 2WD Tractor #2	Baler - Pull Type #2	Equipment Operator Labor	0.11	Hour
	Sept	62 HP 2WD Tractor #2	Baler - Pull Type #2	Equipment Operator Labor	0.11	Hour
Roadside Hay 3x	June		Bale wagon	Equipment Operator Labor	0.18	Hour
	July		Bale wagon	Equipment Operator Labor	0.18	Hour
	Sept		Bale wagon	Equipment Operator Labor	0.18	Hour
Load Hay 3x	June		Hay Squeeze (forklift w/ clamp)	Equipment Operator Labor	0.06	Hour
	July		Hay Squeeze (forklift w/ clamp)	Equipment Operator Labor	0.06	Hour
	Sept		Hay Squeeze (forklift w/ clamp)	Equipment Operator Labor	0.06	Hour