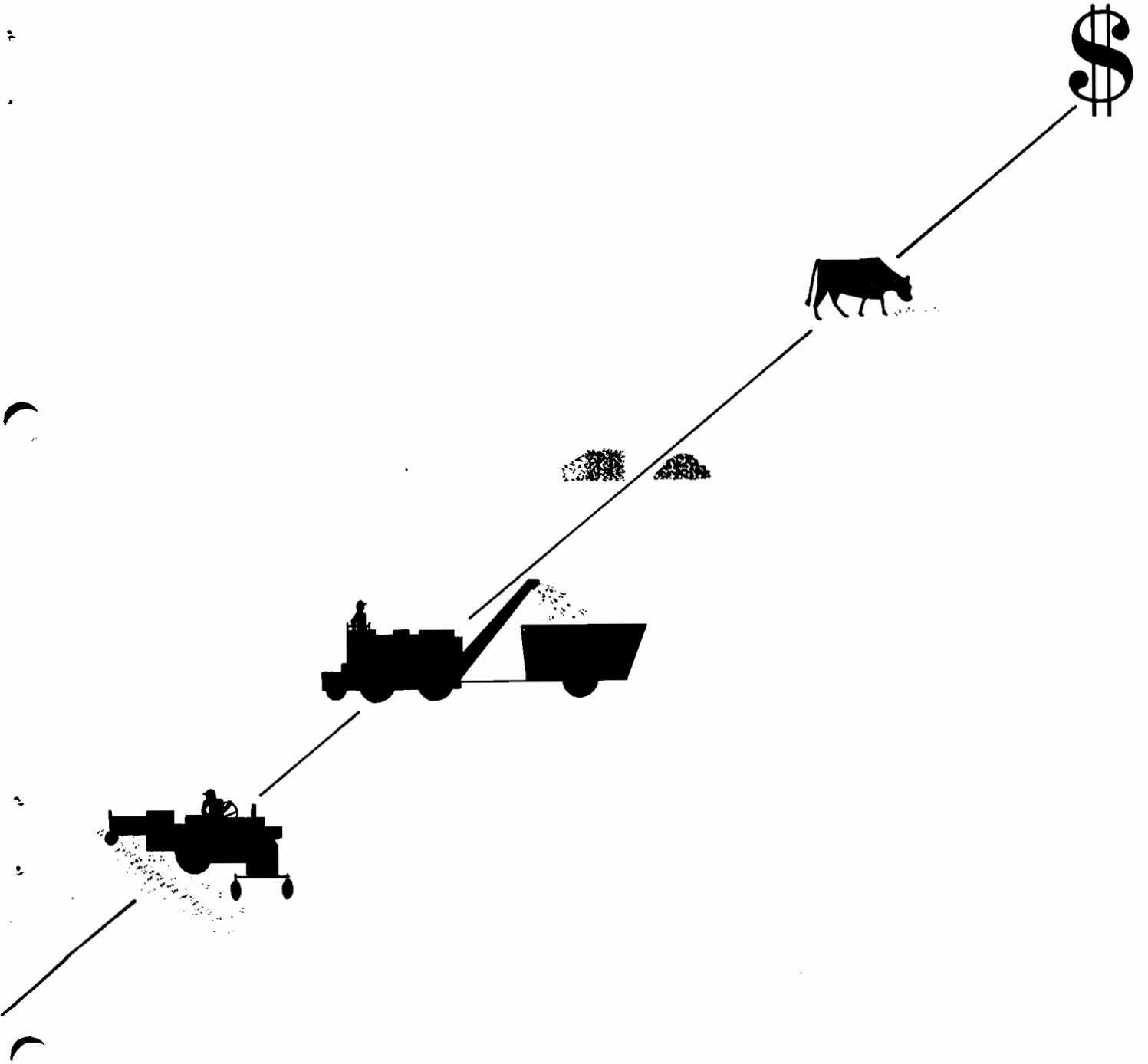
ALFALFA

Economics, Production Practices and Problems in Madera County



Agricultural Extension Service University of California Madera County

ALFALFA ECONOMICS, PRODUCTION PRACTICES AND PROBLEMS IN MADERA COUNTY

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Introduction

This publication is intended to present a review of the importance, adaptability, cultural practices, production cost analysis, marketing, and major production problems in growing alfalfa as they apply to Madera County. Although it cannot be expected to give you all of the details needed in deciding whether or not to grow the crop, or all of the variations that might occur in actual production, it will serve as a guide in making your decision and as an aid in helping you to grow a more profitable crop.

Importance of Alfalfa

Acreage. Madera County has had an average of 43,600 acres of alfalfa during the past ten years. This is equivalent to 20 to 25 per cent of open irrigated land in the county. The trend has been toward an increase with 48,000 acres in 1967. Statewide, the acreage has averaged about 1.16 million acres over the same period with an estimated decline to 1.12 million acres in 1968. (Table 1)

Table 1 - Alfalfa Hay

Recent California Acreage, Production and Farm Price

Year	Acreage Harvested	California Production in Tons	Farm Price - Dollars per Ton*	
			California	Fresno, Kerman, Madera Area
1968	1,152,000	6,451,000	$26.00	--
1967	1,164,000	6,169,000	29.40	$30.09
1966	1,141,000	6,390,000	28.20	26.66
1965	1,176,000	6,292,000	24.00	23.34
1964	1,176,000	6,527,000	24.80	25.68
1963	1,131,000	6,334,000	28.50	30.31
1962	1,120,000	5,824,000	23.40	20.37
1961	1,204,000	6,140,000	20.80	19.99
1960	1,192,000	5,960,000	24.50	26.76

* Season average price received by farmers for baled hay. Source: California Crop and Livestock Reporting Service and University of California Agricultural Extension Service.

Acreage planted to alfalfa has been influenced, not only by the relative profit of the crop itself, but by the effect of government programs on other crops, the need for a rotation crop with other field crops, and as a suitable crop for land development. There are no government programs that apply directly to growing or marketing of alfalfa except as the crop qualifies for conserving base acreage for other allotment and price support programs.

Production. Madera County has produced an average of about 275,000 tons of alfalfa annually or slightly less than five per cent of the state's total of somewhat over six million tons.

Average annual yields in Madera County have been 6 to 6.5 tons per acre and better fields have produced over 10 tons.

Use. About 70 per cent of California's alfalfa hay is sold on the open market with the remainder being fed to livestock on farms where it is grown. With the relatively large livestock and dairy enterprises in the local area, it is estimated that no more than half of the alfalfa produced here is shipped out of the county.

Most of the alfalfa is baled and fed as baled hay. Cubing has increased in recent years to the extent that about 10 per cent of the acreage is harvested by this method. A somewhat smaller acreage of alfalfa on the west side of the county is green chopped and dehydrated and a relatively small tonnage of baled hay is pelleted. Other minor uses include green chopping for direct feeding, an occasional use as silage and some pasturing.

Markets. Other than hay used locally, the major hay markets are the Los Angeles and Bay Area dairies and feed lots. Some cubed and pelleted hay is exported. The most recent market and price information can be obtained from the office of the State of California Market News Service. The nearest office is located at 2550 Mariposa Street in Fresno.

Prices. Average annual prices tend to vary quite widely as shown in Table 1. Factors influencing price include available tonnage of hay as affected by acreage and production, numbers of livestock, market location and export demand. Prices within a season often tend to vary as much as average prices over several years. During 1967, prices received by growers ranged from a low of about $24 a ton during the peak of the harvest season to a high of $36 by mid winter. The graph on page 3 shows the monthly average price variations from 1960 to 1967.

Although there is no assurance that these seasonal variations will always follow the same trend, they are an important consideration in deciding whether or not to store hay for future sale rather than sell during the harvest season. A substantial price differential would be needed to offset storage shrinkage and losses, risks and investment in storage facilities.

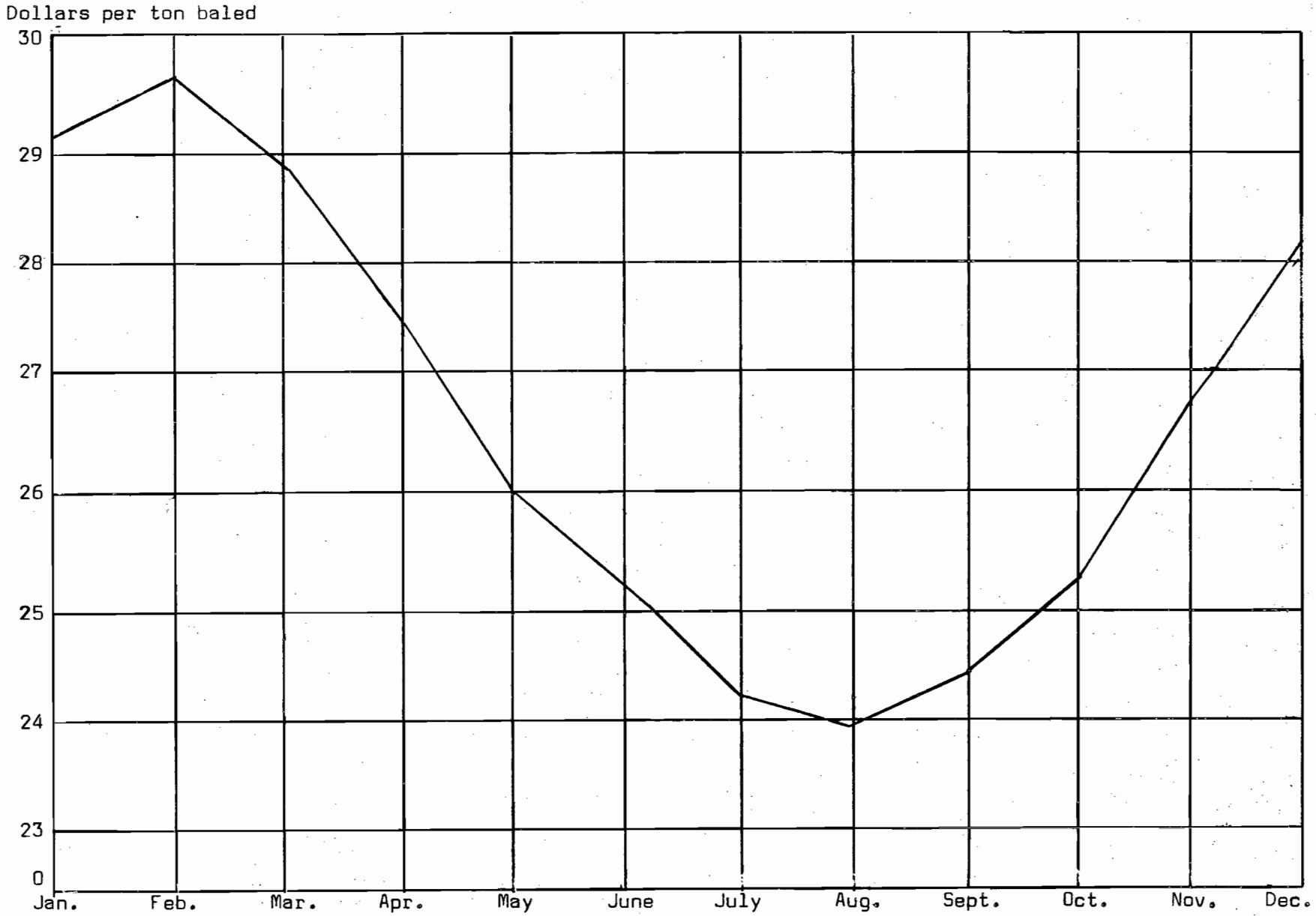
Adaptation

Alfalfa is grown in almost every county in California but the areas of most concentrated production are the southern desert valleys and the Sacramento and San Joaquin Valleys where soils, climate and water conditions are adaptable to good yields.

Soils. Although alfalfa will grow on most soils of moderate depth and medium texture, high production can be obtained only on deep, uniform, well-drained sandy loam to loam soils relatively low in salts and alkali. Soils with excessive sand, clay, shallow hardpan, compacted or stratified layers, high water table or poor internal drainage will invariably result in rapidly declining stands, low yields, weedy fields, and poor quality hay. Because alfalfa is quite alkali tolerant and usually is irrigated by flooding, it is one of the better crops to grow during the early stages of reclaiming alkali soils.

Climate. Different alfalfa varieties are adapted to a wide range of climatic conditions from areas having long periods of sub-zero winter temperatures to those where frost seldom, if ever, occurs. It also withstands severe drouth, recovering readily when moisture becomes available. Prolonged extremely high temperatures

AVERAGE MONTHLY HAY PRICES - 1960-1967



Average Price for Baled Alfalfa Hay Received by California Producers on the 15th of Each Month - 1960-1967.

Source: Calif. Crop and Livestock Reporting Service and University of Calif. Agricultural Extension Service.

are not desirable in that moisture loss increases as temperatures rise and it becomes difficult to irrigate sufficiently without inducing root rots.

The long growing season of the San Joaquin Valley is ideal for alfalfa, permitting five to seven cuttings annually.

Water. All alfalfa grown in this area is irrigated since rainfall averages only about 10 inches annually and almost all rain occurs during the late fall, winter and early spring. Irrigation water is obtained from deep wells or as supplemental water through irrigation districts. Since district water is seldom available all season, almost all growers must depend on deep wells for at least part of their water supply.

Water quality from both well and district sources is generally very good. District water from the east side of the valley is quite pure, approaching that of distilled water. Its continued use might create problems in penetration because of excessive removal of soluble salts. This condition can be corrected by adding gypsum or other neutral salts as soil or water amendments.

Rotation. Continuous production of a single crop most often results in declining yields because of soil compaction, diseases, nematodes, weeds and unbalanced nutrients. Therefore, rotation with different crops has become a standard practice. Because of diverse cropping programs, there has been no established standard sequence of rotation crops except that alfalfa is usually grown for a three-year period following several years of other field crops. These might include cotton, corn, barley, grain sorghum, beans, sugar beets or other minor crops. Three years is the normal expected life of an alfalfa stand, either because of the planned rotation or because stands tend to decline rapidly after the third year. Some stands become unprofitable sooner because of excess weeds, diseases or low production, and others have remained in good condition for six or seven years.

It has seldom, if ever, been practical to replant fields to alfalfa without rotating to another crop for one or more years. Neither has reseeding a thin stand in the second or third year been successful.

In addition to the benefits obtained in disease, nematode and weed control and in restoring soil structure, rotation also provides a better opportunity for making improvements when needed such as deep tilling and regrading.

Cultural Practices

Land grading. Since alfalfa is irrigated primarily by flooding, it is essential that land be graded to provide even water distribution and uniform penetration. For medium textured soils, grades should range between one and three-tenths of a foot fall in 100 feet depending on the soil type and field length. Irrigation runs of more than one-fourth mile are usually too long. Sandy soils should have shorter runs and more slope than fine textured soils. Where fields can be irrigated in two directions, it is sometimes desirable to level in one direction with a minimum slope for row crops and in the other direction with more slope for flood irrigated crops. Grades should continue uniformly to the ends of fields in order to permit drainage of excess water.

Drainage. Excess water is one of the main causes of stand decline in alfalfa. This might occur from holding the water on a field too long, from low areas or from ponding water on the lower ends of checks. When soils remain saturated for

several days following an irrigation, alfalfa plants are weakened or die from lack of oxygen. Invariably where stands decline, such areas become grassy.

A return drainage system is ideal for controlling excess water but any method of drainage is better than allowing excess water to stand too long.

Subsoiling. Alfalfa is a deep rooted perennial crop which requires soils with good structure for adequate root development and water penetration. Because alfalfa is usually grown in rotation with row crops which tend to increase compaction, it is often desirable to break up compacted layers before planting alfalfa. Subsoiling is most effective when done in late summer or early fall when soils are dry.

Preirrigating. When alfalfa follows summer or early fall harvested crops and when initial land preparation can be completed early, land should be preirrigated to settle soils for final seedbed preparation, to germinate weed seeds and to provide deep moisture for the new crop. Alfalfa planted on preirrigated land should not need additional irrigations until spring.

Final land preparation. Check widths can vary from 25 to 60 feet depending on side fall in the field, soil type and length of field. Exact widths are most often based on multiples of harvest equipment swath widths. Borders or levees should be firm, smooth, broad enough and only as high as needed to hold the water within the checks. Checks should be graded or floated perfectly flat between levees to permit even water distribution.

Planting. Fall planting is preferred since alfalfa established early will produce nearly a full crop the first season. Growers have generally avoided mid winter planting because of risk of frost damage to young seedlings. There is much less risk from planting on preirrigated land than on dry soils since moist soils are not as readily affected by short but rapid drops in air temperatures.

Seed can be planted by broadcast seeders, by drill or by aircraft. With good land preparation, there should be no need to plant more than 20 pounds of seed per acre. It is generally desirable to roll a field immediately after planting to cover the seed and prevent moisture loss. Harrowing is not recommended because much of the seed becomes covered too deeply.

Seed inoculation with nitrogen fixing bacteria is essential whether it be present in the soil or applied to the seed as a commercial culture. Where alfalfa has been grown previously in rotation, there is no need to inoculate the seed but on new land where alfalfa has not been grown, the use of a commercial inoculant is cheap insurance.

A nurse crop of oats will increase the total yield of the first cutting of a new stand but alfalfa regrowth will not usually be as vigorous. Use of a nurse crop, therefore, is not recommended except on coarse soils where the seedling plants might be injured from blowing sand.

Fertilizers. Phosphorus is the only nutrient normally applied for alfalfa and there is no certainty that it is needed unless field tests show a response. We suggest making test strips with single superphosphate broadcast at 500, 1000 and 1500 pounds per acre in one or more locations across a field preferably at planting time. Such test strips can be made any time field conditions are suitable but a delay could result in lost production on phosphorus deficient fields. Field treatment with phosphorus should be made as soon as possible after test strips show a response.

Irrigating. New stands should be irrigated frequently enough to maintain a normal rate of growth. Mature stands are usually irrigated two or three times between cuttings depending on the soil type and rate of water infiltration. The time between irrigating and cutting should be regulated so that the soil surface will be dry enough to bear the weight of harvest equipment without causing compaction. Winter irrigating when the alfalfa is dormant is desirable for replenishing subsoil moisture which often cannot be replaced during the summer without injury to the crop. Sprinkler irrigating can be used to advantage on some soils where uniform penetration cannot be obtained by flooding.

Varieties. All varieties presently grown in the San Joaquin Valley have spotted alfalfa aphid resistance although some lack resistance to a new aphid biotype. Some varieties have better pea aphid and disease resistance than others. There is also a difference among varieties in winter dormancy. A more complete discussion on varieties is contained in the University of California publication AXT-246, Alfalfa Hay Varieties.

Pest and disease control. Spotted alfalfa aphids, pea aphids, armyworms, alfalfa caterpillars and alfalfa weevils are the major insect pests of concern in alfalfa. Control recommendations are listed in the University of California annual pest control guide.

Root knot nematodes sometimes cause severe decline in vigor and production on sandy soils. Selection of resistant varieties, rotation with nematode resistant crops and fall planting all can help to minimize nematode injury.

Phytophthora root rot is the most prevalent disease. It is associated with excess water and poor drainage and is one of the major causes of stand decline. There is no cure for the disease but it can be prevented by maintaining good plant vigor and by proper rotation, irrigation and drainage practices.

Gophers are often a problem in some fields. Mounds make fields rough and cause excessive wear on equipment. Burrows in levees cause problems in irrigating. Poison baits applied by mechanical applicators or poison tablets placed in runways are effective control methods.

Weed control. A good rotation, vigorous alfalfa growth, permeable soils and good water control are all factors that help to maintain clean fields. Effective herbicides are available for controlling most broadleaf seedling weeds in new stands. Grasses which germinate in the spring and early summer present a greater problem for which presently there is no good chemical control. Although some grass species persist even where soil and water conditions appear to be satisfactory, most grassy fields are the result of declining stands from root rot, poor water penetration, poor drainage, soil compaction and lack of vigor in the alfalfa. Research is in progress on testing herbicides for summer grass control. Further details on chemical weed control in alfalfa are contained in University of California Leaflet 168, Weed Control Recommendations.

Harvest. Because alfalfa is a perennial plant, it depends on root nutrient reserves to start regrowth following cutting. Cutting prematurely reduces root reserves and not only weakens regrowth but makes plants more susceptible to damage from insects, diseases, nematodes and adverse soil and water conditions. Root nutrient levels are considered to be restored by the time the plants reach the one-tenth bloom or early crown bud stage. Cutting at the one-tenth bloom is also considered the optimum stage for good yields and high quality Hay. In order to

maintain good vigor for the following season, late fall growth should not be removed by cutting or pasturing until winter or until plants have become dormant. In order to minimize damage to regrowth, hay should be baled and removed from the field as promptly as possible following cutting.

During the past ten years hay harvesting and handling has been almost completely modernized from the former mower, rake, two-man baler and hauling trucks to efficient labor saving methods. Almost all hay is now cut with swather-conditioners and baled, cubed or green chopped, often without even turning hay in the windrows. Balers, cubers or choppers require only an equipment operator and the accessory hauling and service trucks. Automatic bale loaders and stackers are rapidly replacing pickup loaders and trucks for hauling hay from the fields.

The efficiency, capacity and cost of modern hay handling equipment has increased to the point where small growers cannot afford to own their hay handling equipment and depend largely on custom operators. Such custom operators have kept up quite well with the demand for their services.

Marketing. There is no standard or organized hay marketing service in this area and growers must depend on their direct contacts with livestock feeders, or sell through hay dealers. Some of the larger producers have direct marketing and hauling arrangements with livestock feeders in the metropolitan dairy and feedlot areas.

Whether a grower sells hay from the field behind the baler or stacks and stores for later sale depends on current and future market prospects or his immediate financing needs. Growers who store hay for later sale need to keep close contact with current market price information. They also need to use adequate storage facilities to protect hay quality from weather deterioration.

Cost Analysis

In determining whether or not to include alfalfa in your cropping program, it is desirable first to analyze costs, returns and production in comparison with alternate crops. Since alfalfa is a perennial crop, we have included cost analysis worksheets both on establishing a stand and on annual production practices on pages 9 and 10. These worksheets show an operating schedule of most generally accepted farm practices together with depreciation and interest costs. Their most important use is in comparing an actual or proposed budget with the sample costs.

One schedule cannot illustrate each farm situation. It can serve only as a guide to recommended practices and sample costs, against which an actual or proposed schedule can be tested for completeness and unit cost of production. It is expected that several items such as yields, individual cash costs, depreciation and interest will vary considerably from one farm to another.

A brief review of each major section of the worksheets may be helpful in explaining their construction and uses.

Cash costs. This section includes representative farm practices and costs, based upon the illustrated labor, equipment and other input costs. No one farm may require all of the inputs in a given year, however, or have exactly the same equipment as indicated. This emphasizes the value as a worksheet, as well as a cost guide.

Depreciation. Equipment used in the operating schedule and the original stand costs are depreciated as illustrated in the cost schedule. These will serve as guides to include depreciation on the actual stand cost and equipment found on a given farm or in a proposed budget.

Interest on investment. These costs, as shown, will serve as guides for an actual situation. The owner's costs of land, improvements, equipment, etc. must be considered. Also, if the grower owns all of these assets outright, then interest charges that are indicated would return to him as income, or reduce the cash requirements for production accordingly.

Expense Flow Worksheet

This monthly summary of expenses shown on page 11 can be useful in budget allowances for the different input items throughout the year. Although depreciation, interest, taxes and other once-a-year expenses or non-cash items can be allocated by months, it might often be unnecessary to separate them.

Variations in Unit Production Costs

Several factors can cause wide variations in the cost per ton of growing alfalfa. Among the factors selected for illustration in table 2 on page 12 are yields, water and land investment costs.

The first part of this table, based on the sample costs shown in the production cost analysis worksheet on page 10, shows a separation of cash and total costs. The difference is represented by depreciation and investment costs. Even though property might be completely depreciated and no cost is charged against investment, one would conclude that production would have to equal at least the six-ton county average at prevailing market prices to offset cash costs.

The second part of this table shows how total production costs are affected by variations in yields and water costs. On this basis, even at rather moderate costs of $20 an acre for water, production costs approach prevailing market prices only at the higher yield levels.

Since World War II land prices have risen sharply. The actual investment in land exerts a great deal of influence on the investment costs of producing alfalfa hay. The third part of this table shows the effect of varying real estate investment on the total cost per ton of hay at the different production levels. Some land might have a capital book value as low as $200 or $400 an acre but the higher values are more realistic based on today's real estate market values. From this again, it is quite obvious that economical production can be obtained only at the higher yields if alfalfa is to carry its own share of the farm production costs.

Problems in Growing Alfalfa

From observation of growers' practices, we have selected several of the main factors which we think are responsible for low production, stand failures or inferior hay quality.

Rotation. Planting alfalfa following cotton has been a common practice and invariably this results in establishing the alfalfa in late winter or spring. As mentioned previously, fall planting is preferred in order to give the alfalfa the best chance of producing a near normal yield the first season. Consideration

ESTABLISHING A STAND OF ALFALFA FOR HAY PRODUCTION

Cost Analysis Work Sheet - Madera County - 1968

Sample costs to establish a stand of alfalfa for hay production in Madera County. Manual labor $1.75 per hour and equipment operator $1.90, which includes employer's Social Security and Workman's Compensation payments. Tractors available are 80 h.p. Crawler, 75 h.p. Wheel Diesel, and 50 h.p. Wheel Diesel. Cash costs, depreciation and interest costs per hour for each tractor are: 80 h.p. Crawler $3.50, $1.60 and $1.00 - 75 h.p. Wheel Tractor $2.20, $1.00 and 50¢ - 50 h.p. Wheel Tractor $1.50, 75¢ and 40¢.

Annual investment costs and real estate taxes are charged to the hay production schedule, so are omitted from the development costs.

Cash Costs	Sample Costs per Acre	My Costs per Acre
Shred previous crop residue		
1/2 hr. man and 75 h.p. wheel tractor	$ 2.05	
Disc 2 x: 1/2 hr. man and crawler tractor	2.70	
Chisel: 1 hr. man and crawler tractor	5.40	
Landplane 1 x: 1/6 hr. man and crawler tractor	.90	
Border preparation: 1/2 hr. man and 75 h.p. wheel tractor	2.05	
Landplane between borders: 1/6 hr. man and crawler tractor	.90	
Preirrigate: power for 1 acre ft. of water	3.50	
Labor: 1 hr. per acre	1.75	
Disc or Springtooth for seedbed preparation 1/4 hr. man and 50 h.p. wheel tractor	.85	
Reshape borders: 1/12 hr. man and 75 h.p. wheel tractor	.35	
Weed control: custom	5.00	
Plant: seed 20 lbs. @ 65¢	13.00	
plant by airplane	1.00	
Cover seed: 1/8 hr. man and 75 h.p. wheel tractor	.50	
Repairs to equipment except tractor	2.00	
Office and business expenses 6% of cash costs	2.52	
Total Cash Costs	$44.47	
Depreciation		
Tractors: Crawler	2.95	
75 h.p. wheel tractor	1.20	
50 h.p. wheel tractor	.20	
Equipment except tractors	2.00	
Total Depreciation	$6.35	
Interest on investment at 7%		
Tractors: Crawler	1.85	
75 h.p. wheel tractor	.60	
50 h.p. wheel tractor	.10	
Equipment except tractors	1.15	
Total Interest on Investment	3.70	
Total Cost to Establish Alfalfa	$54.52	

ALFALFA HAY PRODUCTION

Cost Analysis Work Sheet - Madera County - 1968

Sample costs to produce alfalfa hay in Madera County.
Manual labor $1.75 per hour and equipment operator $1.90, which includes employer's Social Security and Workman's Compensation Insurance payments. Fifty h.p. Wheel Diesel tractor per hour cash costs $1.50, depreciation 75¢ and interest 40¢.

Costs are based on a yield of 7 tons per acre, with a 3-year stand life.

	Sample Costs		My Costs	
Pre-harvest Cash Costs	Per Acre	Per Ton	Per Acre	Per Ton
Irrigate 13 times: labor 8 hrs.	$14.00			
power for 4 ac. ft. water @ $3.50 plus irrigation district taxes	19.00			
Fertilize: 44 lbs. phosphate phosphorous	11.00			
bulk spread fertilizer	2.00			
Weed control: including application	10.00			
Insect control: total	5.00			
Taxes	12.00			
Repairs to irrigation system and equipment except tractor	3.50			
Misc. labor, materials, 1 hr. man and tractor	4.50			
Office and business expense 6% at pre-harvest and harvest cash costs	8.08			
Total Pre-harvest Cash Costs	$89.08	$12.72		
Harvesting Costs				
Swath 6 x: Contract $2.25 per time	13.50			
Turn: Contract 6 x: at 50¢	3.00			
Bale: Contract $4.00 per ton	28.00			
Roadside: Contract $1.75 per ton	12.25			
Total Harvesting Costs	$56.75	$ 8.11		
Total Cash Costs	$145.83	$20.83		
Depreciation				
Irrigation system and equipment $120.00 cost, 18 year life	6.67			
Tractor: 1 hr.	.75			
Stand: Cost $54.52, 3 year life	18.17			
Total Depreciation	$25.59	$ 3.66		
Interest on investment at 7%				
Irrigation system and equipment 1/2 cost $60.00	4.20			
Tractor: 1 hr.	.40			
Stand: 1/2 cost $27.26	1.91			
Land: $800.00 per acre	56.00			
Total Interest on Investment	$62.51	$ 8.93		
Total Cost of Production	$233.93	$33.42		

No allowance has been included for the cost of management.

No income from sheep grazing has been indicated, although this is sometimes earned by hay growers.

ALFALFA HAY PRODUCTION - MADERA COUNTY - 1968

Sample Expense Flow Sheet - Costs Per Acre at 7 Ton Yield

Activity	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Irrigate		2.54	2.54	5.07	5.07	5.08	5.08	5.08	2.54				33.00
Fertilize											13.00		13.00
Weed Control		10.00											10.00
Insect Control								5.00					5.00
Taxes				6.00								6.00	12.00
Repairs	1.75						1.75						3.50
Misc. Labor, Materials, etc.	2.25						2.25						4.50
Business Expenses	.67	.67	.67	.67	.67	.67	.67	.67	.68	.68	.68	.68	8.08
Harvest				9.45	9.46	9.46	9.46	9.46	9.46				56.75
Cash Costs Per Acre	4.67	13.21	3.21	21.19	15.20	15.21	19.21	20.21	12.68	.68	13.68	6.68	145.83
Depreciation	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.14	2.14	2.14	25.59
Interest	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.20	62.51
Total Costs Per Acre	12.01	20.55	10.55	28.53	22.54	22.55	26.55	27.55	20.02	8.03	21.03	14.02	233.93
xxx													

xxx Work space to make adjustments for an individual farm or to convert this page to a cash flow by combining income from sales with the expense flow.

Table 2 - Sample Costs per Ton of Producing Alfalfa Hay at Varying Yields and Selected Variable Factors

Yield, Tons per A	6	7	8	9	10
Variable Factors	Cost per Ton				
Cash Cost	$23.35	$20.83	$18.95	$17.48	$16.31
Total Cost	$38.03	$33.42	$29.96	$27.27	$25.12
Water Cost per Acre					
$15	$37.36	$32.85	$29.46	$26.83	$24.72
$20	38.20	33.56	30.09	27.38	25.22
$25	39.03	34.28	30.71	27.94	25.70
$30	39.86	34.99	31.34	28.49	26.22
Land Investment* Dollars per Acre					
$200	$31.03	$27.42	$24.71	$22.60	$20.92
$400	33.36	29.42	26.46	24.16	22.32
$600	35.70	31.42	28.21	25.71	23.72
$800	38.03	33.42	29.96	27.27	25.12
$1000	40.36	35.42	31.71	28.83	26.51

*Interest rate used was 7%

should be given to planting alfalfa in October or November following small grains, corn, grain sorghum or beans. When alfalfa follows a late summer or fall harvested crop, there should be ample time to do a good job of land preparation and preirrigation.

Land preparation and preirrigation. We suspect that several factors causing low production can be traced to inadequate land preparation and the lack of subsoil moisture. Soil compaction can, at least in part, be improved by deep tillage. Releveling or land planing might be needed where grades and slopes are irregular. Checks should be leveled in final land preparation to insure uniform spreading of water. A preirrigation not only will provide moisture for deep rooting but will germinate many weeds which will be destroyed in final land preparation.

Weed control. In recent years weeds have become an increasingly severe problem, not only in maintaining yields but as much in producing quality hay. Weed control is a continuous process in all crops and main emphasis should be placed on preventing weeds from maturing seed not only on the crop land but in adjacent waste areas as well. As mentioned above, preirrigating will help to germinate a large percentage of weed seeds in the surface soil. Good selective herbicides are available for controlling broadleaf weeds in seedling stands. Treatments for summer grasses are less effective. Selecting clean seed and providing drainage for excess water are also good practices that can help to avoid weed problems.

Pests and diseases. Invariably, insect pests will cause some economic damage to alfalfa if not controlled by chemical treatment. Resistant varieties can offer a degree of protection for some insect pests and also for some diseases. The most damaging disease, phytophthora root rot, can best be prevented by proper irrigation and drainage practices and by maintaining good plant vigor.

Stand decline. To a certain extent almost all the other problems of alfalfa contribute to stand decline. Unfortunately, some of the practices considered necessary for producing the maximum yields, highest quality hay and maximum income are also practices that tend to weaken a stand and cause its early decline. Among these are frequent irrigations, frequent cuttings and grazing fall growth.

Frequent irrigation, in itself, is not detrimental but too often it is associated with prolonged soil saturation from slow water penetration, compaction or shallow soils with impervious layers. Such conditions are conducive to root rots.

Cutting at a 30 to 35-day interval is necessary for consistent production of high quality and near maximum quantity of hay. Cutting before the proper stage, however, will weaken stands by restricting restoration of root nutrients. Grazing fall growth before plants are dormant can also weaken the stand and reduce vigor for the following season.

Fertilizers. Since alfalfa seldom needs the addition of any other nutrient than phosphorus, rather simple and inexpensive field tests as described on page five should provide an adequate guide to fertilizer needs. Although seed inoculation with nitrifying bacteria is a cheap insurance, particularly where alfalfa has not been grown previously, this practice has seldom been found necessary.

Varieties. During the past several years, growers have had a wide selection of varieties, almost all of which have been good under conditions for which they have been recommended. Growers should be cautious, however, on using inferior blends or uncertified varieties just to save a few dollars in planting seed. Some of these have been of questionable origin and some have contained noxious weed seeds which has resulted in an expensive weed control program.

Other Publications of Interest to Alfalfa Growers

Alfalfa Hay Varieties, UC AES AXT-246.
Legume Inoculation, USDA Farmers' Bulletin No. 2003.
Simple Phosphorus Test on Alfalfa, Madera County Leaflet.
Annual Pest and Disease Control Program for Alfalfa Hay, UC Experiment Station, AES Leaflet.
The Spotted Alfalfa Aphid, UC Experiment Station, AES Leaflet No. 52.
Control of the Alfalfa Caterpillar, USDA Leaflet No. 325.
The Alfalfa Weevil, USDA Leaflet No. 368.
Diseases of Alfalfa in California, UC Experiment Station, AES Circular No. 485.
Annual Weed Control Recommendations, UC Experiment Station, AES Leaflet No. 168.
Controlling Dodder in Alfalfa, USDA Farmers' Bulletin No. 2211.
Weed Control in Seedling Alfalfa in Tulare County, Tulare County Leaflet.
Controlling Alfalfa Quality, UC Experiment Station, AES Bulletin No. 784.
Self-Propelled Hay Swathers - Costs and Use in the San Joaquin Valley, UC AES AXT-45.
Hay Cubing and Baling Costs, UC AES AXT-259.
The Border Method of Irrigation, UC Experiment Station, AES Circular No. 408.

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