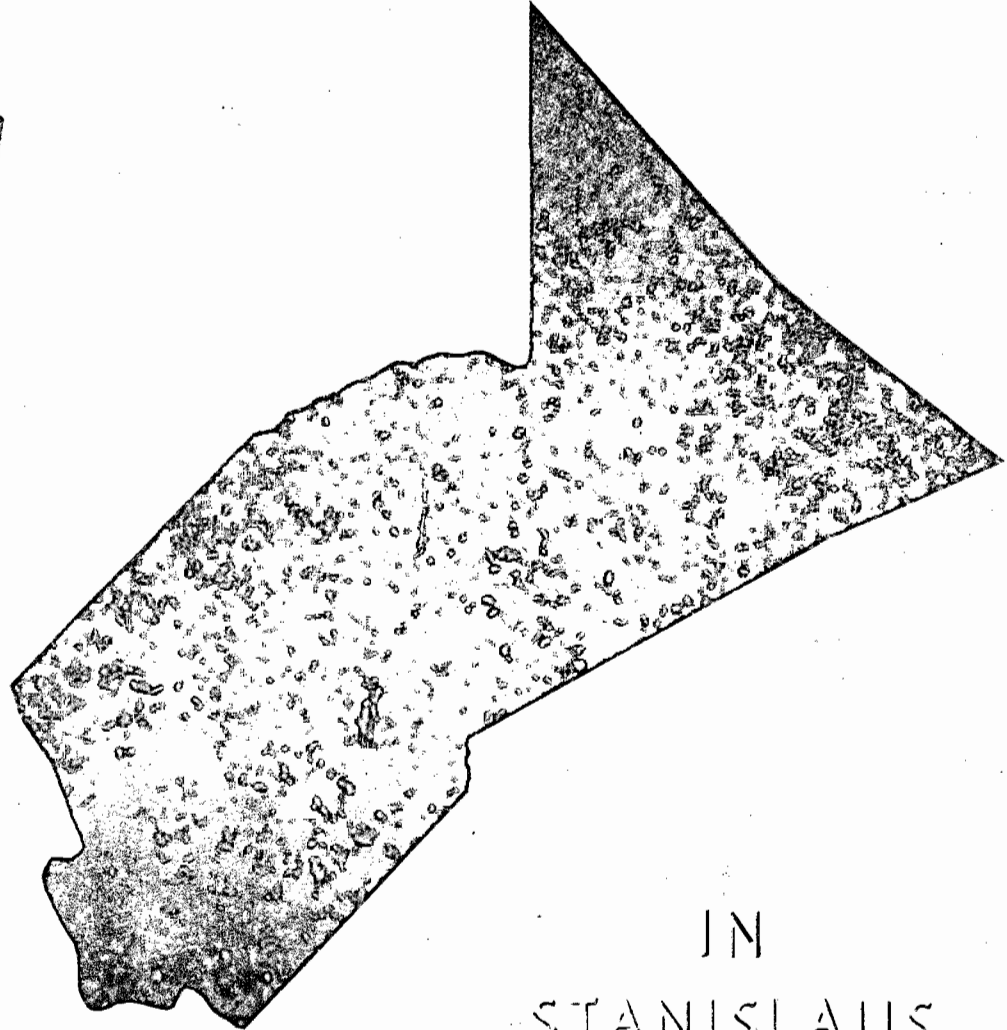


ALFALFA PRODUCTION



IN
STANISLAUS
COUNTY

UNIVERSITY OF CALIFORNIA
College of Agriculture Extension Service
Stanislaus County
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ALFALFA PRODUCTION IN STANISLAUS COUNTY

by

E. E. Stevenson, Farm Advisor

Alfalfa is the principal field crop in Stanislaus County, ranking highest in total income. It is grown throughout the county and in 1952, some 74,000 acres produced an estimated 481,000 tons of hay valued at about \$14,000,000. Acreage varies from 65,000 to 85,000 annually. Yearly yields range from 5 to 11 tons with $6\frac{1}{2}$ tons a good county average.

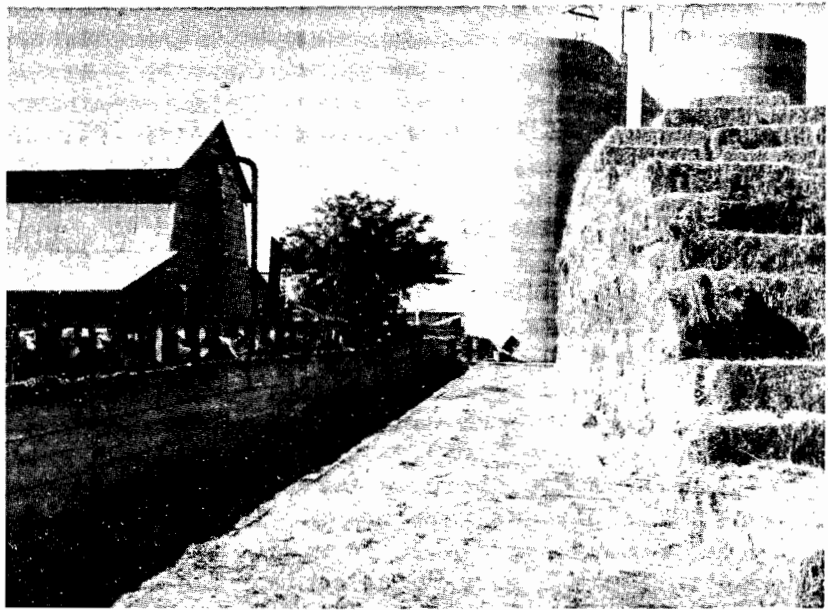
REQUIREMENTS

Alfalfa does best on fertile soils but most soils produce fair crops. The soil should be deep enough and loose enough for good root penetration and should not contain too much alkali. Good management on poorer soils will often produce a satisfactory crop. Alfalfa is fairly tolerant of root-knot nematode, although very little growth may occur during the first season where nematodes are bad.

USE

Alfalfa is grown for feed in connection with dairy, other livestock, and poultry enterprises. Most of the crop is used as hay on the farm where it is grown. Approximately 30 per cent of the crop is sold commercially as hay or alfalfa meal. It is also used to some extent as a pasture crop; it may be cut and fed green or made into high-quality ensilage.

Alfalfa is called a soil-building crop because it does not deplete the nitrogen supply. Several years of non-cultivation usually improve soil structure and water penetration, leaving the soil in good shape for other crops.



Alfalfa may be fed in several ways on a dairy farm --- hay, chopped green, or as ensilage.

VARIETY

CALIVERDE is the best adapted variety for the county. The College of Agriculture at Davis developed **CALIVERDE**, an improved strain of California Common or Chilean, especially for this area. It is resistant to bacterial wilt and to two leaf diseases -- mildew and leaf spot.

CALIVERDE should produce profitable crops of hay for about two years longer than Common. Yields should be equal to or better than Common and the quality of the hay will be better because it is more leafy and contains more carotene.

LAND PREPARATION

Land preparation is most important. Some leveling and checking is needed so irrigation water may be evenly distributed and properly controlled. The cost of good land preparation is repaid in following years by savings in the amount of water used and in higher crop yields.

Leveling should be done only when the soil is dry to prevent puddling or packing the soil. Where a "plow pan" exists, subsoiling or chiseling before planting may improve water penetration. Usually the land is not plowed but the seedbed is made with a disk, spring-tooth and spike-tooth harrows, and a float. The levees can be made with scrapers, disk ridgers or road graders.

Where possible, the lower ends of the borders should be left open to drain off excess water. Drowning out is probably the most important reason why many alfalfa stands yield poorly and become weedy. Proper leveling and drainage will prevent this.

The border or strip method is most commonly used and its advantages are many. The contour check, used to a limited extent, is not recommended.

The levees should not be any higher or wider than necessary for a good job of irrigating. Levees of this size will be covered with alfalfa and are low enough to permit easy movement of equipment across them.

The selection of proper grade, width, and length of check should receive careful consideration. Soil type and head of water delivered into each check determines this. The table below will serve as a useful guide.

Size of Checks Commonly Used in Stanislaus County

	<u>Width</u>	<u>Length</u>
<u>Sandy soils:</u>	40-50 ft.	300-500 ft.
	60-100 ft.	200-300 ft.
<u>Medium-textured soils:</u>	50-60 ft.	600-880 ft.
	75-100 ft.	400-600 ft.
<u>Heavy soils:</u>	50-60 ft.	600-1350 ft.
	75-100 ft.	400-800 ft.

In the commercial hay growing area on the west side of the county, checks are generally either 22 or 27½ feet in width to allow cutting the check with 4 or 5 swaths respectively with a 6-foot cutter bar.

Land that is carefully leveled and graded with properly made checks and levees will produce high-yielding, weed-free crops that can be easily managed.

SEEDBED PREPARATION

Alfalfa seed is small (about 225,000 seeds per pound) so a well prepared seedbed is required for a good stand. A good seedbed for alfalfa is firm and moist with an even, fairly fine mulch about 3 inches in depth. Where crusting is not a problem, the use of a ring roller or packer after seeding will make a good, firm seedbed and result in a better stand.

RATE OF SEEDING

Good alfalfa seed is plump, clean, and should germinate at least 85 per cent. Certified seed guarantees good quality, weed-free seed of known variety and should be used by growers wherever possible. Remember that "the best seed is the cheapest seed in the long run." When broadcasting, use 20 to 30 pounds per acre; for drilling, 15 to 18 pounds are enough. The most common method of seeding is broadcasting. This is followed by a light harrowing. The seed should not be planted deeper than $1\frac{1}{2}$ inches in a light soil or 1 inch in heavier soils.

TIME OF SEEDING

Successful plantings may be made any time from October 1 to April 1, if the weather is favorable. Most stands are planted in the fall from October 15 to December 1, or in the spring from January 20 to March 15, after the danger from frost is over. Early fall plantings may be made by pre-irrigating and drilling the seed into the moisture or by planting dry and irrigating the seed up.

Weather and soil characteristics largely determine which time is best. On the West-side, the crop usually is fall planted because soils become too wet to work after rains start.

On lighter soils, the crop does equally well planted in the fall or the spring.

Fall plantings may be quite weedy and can be damaged if heavy frosts occur before the plants become well established. In years of heavy rainfall, fall planted seedlings may drown out. The main advantage is that almost a full crop is obtained the first year.

Spring plantings usually produce only three good cuttings the first year and may be subject to blowing of the top soil in very light soils. Usually weeds are not serious.

NURSE CROPS

Nurse crops usually do more harm than good and are rarely needed. Nurse crops, such as barley, oats or rye, usually grow faster, shading the small alfalfa plants and using moisture and soil nutrients that the alfalfa plants need. Such fields usually produce less total feed than where no nurse crop was used and the stands may be poorer. Occasionally where spring planting is necessary on a sandy soil that is subject to blowing, a light seeding of about 25 to 30 pounds of rye or 20 pounds of oats or barley per acre may help to hold the soil. However, fall seeding or applying a light dressing of manure after seeding will usually provide a better solution.

SEED TREATMENT AND INOCULATION

Usually no seed treatment for "damping-off disease" is necessary. Seedling losses, when they occur, usually take place after the seedlings are through the ground and seed treatment does not protect against this.

Inoculation of seed has not generally proven beneficial because the bacteria which are needed for good alfalfa growth are the same

ones found on burr clover and these usually occur naturally in the soil. There have been, however, some cases where inoculation proved beneficial. Where heavy cuts have been made when the land is being leveled, inoculated seed may be advisable.

FERTILIZATION

Animal manures, when available, are always desirable because of the plant nutrients they supply and their beneficial effect on the structure of the soil. The response to commercial fertilizers has not always been consistent. Phosphate deficiencies occur fairly often and occasional responses to nitrogen and sulfur have been observed. However, no general fertilizer recommendations can be made. Only by strip tests on each field may a farmer determine the fertilizer needs on his ranch.

When yields are not up to expectation, application of 300 pounds of single superphosphate per acre in late winter will usually give the desired growth. On light soils sulfur deficiency may sometimes occur. Application of ~~200-300~~ 50-100 pounds of soil sulfur or ~~1,000-1,500~~ 200-400 pounds of gypsum per acre will correct this trouble. Gypsum may have to be applied in two applications -- one at the beginning of growth and again following the second cutting.

ROTATION

Alfalfa is important in our crop rotation program. The life of an alfalfa stand usually runs from 3 to 5 years on the lighter soils and from 4 to 5 years on the heavier soil types. (The new wilt-resistant CALIVERDE variety should lengthen the life of stands by about 2 years.) Some of the problems of maintaining stands are discussed under "Diseases." Alfalfa generally follows a non-leguminous crop, such as grain, corn or Sudan grass, better than legume crops such as beans, especially blackeye beans.

Beans, however, do well following alfalfa. In fact, most any crop will follow alfalfa successfully. After an old stand has been plowed up, annual crops should be grown for 3 or 4 years before replanting to alfalfa.

IRRIGATION

For good yields, alfalfa must have enough moisture at all times. Even young stands need careful attention to soil moisture and the field should not be allowed to get so dry that the plants show wilting or "suffering."

In established stands the time, frequency, and amount of water to apply depends largely on soil type, weather, and the water schedule in irrigation districts.



Two irrigations per cutting, one immediately after the removal of the crop, and the second about 10 days before the next cutting is a common practice.

On many deep, fertile soils, one irrigation between cuttings is enough. Where water penetration is difficult on very heavy soils, a third irrigation is occasionally used.

As a useful guide, 1 inch of water will wet a clay soil 4 to 5 inches deep when the soil is dry; a loam soil, 6 to 10 inches; and a sandy soil, 12 inches or more. About 6 acre-inches is usually enough water for a good irrigation. The crop should use from 3 to 5 feet of water for the season.

WEED CONTROL

Weeds in newly planted stands are usually controlled by mowing. In spite of heavy competition from weeds, most stands recover faster than the weeds if clipped 3 or 4 inches above the ground when the weeds are about 1 foot high. If clipped too low, the stand may be retarded and many of the plants may be killed. When weeds are not serious, no clipping should be done before the first cutting.

Where fiddleneck or other broad-leaved weeds are thick, spraying with a selective dinitro weed killer when the weeds are very small (less than 1 inch high) will give good control of the weeds without injuring the alfalfa. The cost is about \$5 to \$6 per acre and where weeds are thick, the cost of treatment may be repaid through a higher yield of better quality hay and a good stand of alfalfa plants.

A vigorous stand of alfalfa crowds out most weeds (including morning glory) until the plants begin to thin out. Sandburs and puncture vine may be troublesome if the stand is sparse. Spraying with weed oil or a mixture of dinitro and weed oil within four days after cutting will control these and other

weeds, including dodder. Two applications might be necessary and the cost may be too great unless hay prices are high.

Some growers spring-tooth alfalfa fields in the late fall or winter in order to kill fox-tail grasses, other winter weeds, or between cuttings to kill white weed (*Gnaphalium* sp.).

BARE SPOTS

Bare areas or spots of poor growth often occur in fields. These may be caused by a number of things, such as plow pan, puddled soil, alkali, nematodes, or high spots. (The latter can readily be taken care of by scraping.) Sometimes these spots may be improved by chiseling in the fall and applying gypsum at the rate of 3,000 to 6,000 pounds per acre. Where barnyard manure is available, a heavy application of manure plus one or two tons of gypsum applied in the winter will usually give good results.

It is important that the land be prepared correctly before the stand is planted, as it is very difficult to try to keep plants growing on "problem spots." Chiseling in the fall, while the soil is dry and before the seedbed is made, is sometimes helpful but the land must be allowed to settle well before the final seedbed is made.

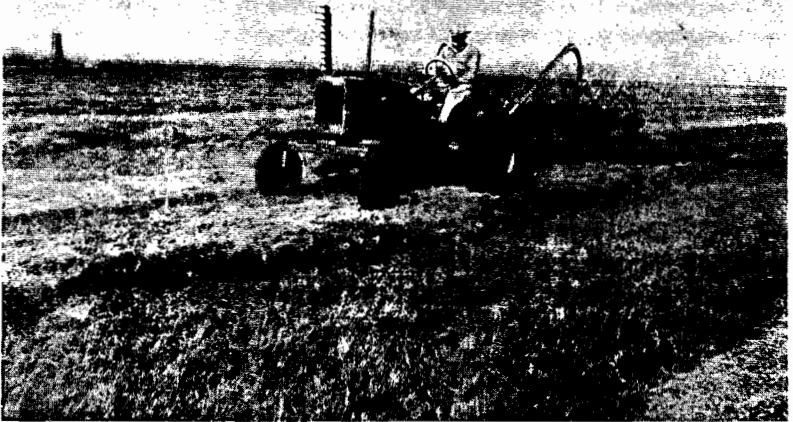
GOPHERS

Pocket gophers do considerable damage to alfalfa stands by cutting plant roots; their burrows in the levees make irrigation difficult; and the mounds of soil interfere with harvesting. Some of the gophers may be killed when irrigation water floods them out. Usually trapping or poisoning is necessary for a practical control. Further information on control of gophers may be found in the circular, "CONTROL OF FIELD RODENTS," available at the Farm Advisor's office.

MAKING ALFALFA HAY

Making good quality hay is best learned by experience. Fine stems, leafiness, green color, and freedom from weeds and baling wire are the requirements of high quality hay.

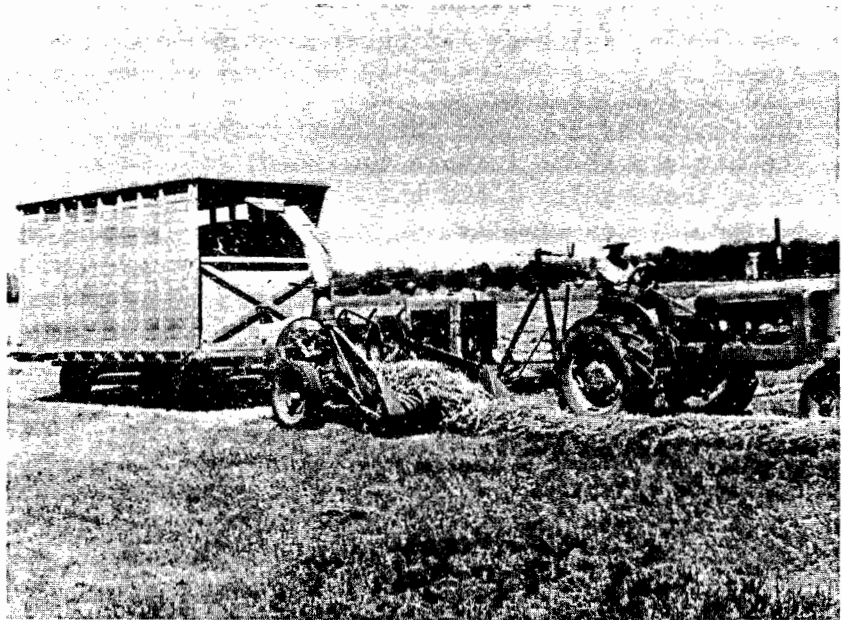
The time of cutting or stage of growth is important. For high yields of good quality, hay should be cut when the field is about in the 1/10 to 1/4 bloom stage. When cut at this stage, the stand lasts longer than when cut earlier. The hay should be left in the swath only until it is thoroughly wilted but not until the leaves become dry and brittle.



A side-delivery rake is used to rake the hay into small, compact windrows to complete curing.

Extreme care should be taken to make sure that no baling wire or other pieces of metal are baled with the hay. "Hardware sickness" is a serious hazard to dairy cows and in most cases is caused by careless baling crews.

In recent years, dairymen have come to prefer and use more chopped hay. This serves to conserve storage space and reduce waste. This method has resulted in a very leafy, high quality hay which feeds well.



Alfalfa can be chopped from the windrow, blown into wagons, hauled out of the field, and blown into the haymow.

In putting up any hay, especially chopped hay, extreme caution must be taken to be certain the hay is dry enough to prevent heating and reduce the hazards of possible fire. The use of barn mow hay driers is strongly recommended for chopped hay.

DISEASES

Soil diseases are important in the length of the life of alfalfa stands. Bacterial wilt, dwarf, crown rot, and fusarium wilt are soil diseases which are found in the county. Leaf and stem diseases are also present.

Bacterial Wilt causes a stunting of the plants, shortened internodes and small, pale yellow leaflets. When the bark is peeled back from the taproot, the outer part of the woody cylinder will show a straw-yellow or brownish-yellow color as contrasted to the normal white of healthy plants. Sometimes reddish-brown, canker-like lesions are formed in the woody tissue just beneath the bark in the taproot. Affected plants gradually die. Bacterial wilt is probably the main reason for the short life of alfalfa stands in this area. CALIVERDE is resistant to bacterial wilt and should do much to combat this difficulty.

Crown Rot diseases are more serious where water stands, causing plants to be sickly and stunted and stands to be thinned out and short-lived. Proper land preparation and careful irrigation usually will prevent serious trouble.

Alfalfa Dwarf is found only in the southern part of Stanislaus County and is more widespread in the counties south of us. This is a virus disease caused by the same organism as Pierce's disease of grapes. The affected plants show a decided dwarf growth with small, dark leaves. Usually the woody part of the root is discolored. The variety California Common 49 is resistant to dwarf and should be planted wherever this disease is serious.

Fusarium Wilt -- Affected plants turn yellow, wither and die as in other soil diseases.

Alfalfa Stem Nematode is fairly common in the Patterson area. This nematode lives in the stems of the alfalfa above ground, causing the stalks to be short, swollen, and deformed. Usually only the first crop in the spring is damaged, but stands and subsequent yields may be seriously affected. Growers can avoid serious damage by allowing at least 3 years between alfalfa plantings and using strip checks rather than contour checks. When only one year is allowed between alfalfa plantings, milo is the best crop to raise. All volunteer alfalfa plants and weeds should be carefully controlled during the rotation period. CALIVERDE is not resistant to stem nematode.

Leaf Spot and Mildew are common leaf diseases of alfalfa. In the spring and early fall, leaf diseases sometimes kill most of the lower leaves. CALIVERDE is resistant to leaf spot and mildew and will reduce damage to a minimum.

ROTATION REDUCES DISEASE DAMAGE

The disease control problem in alfalfa can best be handled by a careful crop rotation program. When land is kept out of alfalfa for at least 3 or 4 years, the amount of disease in the soil can be reduced enough so another crop of alfalfa may be grown successfully.

INSECTS

Alfalfa Caterpillar is the most serious insect pest of alfalfa. The caterpillars are about one inch long, dark green, and with a distinct line on each side which is often pale yellow or white. They feed on the leaves and may entirely defoliate the plants. Injury is most severe from July through September. If alfalfa is about ready to bloom when the worm population is high, cutting for control is advisable and practical.

Alfalfa caterpillar may also be controlled by treating with Methoxychlor at the rate of 3/4 to 1 pound of active material per acre when counts made with a standard insect net show 10 non-parasitized caterpillars per sweep. Before treating, growers are urged to consult the Agricultural Extension Service or other competent authority for specific advice.

OTHER INSECTS

Other insects, such as grasshoppers, alfalfa weevils, and army worms, may sometimes cause damage. When damage from army worms becomes severe, cutting the field is the only practical solution. Infestations of army worms may be prevented from migrating and damaging nearby crops by applying a barrier of DDT or Toxaphene around the alfalfa field before cutting.

Further information on the control of alfalfa insects may be found in the leaflet, "INSECT CONTROL IN ALFALFA AND LADINO CLOVER," available at the Farm Advisor's office, Room 2, Federal Building, Modesto.

WHAT IT WILL COST TO GROW ALFALFA
IN STANISLAUS COUNTY

Prepared - January, 1953

Based on a 6½-ton yield per acre with 5 cuttings
Man labor \$1.15, small tractor \$1.25

SAMPLE COSTS

	<u>Eastside</u>		<u>Westside</u>	
	Per Acre	Per Ton	Per Acre	Per Ton
Misc. - fertilize, harrow, ditch, border work, etc.,				
Eastside - 2 man-hrs., 1½ tr.-hrs. (Westside less)	\$ 4.18	\$.64	\$ 2.00	\$.31
Irrigate - Eastside 3½ hrs., Westside 7 hrs.	4.03	.62	8.05	1.24
Mowing - 2 man- and tractor-hrs.	4.80	.74	4.80	.74
Raking and turning - Eastside 35 man- and tr.-hrs.				
Westside 28 man- and tr.-hrs.	8.40	1.29	6.72	1.03
Baling, contract - @ \$4.50	29.25	4.50	29.25	4.50
Hauling and roadsiding, contract - @ \$2.00	13.00	2.00	13.00	2.00
Total labor and harvesting	63.66	9.79	63.82	9.82
Irrigation water tax, 4 acre-feet	1.50	.23	23.50	3.61
Fertilizer	6.45	.99	---	---
Total material costs	7.95	1.22	23.50	3.61
General expense - office, car, etc.	3.75		3.00	
County taxes, \$100 at \$5.75 rate	5.75		5.75	
Insurance, repairs, etc.	4.00		3.75	
Total cash overhead costs	13.50	2.08	12.50	1.92
TOTAL CASH COSTS	85.11	13.09	99.82	15.35
Depreciation				
Stand \$30 cost, 6-yr. life	5.00		5.00	
Irrigation facilities \$60 cost, 20-yr. life	3.00		3.00	
Tillage and harvest equipment \$25, 10-yr. life	2.50		2.50	
Total depreciation	10.50	1.62	10.50	1.62
Interest on investment at 5%				
Stand, irrig., and equip.: on ½ of \$115	2.88		2.88	
Land at \$600 per acre	30.00		30.00	
Total interest on investment	32.88	5.06	32.88	5.06
TOTAL COST OF HAY	\$128.49	\$19.77	\$143.20	\$22.03

The above costs are considered fairly representative for the two main alfalfa producing areas of the county -- the Westside and the Eastside. The alfalfa crop is considered on an ownership basis. Rent estimates taken from the above figures show a 1/3 share rent to be about \$43.00 on the Eastside and \$48.00 on the Westside.

Costs will vary considerably depending on the acreage farmed and efficiency of management. With hay costs \$19.77/ton on the Eastside and \$22.03/ton on the Westside, yields must be higher than average or costs lower than average for good profits. (Westside growers receive about \$1.75/ton premium for their hay.)