Some Factors Influencing the Market for Alfalfa in California [1/]

by

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Alfalfa hay is a very important crop in the California agricultural economy, although production tends to ebb and flow with changes in total cattle numbers occurring cyclically over time. Traditionally it has been the fifth or sixth most important crop in terms of value. Average expected prices should place it in that range again this year. According to 1978 Agricultural Commissioner reports, the five most important counties in alfalfa hay production, in relative percentage shares, were Imperial (23.9%), Tulare (7.8%), Kern (7.6%), Fresno (6.9%), and Merced (5.7%).

Alfalfa harvested acreage increased gradually during the late sixties and into the early seventies and has been gradually falling since then; and the downward trend was worsened by the extreme effects of the drought occurring from 1974 through 1977. This year the total alfalfa hay harvested acreage of 1.05 million acres is expected to be near a 10-year low. Symposium speakers have indicated statewide average yields have remained reasonably close to 6 tons per acre over the last 10 years. This year's yield estimate will approach that figure and resulting total production is expected to be about 6.2 million tons. One recent sharp change occurring is prevailing higher price levels and these could exceed the 1976 statewide average price levels. Value of 1979 alfalfa hay production could range from about $495 to $533 million (Table 1).

The Imperial Valley and the Southern and Northern San Joaquin regions have been the most important alfalfa-producing regions in the state. However, continuing changes in cropping patterns are a result of several competing factors. As Yeary and other speakers have pointed out in previous symposia, the crop competes in an environment of other more intensive types of agricultural commodities. Farmers must consider their regular rotational program, but economics also influences the commodity potential. Unlike annual crops, alfalfa hay must be planted with a three to four-year plan in order to achieve the highest long-term income. Thus, commodity income projections must be made four to five years ahead, and continuing change is apparent. Energy, rising interest rates, rising water costs and a myriad of other factors influence these projections. However, it is still useful to consider alternatives. Thus, the most important variables influencing alfalfa production over the next five-year period can be isolated. In addition, potential regional production cost (differentials) and their effect are worth considering.

It is a purpose of this paper to (1) evaluate the trends in annual supply-usage balances over time, (2) identify and evaluate regional economic differences in alfalfa production potential in California, and (3) identify and evaluate some of the factors affecting the economic environment of the alfalfa industry over the next six years.

Supply-Usage Balances

The 1974-76 period was one in which total acreage was declining slightly and usage was increasing because of large numbers of animals in California. As a result, the inventory on May 1, 1976, was only about 306 thousand tons. Coupling this with the relatively small 1976 production resulted in the 1977 crop being one of record high prices. The experience of the next year was of another decline in the total acreage harvested, but a significant

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1/ Presented at the Ninth California Alfalfa Symposium, Fresno, Dec. 12-13 1979

change had occurred. The California drought ended while beef cattle numbers were still being drastically reduced. This was primarily due to the effects of the two-and-one-half year cattle industry liquidation. Prices in 1978 did not respond as one might expect, if the alfalfa hay supply situation was the only factor analyzed (Table 2).

Trends and usage

The demand for alfalfa hay is heavily influenced by the total number of milk cows and heifers in inventory at any one point in time. The total inventory of milk cows has increased about 60 thousand animals since 1973. Estimates of usage by dairy cows range from 70-75 percent of all alfalfa hay utilized.2/

While the inventory of milk cows and heifers is very important, one should also recognize the presence of beef cattle and calves and their residual influence on alfalfa hay prices. During the liquidation process occurring from 1974-77, the beef cow inventory declined, as did cattle and calves on feed. Numbers of cattle and calves on feed should stabilize in the next four to five years, and might increase slightly, while the rising inventory of beef cows and calves should enhance total alfalfa hay demand (Table 3).

Interregional demand differences throughout the state are also important. Since we are mainly concentrating on analyses of dairy cow numbers, a review of the 1974 situation might be helpful. Aggregate production-consumption relationships have not changed perceptibly since that time, but regional changes may be occurring. In 1974 the nine northernmost counties in the state produced about 450 thousand tons of alfalfa, while dairy use was 134.5 thousand tons. Central Coastal counties were deficit about 450 thousand tons. One can assume that much of the surplus hay from the nine northern counties moved into this region. The Sacramento Valley produced alfalfa in excess of their needs. Production was estimated to be about 737 thousand tons, while consumption was 230 thousand tons. The San Joaquin Valley production volume was about 4.3 million tons while 2.6 million tons were consumed by dairy animals. The Southern California market was approximately in balance with consumption and production approximating 1.6 million tons.

With the recent changes and shifts in dairy production occurring in the state, one would expect the San Joaquin Valley surplus to have diminished and the Southern California region to have become slightly surplus, since dairy cattle numbers have tended to move from the Los Angeles basin.3/

Economics of Alfalfa Production, 1979-1985

Previous speakers have noted that alfalfa competes with a variety of other crops in the farmer's planning framework. Regional comparative advantage as a result of change in the cost of critical inputs also seems worth evaluating. In order to evaluate this phenomena, situations were investigated by use of the California Extension Budget Generator. Typical budgets for five regional producing situations were simulated in 1979. Cost-of-production projections to 1985 were calculated for the two important Northern and Southern San Joaquin alfalfa producing regions. The main "thumb rule" applied in the projections was that all energy-related inputs would increase in the following sequence: an increase of 30 percent from 1979-1980, 30 percent from 1980-81, and 7-1/2 percent annually from 1981-85. While more drastic changes than this could occur, these seem to be in line with recent history. These were programmed through the Budget Generator and resultant costs-of-production were calculated.

2/ This estimate was about 70 percent of total 1973 production by James H. Cothern in Processing, Transporting and Pricing California Alfalfa Hay, Extension Leaflet 2890 (Berkeley: June 1977). The 1974-76 estimate was 74 percent of total usage as estimated by G. A. King, J. C. Fitz, C. M. Warner and A. C. Bywater in Trends in California Livestock and Poultry Production, Consumption and Feed Use: 1961-1978. Unpublished Department of Agricultural Economics bulletin, Davis, 1978.

3/ Cothern, op. cit., p.5.

Estimated projected regional costs-of-production, 1979

In order to evaluate present comparative advantage, a common 1979 base budget was prepared for the appropriate regions. These data are summarized in Table 4. Results of this analysis indicate that the Southern San Joaquin costs of producing alfalfa in 1979 would be about $82 per ton as compared to Yeary's estimated 1978 costs of $78 per ton. Costs range from a low of $59 per ton in Northern San Joaquin to about $114 per ton in the Coastal regions. What are the most critical factors likely to affect the cost of production in each of these regions? In almost every case they relate to the availability, use and cost of water. For example, in constructing the Southern San Joaquin base budget, the basic assumption was that six acre-feet of irrigation district water costing about $10 per acre-foot would be used. In the Northern San Joaquin budget, water was assumed to be available at a much lower cost and less was used. The apparent $8 per ton production differential between the Southern and Northern San Joaquin production costs was mainly explained by the use and cost of available water. Cultural practices vary throughout the state, and the typical budget for the Sacramento Valley mirrored this, since this region was assumed to be utilizing flood irrigation and groundwater. For the base 1979 simulation, water cost in this particular situation was about $12 per acre-foot. But since fewer acre-feet were used, differences were negligible. Basic cost differences were also attributed to differences in harvesting costs and methods. However, a cash overhead cost reflecting the practice of cash renting contributed to cash overhead costs and a total cost of $77 per ton, or very close to the Southern San Joaquin cost.

Availability of moderately-priced water in the Southern Desert area was assumed and resulted in slightly lower variable costs than that attributed to Southern San Joaquin. This was offset by higher cash overhead costs as a result of the custom operations assumed and a higher cash rent charged to the particular operation involved.

The Coastal Regions seemed to be the highest cost-of-producing area and possessed the most readily identifiable characteristic of high cost water applied at a relatively high rate. The water cost, as a result of pumping, was assumed to be about $12 per acre-foot. At the rate applied this resulted in substantially higher water costs in other regions. In addition, higher fixed costs associated with ownership of equipment also resulted in a total residual being much higher than other competing areas. Water costs are extremely variable, and our simulation was a representation of only some of the differences prevailing in California. A survey of water use practice conducted in 1976 indicated conjunctive use of groundwater and surface water in almost all regions.4/

Results of the 1979-1985 projections

Production Effects The interesting aspect of this particular analysis was evaluating the impact of anticipated changes in energy costs on the economics of alfalfa production.5/ Anticipated changes in energy costs were incorporated into budget projections for two regions -- the Southern and Northern San Joaquin. Variable costs in the Southern San Joaquin would increase from about $26 per ton in the base year to about $53 per ton in 1985. In the Southern San Joaquin the base year variable costs were about $44 per ton. This would increase to about $67 per ton in 1985. Several conclusions seem to emanate from these simulations. First, it seems apparent that great pressure will continue to be exerted on producers to make more economical use of ground and surface water in alfalfa production over the next six-year period, as well as other energy-related inputs. Those regions presently using groundwater and flood irrigating will definitely have problems staying competitive. We would also expect the cost of lifting water from deep wells to become more cost prohibitive, regardless of the irrigation method used. Alfalfa yield-water use relationships are also worth noting. Producers may be ahead economically with slightly lower yields if water use can be cut significantly. We would expect aggregate comparative advantage in alfalfa production between regions to be most affected by water use and application rates rather than other readily identifiable characteristics.

4/ Allan Highstreet, Carole Frank Nuckton and Gerald L. Horner, Agricultural Water Use and Costs in California. Unpublished bulletin, Davis, 1979. According to this survey, water use and costs were extremely variable within, as well as between, regions. For example, efficient Southern San Joaquin producers might use less than the six-acre feet quoted here.

5/ Oddly, the "real" cost of electricity for pumping appears to be slowing after markedly sharp increases during the drought years.

Market Effects The continuing dislocation of the dairy industry from Southern to Northern California will pose some special problems for Southern Desert producers. The rising cost of diesel fuel will be reflected in higher transportation costs and f.o.b. ranch prices to producers in that region may continually be discounted since greater distances to market will become an increasing problem. Increases in stocker and feeder populations in Southern California could ease this somewhat. For those individuals contemplating long distance transportation, more efficient handling and transporting systems should be explored. A similar problem will be encountered in Mountain and Coastal regions; but transportation will also become more of a critical factor for competing Nevada and Arizona hay.

Institutional Effects The rapidly changing energy situation is going to continue to have unforeseen effects on the organization, structure and operation of California agriculture. A priori analysis leads experts in two distinctly opposite directions. First are those who believe rising energy and water costs will force producers in the direction of those crops using less water and energy. These individuals ignore the income effect because producers tend to shift to the income-maximizing crops in the short run. While the second school might argue this latter point vehemently, they tend to ignore some physical, physiological and rotational constraints and opportunities in crop production that could improve the net income of the farm. This latter point implies we may need to review some of the historic contributions of alfalfa to soil quality, to plant nutrition, and to decreased reliance on inorganic fertilizer application and mechanical cultural practices and to initiate new research in areas where information is not available.

Conclusions

Despite the increased costs of production and transportation, the market situation looks reasonably favorable for alfalfa during the next six years. Increased numbers of beef cattle and stable dairy cow numbers should result in a relatively strong and stable alfalfa market. Projected returns should exceed costs for most regions, since market prices will probably average at or above 1979 levels of $80-$85 per ton during the next three to five years. Expect slight aggregate increases in total state production, but farmers' desire to shift to more intensive cropping patterns will probably result in these being slight. It should be a reasonably good period for a producer who is reasonably cost and water conscious.

Table 1.

ALFALFA HAY: Acreage, Yield, Production, and Value, California 1969-79*

Crop Year	Acreage Harvested	Yield per Acre	Production	Average Price	Value of Production
	1,000 acres	*tons*	*1,000 tons*	*Dollars/ton*	*1,000 dollars*
1969	1,129	5.50	6,210	28.50	176,985
1970	1,152	5.60	6.451	30.50	196,756
1971	1,210	5.70	6,897	32.00	220,704
1972	1,198	6.00	7,188	35.00	251,580
1973	1,190	5.80	6,902	51.00	352,002
1974	1,150	5.90	6,785	64.00	434,240
1975	1,120	5.90	6,608	62.50	413,000
1976	1,100	6.00	6,600	76.00	501,600
1977	1,140	5.85	6,669	61.00	406,809
1978	1,090	5.45	5,941	62.00	368,342
1979**	1,050	5.90	6,195	80-86.00***	495-533,000***

Source: California Crop and Livestock Reporting Service
* Field Crop Statistics 1977-78
** Preliminary
*** Author's estimate

Table 2.

California Hay Crop Production 1974-78
(in 1,000 tons)

Year	Carry-over May 1	Production				Total Supply	January 1	
		Alfalfa	Grain Hay	All Other Hay	Total Crop		Year	Stocks on Farms
1974	787	6,785	597	313	7,695	8,482	1975	1,693
1975	308	6,608	610	424	7,642	7,950	1976	1,681
1976	306	6,600	592	362	7,554	7,860	1977	1,737
1977	680	6,669	722	338	7,729	8,409	1978	2,860
1978a/	1,082	5,941	566	448	6,955	8,037	1979	2,226

Source: California Crop and Livestock Reporting Service
a/ Preliminary

Table 3

Livestock Numbers in California 1974-79
(in thousands)

Year	Milk Cows & Heifers That Have Calved Jan 1	Cattle & Calves On Feed Jan 1	Other Cattle & Calves Jan 1	Sheep & Lambs On Farms Jan 1[a/]	Hogs including Pigs On Farms Dec 1	Chickens On Farms Dec 1[b/]	Broilers & Fryers Produced	Turkeys Produced
1973	789	1,181	2,740	1,071	143	50,384	83,193	17,548
1974	810	1,204	3,236	1,122	124	49,878	90,377	17,888
1975	800	688	3,303	1,100	138	48,071	95,825	15,771
1976	810	960	3,180	1,052	133	46,191	104,950	17,514
1977	809	801	2,354	1,113	160	45,616	112,500	17,365
1978[c/]	846	845	2,739	1,115	190	46,020	122,400	16,780
1979[d/]	860	796	3,044	1,150	-	-	-	18,928[e/]

Source: California Crop and Livestock Reporting Service
a/ Includes sheep and lambs on feed for market
b/ Excludes broilers and fryers
c/ Revised
d/ Preliminary
e/ Expected to be produced in 1979

Table 4

Estimated Regional Cost of Production 1979

Area	Yield	Variable Cost	Cash Overhead	Fixed Costs	Total Costs
	( )	dollars per ton			
Northern San Joaquin	7.0	36.40	2.14	20.88	59.42
Southern San Joaquin	8.5	44.42	3.21	34.46	82.09
Sacramento Valley	7.0	31.46	37.75	7.88	77.09
Southern Desert	8.5	38.49	15.65	15.44	69.58
Mountain Region	6.0	34.91	3.37	48.29	86.57
Coastal	5.7	59.98	5.00	48.70	113.68

Table 5.

Estimated Projected Regional Cost of Production, Alfalfa 1979-1985

Year	Yield	Variable Cost	Cash Overhead*	Fixed Costs	Total Costs
	-tons-	----------dollars per ton----------			
Northern San Joaquin					
1979	7.0	36.40	2.14	20.88	59.42
1980	7.0	41.59	2.26	20.88	64.73
1981	7.0	47.90	2.42	20.88	71.20
1985	7.0	53.82	2.55	20.88	77.25
Southern San Joaquin					
1979	8.5	44.42	3.21	34.46	82.09
1980	8.5	49.01	3.33	34.46	86.81
1981	8.5	55.15	3.49	34.46	93.10
1985	8.5	67.04	3.67	34.46	105.17

* Includes property taxes and management costs