

Cost & Profit Comparison of Baling & Cubing Alfalfa Hay

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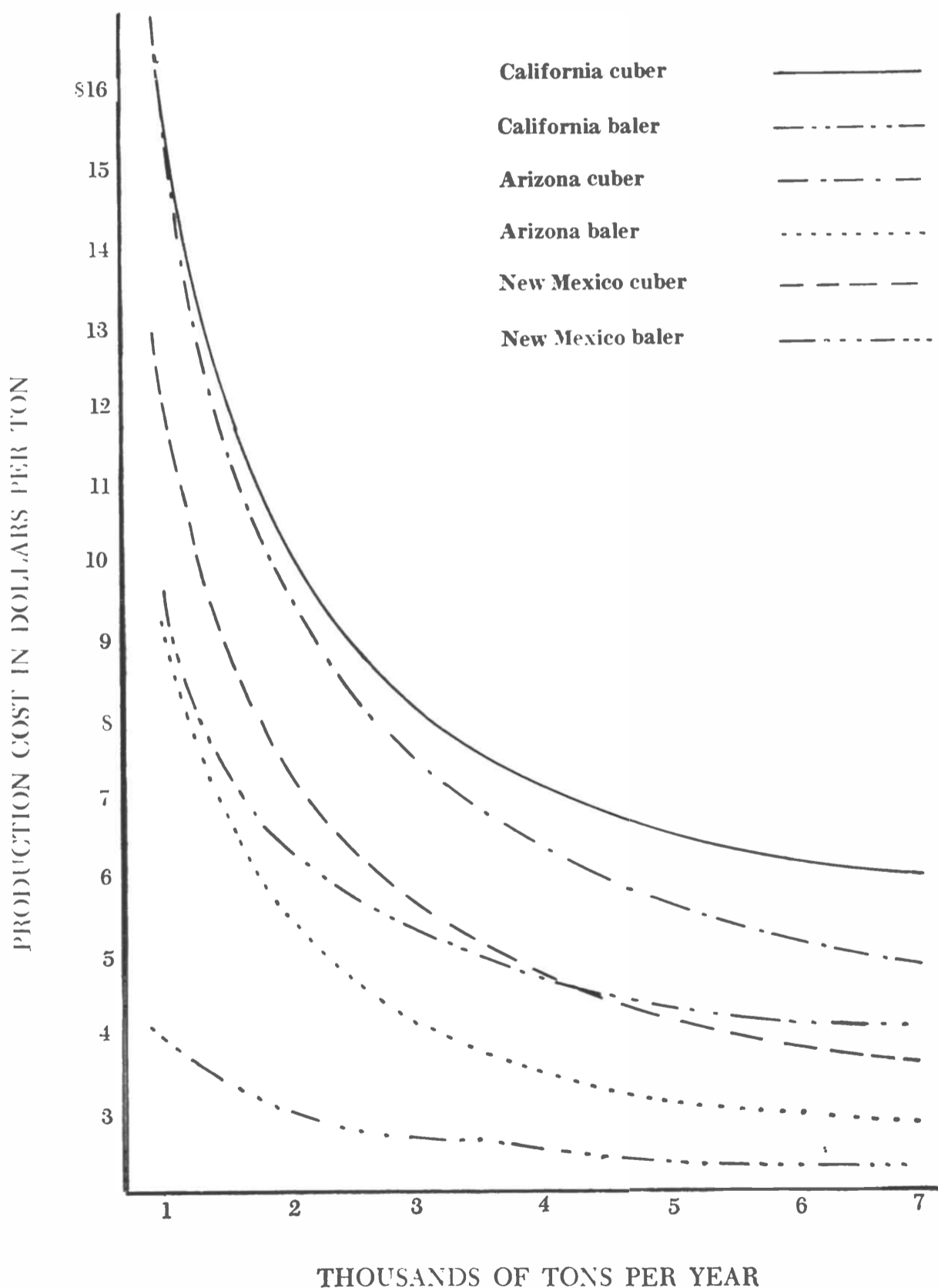


Figure 1. Arizona, New Mexico and California model operations.

A technical innovation in alfalfa hay harvesting was commercially introduced into Arizona agriculture in the early 1960s. Development of such an innovation began in the early 1950s and was first known as a wafering machine because of the appearance of the product. Later research altered the form of the hay product to more closely resemble a cube. Alfalfa hay in the form of 1½ inch square cubes became a significant part of Arizona agriculture in 1965 when the John Deere 400 Hay Cuber was commercially introduced into the state.

Each year when alfalfa hay cubes have been available they have commanded a significantly higher price per ton than the more traditional hay bales. The price differential has been mostly due to the savings in labor costs associated with loading, unloading and feeding of the more cumbersome bales. Hay cubes may be handled more like grain than bales. Elevators, dump-trucks and skip-loaders completely preclude the necessity of ever moving hay cubes by hand.

This paper represents an attempt to compare the costs and returns associated with harvesting alfalfa hay in the form of cubes as opposed to the form of bales. An additional goal is to determine the extent to which cubing

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Figure 2. In this picture as well as on the cover is shown hay cubing machines picking up cured hay after being mowed and windrowed. Note the sprays of water being applied to the hay as it is being picked up. This is done to bring the hay to proper moisture content for good compaction in the cubing process.

machines are utilized in Arizona hay harvesting.

Information concerning output, costs of operation and prices received for hay was obtained by personal interviews with farmers involved in the harvesting of alfalfa hay in Arizona. This information reflected therein represented the 1968 hay crop. Secondary cost data was furnished by equipment dealers, insurance companies, petroleum companies and other agencies supplying input factors of production to the harvesting enterprises.

Not all of the operations considered in the study performed precisely the same functions. For example, some firms hauled hay and others did not offer such service. Therefore, in order to standardize operations with directly comparable services, synthetic budgets were established to represent both cubing and baling operations of similar output capacity.

Two different types of operations were examined in this study. The first identified as a custom harvesting

operation. This method assumes that a harvesting manager performs all of the harvesting functions in return for a fixed fee per ton. This operator never has legal possession of the hay. The second method is a contractual arrangement whereby the harvester purchases hay standing in the field, harvests the hay and sells the finished product. In such a situation the price per ton of the hay standing in the field is considered a variable cost to the harvesting enterprise.

Extent of Utilization

This study considered 30 cubing machines utilized on ten farm enterprises. This accounted for all but seven cubers in use in the state at the time these machines harvested 127,108 tons of alfalfa hay in 1968. Therefore, approximately 12 percent of Arizona's alfalfa hay was harvested in the form of cubes. Headquarters for all of the cubing enterprises considered were located in either Maricopa or Pinal counties.

Actual Operations

Table 1 provides a brief profit summary of the hay harvesting operations considered in the study. When contract harvesting was assumed, the average cubing firm netted \$5.22 per

ton more than the average baling firm. The custom harvesting assumption yielded an average profit advantage of \$2.38 per ton for the cubers. In both instances total operating costs were higher for cubers. However, this disadvantage was more than compensated for by the bonus price commanded by the cubed hay.

Model Operations

Four model harvesting operations were constructed for the purpose of standardizing harvest functions. In each instance it was assumed that the hay was cut, raked, cubed or baled, and delivered within a five mile radius of the field in which it was grown. An operation with two balers was assumed to have an output capability corresponding to that of a firm with one cuber.

The model harvesting operations are summarized in Table 2. As with the actual operations the model cubers have a profit advantage in all instances. The same is true with one exception when the ratios of net profits to total cost per ton expressed as a percentage are compared. The exception is revealed when the two baler custom operation is compared with the one cuber custom enterprise. In such situation, the balers have an advantage of 2.69 percent.

Interstate Comparisons

Total costs for the two baler and one cuber model enterprises presented in Table 2 were compared with similar operations in California¹ and New Mexico². Comparisons were made through the ranges of possible annual outputs from 1,000 to 7,000 tons. Results are graphically presented in Figure 1.

Production costs per ton for both balers and cubers were highest in California and lowest in New Mexico. Arizona costs fell between those of the other two states. Baling costs were lower than cubing costs with one exception. For output levels of approximately 4,300 to 7,000 tons per year, New Mexico cubing costs were less than California baling costs. No attempt was made to compare returns and profit levels for baling and cubing among the three states.

Conclusions

Interpretation of the data may be masked to a certain degree by the hay price situation prevailing in 1968. Much of the alfalfa hay that year was heavily contaminated by DDT. As a result, hay prices were significantly lower than usual.

The higher net profit received by



Figure 3. Another view of the hay cubing equipment with piles of cubes behind the machinery.

cuber operators results not from a cost advantage but from a price advantage because hay handlers and feeders prefer the convenience of the small compact cubes as opposed to the larger, bulkier bales. Demand for alfalfa hay cubes and the higher net returns per ton of cubed hay lead the economists to forecast that more hay harvesting firms will adopt hay cubing machines in the future. The rate of adoption of the cubing machines will be affected by the profitability of the

machines relative to the returns to management and capital used in alternative enterprises. As more hay harvesters adopt the cubing machines and demand for hay cubes is more nearly satisfied, the rate of adoption may decrease.

¹ California Grain and Feed Association and the University of California cooperating. Proceedings: Alfalfa Cubing and Wafaring Conference, Davis, California, June, 1966.

² Canady, John D., A Market Performance Analysis of the New Mexico Alfalfa Hay Market in 1968. (Unpublished Master of Science degree thesis, Department of Agricultural Economics and Agribusiness, New Mexico State University, 1969).

Table 1. High Low, and Weighted Average Dollar Profits Per Ton For Alfalfa Hay Harvesting Operations In Arizona, 1968.

	Contract baling			Custom baling			Contract cubing			Custom cubing		
	high	low	avg.	high	low	avg.	high	low	avg.	high	low	avg.
Returns Per Ton	\$24.00	\$20.00	\$22.34	\$ 8.50	\$ 8.50	\$ 8.50	\$33.50	\$27.00	\$28.68	\$12.00	\$12.00	\$12.00
Fixed Cost Per Ton	2.17	3.27	2.39	1.60	3.18	2.39	3.34	4.74	2.91	2.49	4.74	2.91
Variables Cost Per Ton	19.75	20.78	20.94	2.11	5.51	2.94	21.42	23.28	21.54	3.12	5.28	3.54
Total Cost Per Ton	21.95	24.05	23.33	3.71	8.69	5.33	24.81	28.02	24.45	5.61	10.02	6.45
Net Profit Per Ton	2.05	-4.05	-0.99	4.79	-0.19	3.17	8.69	-1.02	4.23	6.39	1.98	5.55

Table 2. Total Costs, Total Returns, Net Profits, and Net Profits as a Percentage of Total Cost For Four Model Hay Operations in Arizona, 1968.

Operation	Total Cost Per Ton	Total Return Per Ton	Net Profit Per Ton	Ratio of Net Profits To Total Cost Per Ton
<i>Contractual Harvesting</i>				
2-baler	\$22.09	\$22.34	\$ 0.25	1.13%
1-cuber	23.85	28.70	4.85	20.34%
8-baler	21.81	22.34	0.53	2.43%
4-cuber	23.11	28.70	5.59	24.19%
<i>Custom Harvesting</i>				
2-baler	4.09	8.50	4.41	107.88%
1-cuber	5.85	12.00	6.15	105.13%
8-baler	3.81	8.50	4.69	123.10%
4-cuber	5.11	12.00	6.89	134.83%