

Arizona Hay Price - Quality Relationships

Published by the
ARIZONA AGRICULTURAL EXPERIMENT STATION
THE UNIVERSITY OF ARIZONA
Tucson

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ARIZONA HAY

Price-Quality Relationships

by ROBERT C. ANGUS¹

INTRODUCTION

Alfalfa hay is one of the primary crops in Arizona. During 1962 1,008,000 tons were produced on 210,000 acres. Approximately half the acreage is located in Maricopa County with large acreages in Yuma, Pinal, and Cochise counties, Table 1. Alfalfa ranked second only to cotton on an acreage basis²

Table 1. Estimated Alfalfa Acreage by Counties in 1962.

Counties	Acres cut for hay	Counties	Acres cut for hay
Apache	2,500	Mohave	2,500
Cochise	14,600	Navajo	5,100
Coconino	600	Pima	2,600
Gila	300	Pinal	17,500
Graham	7,300	Santa Cruz	1,700
Greenlee	1,300	Yavapai	6,000
Maricopa	104,000	Yuma	44,000

Source: The Arizona Crop and Livestock Reporting Service, Phoenix, Arizona.

In terms of cash receipts alfalfa ranked sixth behind cotton, cattle, vegetable crops, dairy products, and feed grain. Cash receipts from hay reached 27.1 million dollars in 1962. This represented five percent of the total value of crop and livestock products produced in Arizona.

The production and marketing system for alfalfa hay appears more commercial in Arizona than in other western states. In the first place, Arizona alfalfa growers deal with much larger annual hay production per farm. The volume of hay per sale was 282 tons in Arizona. More than half of the Arizona producers sell all the hay they produce.

Unlike many other farm products the market for hay appears diverse. Buyers represent dairies, feedlots, cooperatives, or hay dealers not engaged in production. There are producers who sell hay in excess of their feeding needs or buy to fill deficits.

The fact that transactions often take place over the phone con-

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²Arizona Agriculture 1963, Bul. A-25, Agricultural Experiment Station and Co-operative Extension Service, The University of Arizona.

tributes to geographic diversity. The situation is complicated by alternative conditions of sale. In addition, alfalfa hay has a heterogeneous character. Variations in the content of legumes, grasses, and other plants are associated with differences in hay. Soil, climate, and management differences also contribute. The number of subjective factors involved in hay quality, color, leafiness, and texture makes standard grades difficult to define and apply. The diversity of the alfalfa market combined with lack of information and grades can lead to an inefficient market.

This study was initiated to define the basic characteristics of the alfalfa market in Arizona. It was thought that the lack of information and grades could result in situations where price differences exist for hay of the same quality and fail to exist for hay of different qualities. Hay pricing was examined in this study with respect to U. S. grades and the associated market characteristics.

Procedure

Samples of hay were obtained from producers in the Yuma and Salt River Valley areas. Producers to be included were selected by driving through each area at different times during the season and locating hay which was being baled or which had been baled recently. The use of formal random sampling techniques would have been prohibitively expensive because a list of all the alfalfa producers was unavailable. Such a procedure would have required elaborate arrangements with the producers because baled hay moves off the farm very quickly.

Producers provided information concerning the price of the hay, the type of buyer, and the conditions of sale represented by each sample. If hay was not sold at the time of the initial interview, producers mailed the information after transactions were completed. The samples consisting of four to five pound wafers removed from each bale were in turn forwarded to the Hay Grading Office of the U. S. Department of Agriculture in Portland, Oregon. An official inspection certificate reporting the federal grade was issued for each sample. Correlation and analysis of variance techniques were used to investigate associations between the price and the various aspects of the federal hay grade.

Prices and Market Characteristics

Three price aspects, the general level, the seasonal pattern, and the price for a specific lot of hay are important in market evaluation. In theory the general level of hay prices of Arizona would be affected on the demand side by the number of cattle in feedlots and dairies in both Arizona and southern California and pasture conditions. The supply of hay would be affected by the acres of alfalfa under cultivation in both states, the availability of substitute feeds, weather, and hay produced elsewhere. Drought in areas where hay is produced without irrigation has been associated with high price levels in Arizona. The average prices of hay in Arizona for the last five years are presented in Table 2.

Table 2. Seasonal Average Prices Received by Arizona Growers for Alfalfa Hay.

Year	Price per Ton (dollars)
1958	25.50
1959	25.80
1960	26.33
1961	23.50
1962	24.60

Source: Arizona Crop and Livestock Reporting Service, SRS, USDA, Phoenix, Arizona.

Pronounced seasonal hay price patterns exist for the Salt River Valley and Yuma County areas, Figure 1.³ Seasonal high prices for alfalfa in the Salt River Valley area occur during the winter from December to late March. Hay is sold from storage during this period. Winter prices in the Salt River Valley are considerably higher than in the Yuma County area. A portion of this difference — two to three dollars per ton — can be explained by differences in the stage of marketing. Salt River Valley price quotations were FOB the warehouse while prices for Yuma County area are quoted at the roadside.

The second seasonal price plateau occurred from late March until late June. Prices for spring hay dropped from the winter high in the Salt River Valley but rose slightly in the Yuma area. The change in price quotations from FOB warehouse to bales in the field accounts for part of the price decrease in the Salt River Valley. Large quantities of spring hay are purchased for dairies because of the fine quality and low concentration of pesticides. This price plateau terminates in late June when the hay becomes coarse and less succulent.

Summer hay, produced from late June to early October, is sold to cattle feeders and prices hit seasonal lows. Prices recover during early October and December when temperatures moderate. Fall hay, which is fine-stemmed, approaches spring hay in quality.

Individual lot prices depend upon the general level of hay prices, the date of sale, and the circumstances concerning the sale. Condition of sale includes the particulars concerning means of transportation, number of cuttings, and the volume of hay per sale. These factors are discussed in the following paragraphs in order to picture the institutional structure of the Arizona alfalfa hay market.

Type of Buyer

Buyers of hay were classified into seven categories: local dealers, dealers in the feeder area, brokers, truckers, marketing cooperatives, feeders, and others. Sixty-eight percent of the transactions were accounted for by local dealers, dealers in the feeder area, and sales

³Hay Market News, Federal Market News Service, U. S. Department of Agriculture, AMS, 297 Wholesale Terminal Building, Los Angeles 21, California.

direct to the feeder, Table 3. Statistical analysis fails to show a significant relationship among types of buyers and the price paid for hay.

Table 3. Distribution of Hay Sales in the Sample with Respect to Type of Buyer.

	Number of Sales	Percent of Sales
Local Dealer	14	20
Dealer in Feeder Area	17	24
Broker	12	17
Direct to Feeder	17	24
Trucker	3	4
Marketing Cooperative	1	10
Other	1	1
Total	71	100

Condition of Sale

Baled hay was usually sold in the field, loaded at the farm, or delivered. Over eighty percent of the sales investigated applied to hay baled in the field and loaded at the farm, Table 4. In other areas of the

Table 4. Condition of Sale for Transactions in the Sample.

	Number of Sales	Percent of Sales
In the Field	32	46
Loaded at the Farm	31	45
Delivered	6	9
Total	69	100

West hay is often sold on the stump. This type of sale was not found in the Arizona sample. The relation of price and condition of sale was found to be statistically significant for Arizona. Discussions with hay dealers indicated that a generally accepted set of price differentials were used by the industry in adjusting prices to condition of sale.

Number of Cuttings

Arizona differs from the remainder of the West in that a greater number of cuttings of alfalfa are obtained. Alfalfa production under irrigation and the mild climate of Arizona allow farmers to obtain five to eight cuttings, Table 5. In fact, twenty-seven percent of the pro-

ducers interviewed claimed five cuttings were normally obtained; thirty-three percent claimed six cuttings; seventeen percent claimed seven cuttings; and eleven percent claimed eight. The number of cuttings depends upon the number of irrigations and management. In some cases potential cuttings are pastured or are not irrigated when hay prices are unfavorable.

There was a general agreement among the producers interviewed that the first cutting hay sold for the best price, Table 6. A substantial number of the producers answered that the first and last cuttings or the first and second cuttings sold for the highest price. A few farmers indicated that the sixth or seventh cuttings sold for the highest price. There is a slight discrepancy between actual performance of the seasonal pattern and farmers' opinions on price. It is true that the first

Table 5. Number of Cuttings Obtained by Arizona Alfalfa Producers Interviewed.

Cutting Number	Number of Producers	Percent of Producers
1	0	0
2	0	0
3	3	4
4	4	6
5	19	27
6	24	33
7	12	17
8	8	11
9	1	1
10	1	1

Table 6. Producer Estimates of the Cutting or Cuttings of Alfalfa Which Normally Sell for the Highest Price.

Number of Cutting	Number of Producers	Percent of Producers
First	48	67.6
Second	1	1.4
Third	1	1.4
Fourth	0	0.5
Fifth	0	0.5
Sixth	4	5.6
Seventh	2	2.8
First and Last	7	9.9
First and Second	8	11.3
	71	100.0

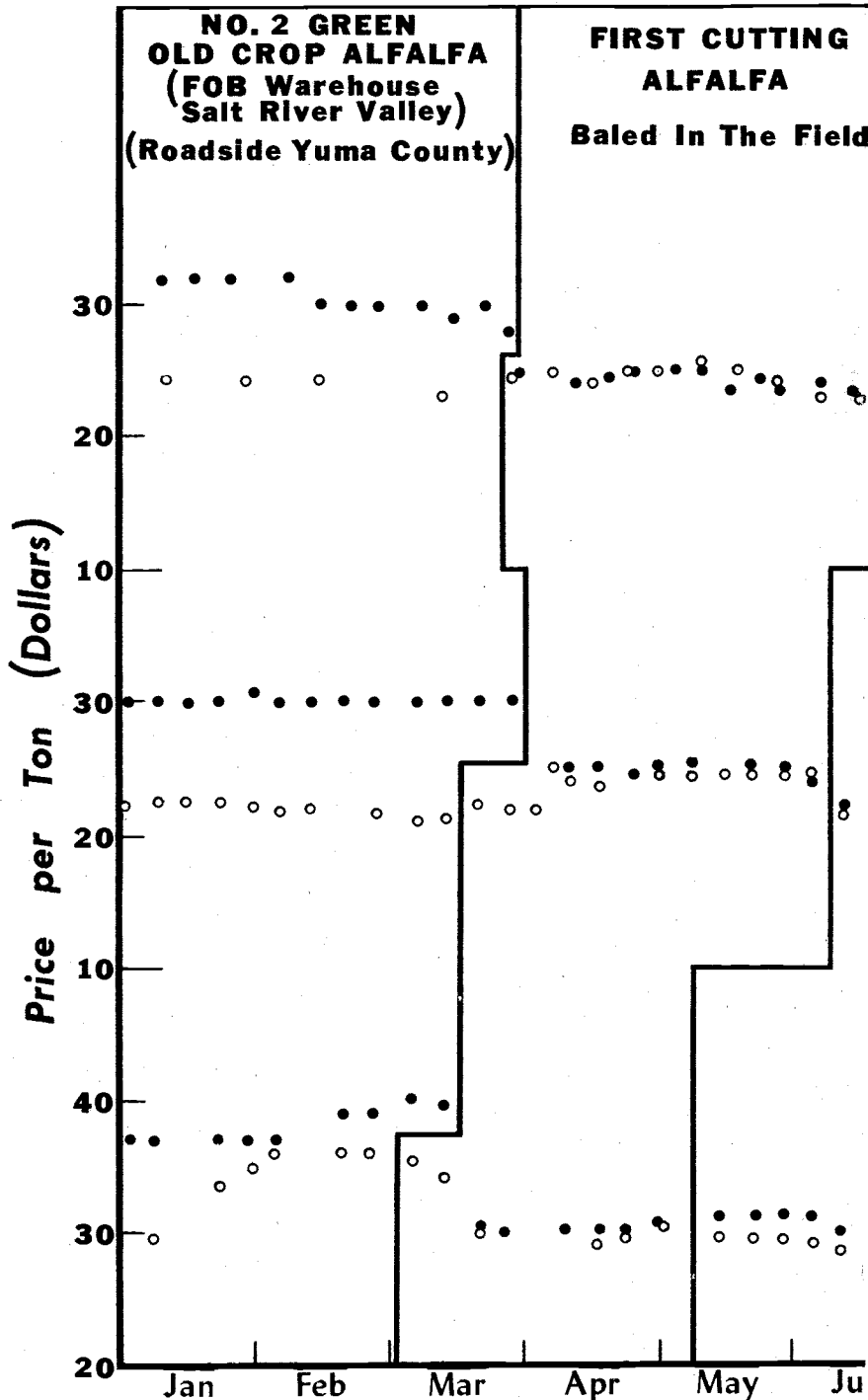
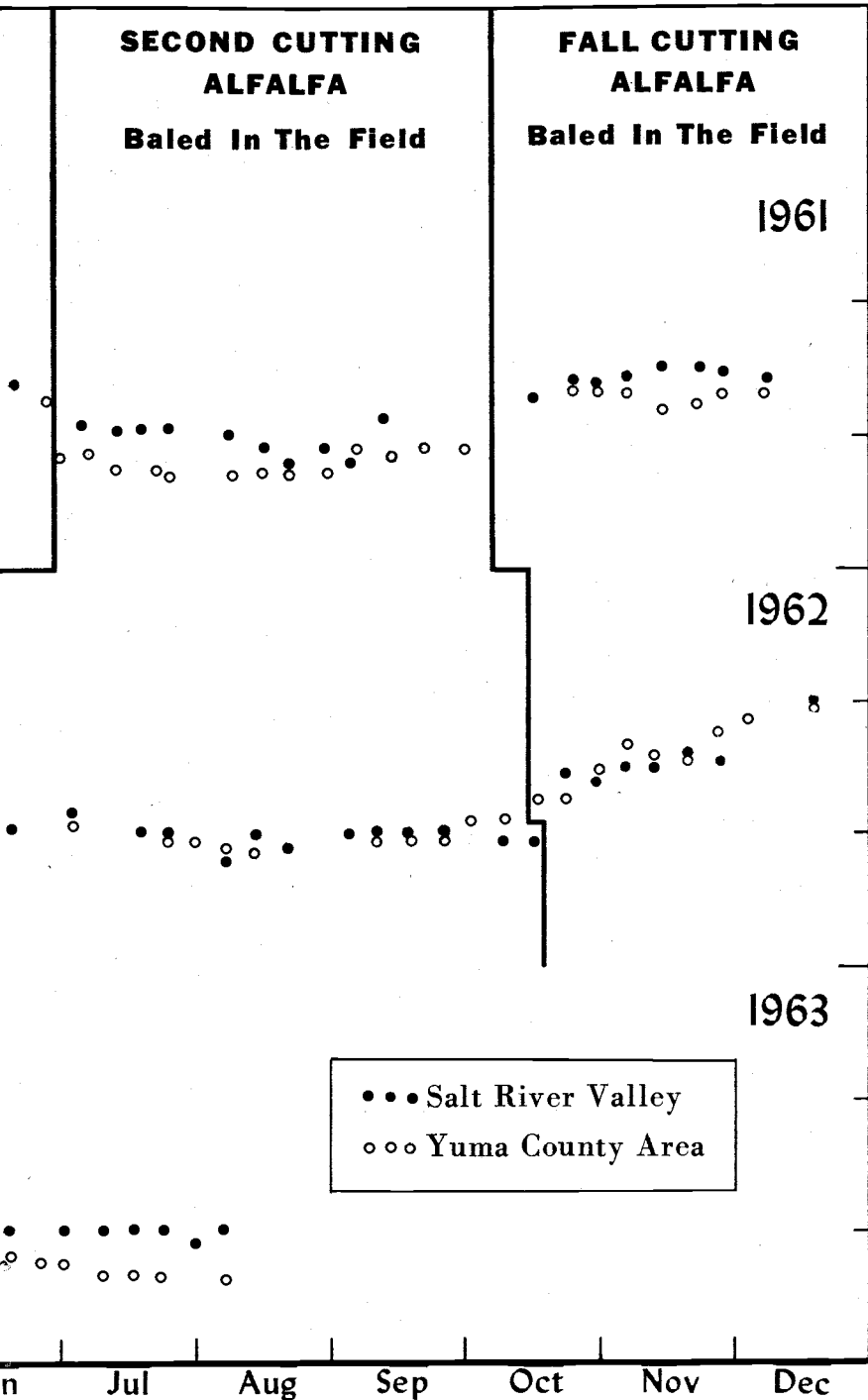


Figure 1. Seasonal Hay Price Patterns.



cuttings and the last fall cuttings sell at about the same level and considerably above the summer cuttings. This is probably what the farmers described. In the Salt River Valley, at least, the farmers appeared to ignore the possibility of storing hay for sale during the early winter months. Hay sold from storage during these months appears to obtain the highest price. The relationship between price and cuttings was confirmed by statistical analysis.

Volume of Hay per Sale

The volume of hay per sale was obtained from each producer along with the quantity of hay produced per year and the quantity of hay sold per year. Nearly half of the producers interviewed indicated sales of over 100 tons. These larger sales average 529 tons per sale. The average of all sales investigated was 282 tons, Table 7.

Table 7. Volume of Hay per Sale.

Volume per Sale (tons)	Number of Sales	Average Volume per Sale (tons)	Total Volume
1-19	8	10.2	82
20-39	9	23.3	210
40-59	8	45.1	361
60-79	6	67.5	405
80-99	5	86.0	430
100 and over	35	528.9	18,512

Hay producers represented in this sample average 2,346 tons of hay produced per year. Of this figure 2,156 tons of hay were sold. In contrast to the remainder of the West, Arizona hay producers are large in terms of hay produced as well as in terms of hay sold. This serves to emphasize the commercial nature of alfalfa hay production in Arizona.

PRICE AND QUALITY

Comparison of hay prices and quality requires a set of standards on which to judge quality. Quality is a nebulous thing. Buyers vary in the importance they place on different characteristics of hay. The best defined measures of quality are the federal hay grades published in the Handbook of Official Hay and Straw Standards.⁴

The federal standards define alfalfa to include not more than ten percent of other large plants. The hay is rated as to content of foreign material, percent of green color, percent of leafiness, coarseness, or fineness of stems. Basic hay grades are U. S. number 1, 2, 3, and sample. Modifiers such as extra green, extra leafy, green, or leafy are used to indicate hay with special characteristics within each class. A remark

⁴*Handbook of Official Hay and Straw Standards*, USDA, Agricultural Marketing Service, Grain Division, Revised, July 1949.

Price per Ton

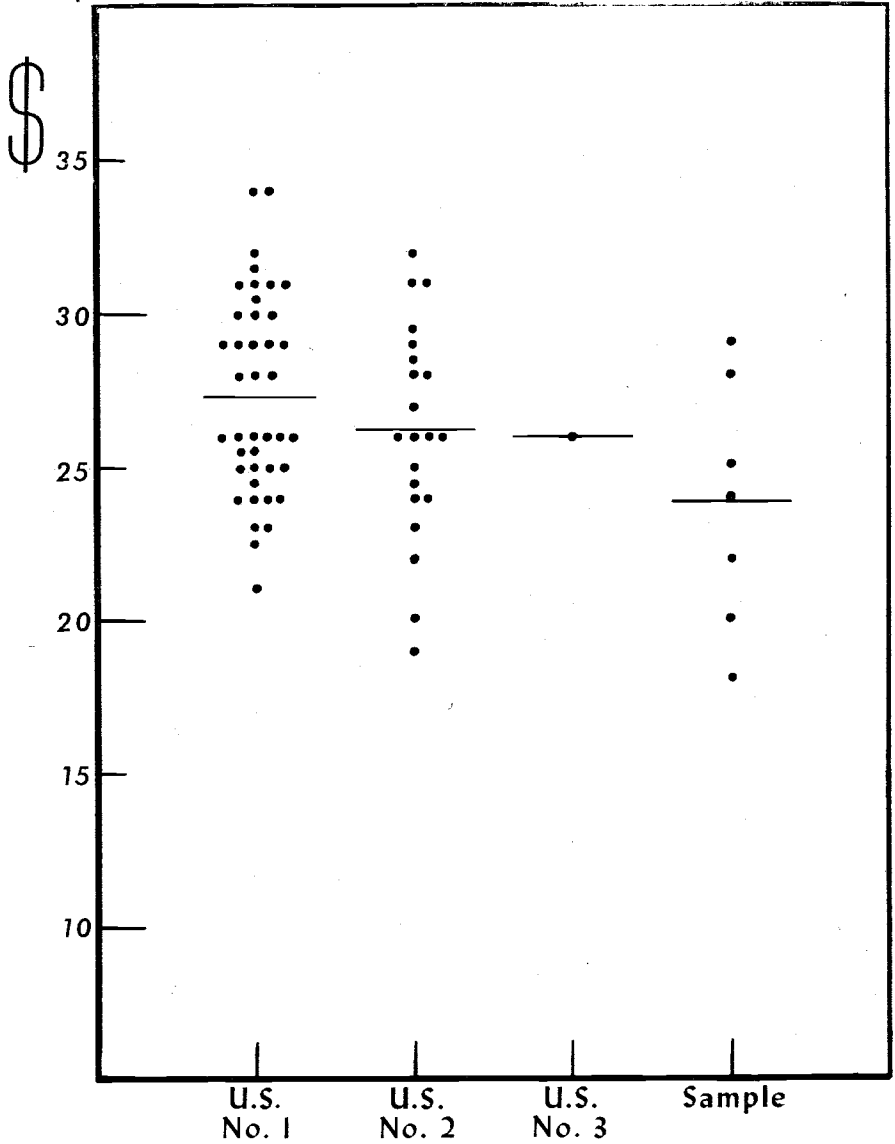


Figure 2. Distribution of Hay Prices by U. S. Grade.

section is included in the grade certificate. These remarks include the percent of leaves, the percent of green color, and the percent of farm material found in the samples. Thus, the inspection certificate provided numerical criterion for evaluating each sample of hay. Statistical techniques were used to associate price with the various characteristics of the alfalfa hay.

Relationship of Price to Grade

One major objective of a grading system for a commodity is to obtain price premiums for the better grades. In other words the higher the grade the higher the price. When the average price for each grade of alfalfa was compared, this relationship appeared to exist. The prices averaged \$27.37 for U. S. number 1; \$26.17 for U. S. number 2; \$26.00 for U. S. number 3; and \$23.71 for sample grades. However, the ranges of prices for U. S. number 1, 2 and sample grades were very large, Figure 2. There was a great deal of over-lap in prices of these grades. Statistical analysis designed to consider average price differences between grades in light of price variation within each grade indicated that the price differences found were not as large as expected if a significant relation between price and grade existed. In summary, evidence of a significant positive relation between prices and grade was not found.

Relationship of Price to Percent of Leaves

It was thought that if price was not related to grade, it might be related to percent of leaves. No relationship was found between the price paid per ton of alfalfa hay and the percent leaves reported on the inspection certificate, Figure 3. The prices for U. S. number 1 alfalfa hay with fifty percent leaves ranged from \$23 to \$34 in Arizona. Wide variations were found for the other grades as well. The price variation of alfalfa hay of similar grades must be due to other factors.

Relationship of Price to Percent Green Color

The results of comparison of price and percent green color are similar to the comparison of price and percent leafiness of hay. Again no relationship was found between prices and percent of green color. Figure 4. Wide variations in price were found for hay of a given percent green color. It appears as if percent green color of hay is not a criteria used by buyers and sellers in arriving at a price.

Price per Ton

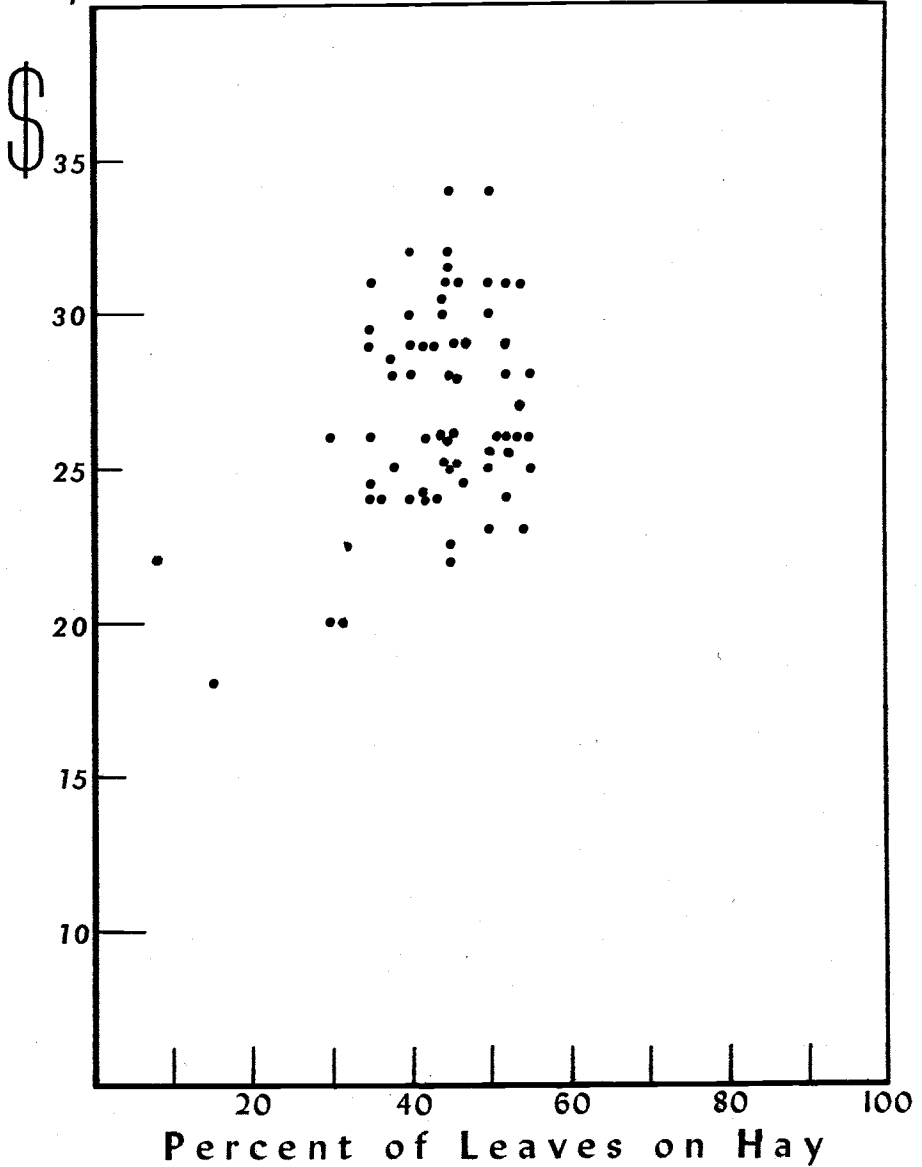


Figure 3. Distribution of Hay Prices by Percent of Leaves of Hay.

Price per Ton

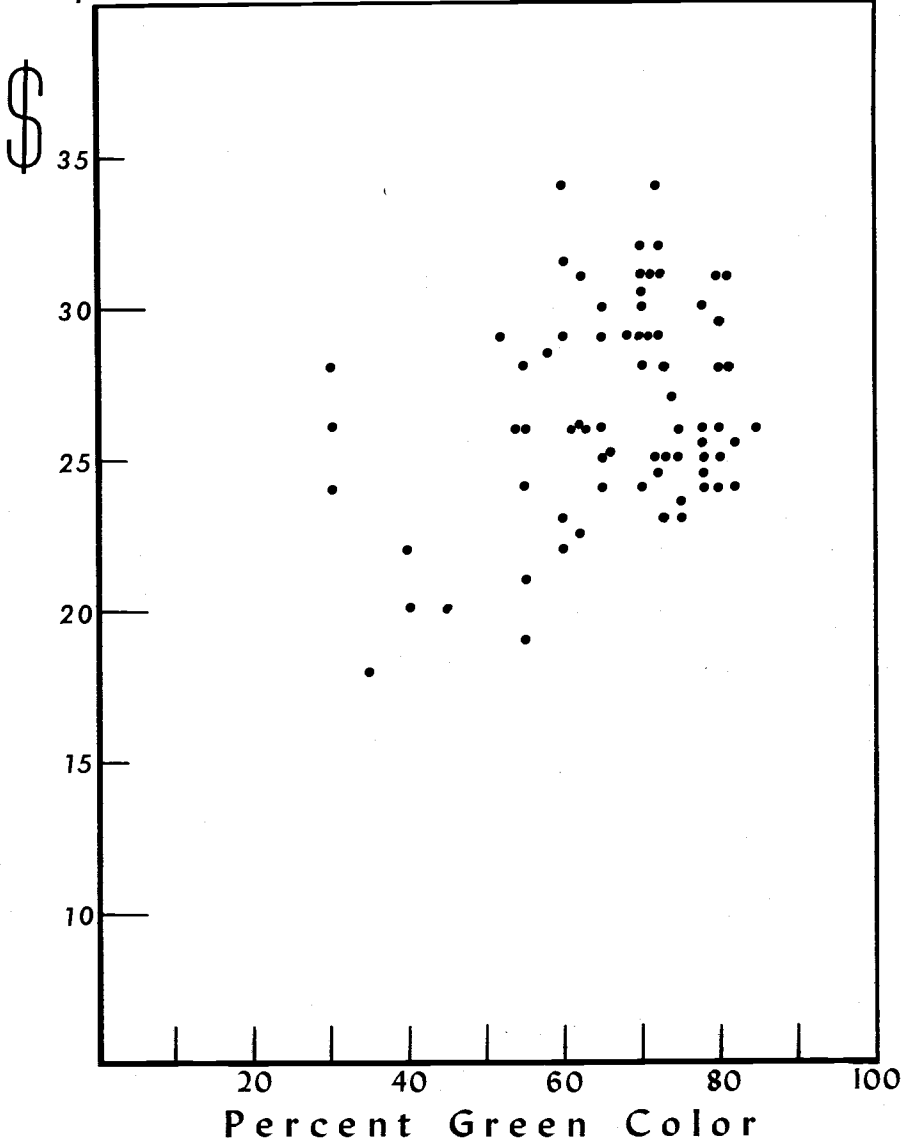


Figure 4. Distribution of Hay Prices by Percent Green Color.

SUMMARY

Purpose of this study was to describe the hay marketing industry in Arizona as well as to define the relationship between hay prices and hay quality. The data were obtained from interviews with producers. Hay samples were graded by the U. S. Department of Agriculture, Hay Grading Office in Portland, Oregon. General results on structure indicated hay sales and production in Arizona were very large. In addition, the percent of hay sold was large. In short, Arizona has a distinctly commercial hay marketing industry.

As far as the relationship between hay prices and U. S. grades are concerned, U. S. grades were not significantly related to prices paid for the hay. In addition, subfactors included in the grade — that is percent leafiness and percent green color — were not significantly related to price. Apparently other factors are related to price. Few Arizona producers were found to use federal hay inspection. The federal hay standards do not play a large role in the institutional market structure for alfalfa hay in Arizona. Thus there appears to be no significant relationship between price and quality on the assumption that U. S. grades reflect quality differences.

It would have been interesting to examine the relationship between date of sale and price paid by cutting numbers and by quality of hay. This type analysis, however, was hampered by the lack of data. The results of this study, however, suggest the need for quality standards in the marketing of hay. It would be of interest to both buyers and sellers of hay to have a good indication of the quality of product which is exchanged. Hay standards would help insure that the producers of a high quality product would enjoy the premium from its sale provided it was in demand. The study suggests that the hay standards presently defined may not be appropriate. Considerable training and skill are required to inspect and grade hay. There are few hay inspectors in Arizona. In addition, the U. S. grades for alfalfa may actually fail to reflect quality. Perhaps a simple chemical test of protein content and/or of other chemical properties of hay would be more appropriate than the present standards. It is the author's opinion that the characteristics of hay in terms of feeding value must be better defined by the animal scientist before a meaningful set of standards can be defined and applied.

