ALFALFA QUALITY - CAN PRODUCERS AND USERS GET TOGETHER?

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I accepted this assignment with great reluctance. I have approached this subject from about every conceivable point of view, making charts, tables, graphs, etc., and wrestling with the subject mentally while reviewing all of the various ideas that have been presented in times past. There are many view points and different considerations that must be taken into account, depending on supply and demand, whether you are buying or selling, what kind of soil you have (heavy clay and/or salty, alkaline soils produce slower growth and higher quality), what your local climate is, and a number of such variable factors. There are, however, a number of points of view which need to be mentioned that I believe we are all in agreement about. There may be others, but those that occur to me include:

1. The dairy industry is the principal consumer of alfalfa hay in the State, using about 60 percent of the total, followed by beef with 25 percent, horses with 10 percent, and export plus miscellaneous uses, 5 percent. We may actually use more for horses than I have credited, and the beef use is difficult to tie down which may indicate that less than 60 percent is used for dairy cattle.

2. Although our acreage has fallen by 110,000 acres in the last four years, yield increases have held alfalfa production at around 6,600,000 tons yearly, down just 300,000 tons from our peak acreage year of 1971.

3. Dairy cows, beef calves and feeder cattle fed high-quality alfalfa hay (low fiber high protein, weed free, free of dust, mold) eat more, waste less, produce more milk and meat, and are more profitable.

4. High quality, immature alfalfa hay costs the grower more to produce due to a shorter stand life, greater harvest costs, increased weed control costs, and most important, lower yields.

5. Most producers recognize that buyers cannot afford complete compensation for increased costs to produce high quality alfalfa hay. Most users have not been willing to compensate the producer sufficiently to encourage his all-out production of high quality alfalfa hay. This is the area of concern.

What is a reasonable compromise so that the seller feels that he is being compensated at least partially for his extra costs, and the buyer is able to satisfy himself that he is lowering his cost of production by purchasing, and paying extra for, high quality hay? Let's examine some of the grower's direct costs if he is producing high quality alfalfa, cut immaturely, with reduced yields (for more information on these subjects, see "How Cutting Schedules and Varieties Effect Yield, Quality, and Stand Life", Proceedings, Fourth California Alfalfa Symposium, December 1974).

Stand Life. A 1976 alfalfa cost study dated October 1976, from Kern County, indicates a stand establishment cost of $158.35 with a three-year depreciation of $52.80 per year. Many producers will tell you that their accounting records show the need to plug in about a $50.00 stand depreciation cost every year. What kind of savings occur if that stand can be made to last four rather than the three years? This will reduce the cost to $39.59 per year, for a yearly savings of about $13.00 per acre, or a cost of about $1.50 per ton with a yield level of 8.5 tons per season. This $13.00 per year is a direct cost for decreased stand life that should be charged to the production of high quality alfalfa hay.

Harvest Costs. A direct comparison of harvest costs between producing average or *good* and high or *excellent* quality alfalfa hay (see "Alfalfa Hay Testing", UC Leaflet 2323, formerly AXT-290), is difficult at best. Most agree that at least one additional cutting will be required, and often two per season are necessary, to produce hay higher than 54 percent TDN. In the San Joaquin Valley seven cuttings are normally taken, with six a normal number for alfalfa grown on heavy soils. The same Kern County cost study cited above indicates that some harvest costs such as swathing and turning are on a contract basis which totals $6.00 per swathing and turning; other costs such as baling and road siding are on a contract cost of $14.00 per ton. I am going to assume approximately $10.00 per harvest as

a reasonable cost which should be charged against every complete harvest. Who should pay for this extra $10.00 per year or $1.18 per ton (8.5 tons per acre per season) cost generated by the one extra cutting to produce higher quality alfalfa?

Lost Production. This extra cost is a lot easier to document since there are many figures that can be used. Table 1 illustrates one set of data developed at Davis over 20 years ago on the second cutting taken in May of 1955. This table merits your careful scrutiny, particularly the first three columns if you are a consumer, and the last three if you are a producer. This information tells us that in the ordinary maturing of this cutting of alfalfa, the cutting had to be taken in the early flower bud stage in order to produce 53 percent TDN hay or above. Yields continue to increase, substantially, until the 1/2 bloom stage. I want to particularly call your attention to the 0.6 ton per acre increases in yield obtained in going from bud stage to 1/10 bloom and again from 1/10 bloom to 1/2 bloom. These data do not show a near equal yield for 1/10 bloom and 1/2 bloom such as we have been led to believe from research done here at Davis in this same period of time. I have checked these old experiments very carefully and find that the investigator left out the weight of the first cutting each year, wishing to start each of the stages of maturity out on an equal basis. My research shows that harvesting at an immature stage of maturity the previous year has a profound effect in reducing the first cutting yields when compared to more mature cutting frequencies!

I have previously referred you to the Proceedings of the Fourth California Alfalfa Symposium for a dicussion on the effects of cutting schedules and varieties on yield, quality, and stand life. I have taken the data from this study and attempted to relate the yield relationships which I found between 50 percent bud, 10 percent bloom, and 50 percent bloom, to the price of hay graded equivalent to U.S. No. 1, No. 2 leafy, and No. 2 for a large area around Fresno. This is summarized in Table 2. These data confirm that hay cut in the bud stage will average about 53-54 percent TDN, with some cuttings higher and the mid summer cuttings lower. I am assuming that the price relationship for the three U.S. grades compares to the three maturity stages listed. The yield relationships among the three show about a 2 tons per acre yield decrease as we produce more immature hay by decreasing the days between cuttings, and increasing the cuttings per season from six to seven and eight. By multiplying tons per acre for the three stages times the dollar value found June 14, 1976, we arrive at a gross dollar value per acre, with the dollar difference per year also indicated. This type of comparison adds up to a total of $111.00 difference in gross income between producing hay in the bud stage and hay in the 50 percent bloom stage. Remember that proper dollar value has been credited based on 1976 summer hay prices and the yield relationship found in a three year study here at Davis. If the data were available, it would have been better to have used the yearly average price for these three grades, but that information is not yet available for the 1976 season.

I have attempted in Table 3 to illustrate the price per ton a grower would need to compensate for changing his system to a new practice. I have also related this on a dollars per ton premium needed. For example, if your present practice is to cut hay in the 10 percent bloom stage, and you are satisfied with that yield, but wish to know how much premium you would need to equal the same income if you cut at the 50 percent bud stage, then you would consult the first row of figures which indicate that you would need to sell your bud stage hay at $86.50 per ton, a premium of $8.50 above the $78.00 which the Federal State Market News Service indicates as a price for hay equivalent to U.S. No. 1 grade. But if you are producing hay that is 50 percent bloom, and want to know what you would have to receive per ton if you reduced your cutting interval and produced hay in the 50 percent bud stage, the $95.50 price is $17.50 per ton more than the quoted price of $78.00. This latter price differential is too great to expect based on the prices between U.S. No. 1 and U.S. No. 2 hay of $5.00 per ton in this example. The Market News Service Report for November 1, 1976 indicates a delivered price differential between U.S. No. 1 and U.S. No. 2 alfalfa of $9.00 per ton and $7.00 per ton in the Los Angeles dairy section and the Petaluma area, respectively

The cost of producing high quality hay will vary depending upon what quality of hay you are presently producing, and whether or not you are satisfied with the income that is generated. To assign a dollar value per ton will obviously not fit all situations but it appears to me that there is at least a $10.00 per ton cost attached to the production of high quality hay, classified as excellent (bud stage), or U.S. No. 1, compared to that classified as good (50 percent bloom), or U.S. No. 2.

There are other considerations. Usually immature hay is higher in moisture, and if sold without a long storage period, there is an advantage to the producer. Also, it's been demonstrated repeatedly that immature alfalfa is unable to compete as effectively against weeds

and consequently immature alfalfa normally wi be weedier, especially in the first, fourth fifth, and last cuttings.

It is obvious that the consumer cannot afford to pay the entire $12.68 per ton premium ($1.50 per ton for decreased stand life, a $1.18 per ton premium for extra harvest costs, and $10.00 per ton for decreased tonnage). The fact is that many producers, in the San Joaquin Valley at least, rotate out their alfalfa at the end of three years for its affect on subsequent crops. In addition, there are superior varieties available today in every dormancy category, that have resistance to phytophthora root rot, a major stand thinning disease. This fact, taken with better water management, can keep a productive stand for four years, even when cut a little more frequently. As yet, the bulk of the acreage in the San Joaquin Valley is not planted to these new improved varieties.

Another compromise area would be in the charges for an extra harvest. Both stand loss and extra harvest costs are a little intangible. Most producers are willing to compromise and swallow most of these costs in their own operation. The most tangible loss is in lost income due to lower production resulting from producing higher quality alfalfa.

The present price structure does provide a price premium for high quality alfalfa that varies from $3.00 to $6.00 per ton. This is 25 to 50 percent of the entire cost of $12.68 per ton to produce this quality. Obviously, many producers do not feel that that is enough, or we would have more high quality alfalfa hay in the market place. If producers are willing to absorb the stand costs, increased harvest costs, and penalty for weedier hay, it appears that hay users should consider an additional premium in order to obtain the quality of hay they desire.

What Is The Solution?

Alfalfa consumers, particularly dairymen and a few beef men who understand the value of quality alfalfa, have been successful in securing high quality alfalfa above 54 percent TDN. Table 4 summarizes the TDN analysis from 467 samples received at the Petaluma Hay Analysis in 1975 (P.O. Box 948, Petaluma, CA 94952). Even though these samples were already preselected for high quality, only 188 or 40 percent graded 54 percent TDN or above. Only the first and sixth cutting consistently gave this quality alfalfa, although some high quality alfalfa was obtained from all cuttings, although very little from the fourth cutting. Since the summer months offer the greatest opportunity for high production through increased maturity at harvest (see Figure 1), producers should recognize that they are better off to increase days between the third and fourth, and fourth and fifth cuts, and produce more tons in the summer, and take a discount on this hay. Dairymen can then fill their requirements during other parts of the season when higher quality hay is naturally easier to produce and when there is less of a yield penalty if you grow immature hay. Figure 2 shows that throughout the season, frequent cutting is the only way to produce hay above 54 percent TDN. The only exception to this is where alfalfa is grown under some kind of stress conditions such as heavy soils which don't produce a tall, stemmy alfalfa, or where salt or alkali cause reduced growth. That quality is influenced by soil type is shown in Table 5, which illustrates that 1/2 bloom alfalfa from San Joaquin Valley clay loam soils is about the same quality as bud stage hay produced on San Joaquin Valley sandy loam soils. These results came from an extensive survey conducted throughout the State that were categorized by soil type. The same general situation exists in Imperial County.

Summary

I believe that the hay producer and user can get together. It involves a recognition by both of the other's legitimate needs. I believe this can be done, with certain changes, on the basis of Dr. Bath's proposal presented at the December 1974 Symposium (see "Buying and Selling Alfalfa Hay on the Basis of a Chemical Analysis", Proceedings, Fourth California Alfalfa Symposium, December 1974). This proposal is weighted too heavily in favor of the purchasor, since the base 22 percent modified crude fiber (MCF) or 54 percent TDN is not ordinarily produced. Dr. Bath has proposed that dairymen pay a premium of $1.50 per ton for each percentage less than 22 percent MCF, and that the grower be penalized $1.50 per ton for each percentage above 22 percent MCF (below 54 percent TDN). My modifications of Dr. Bath's proposal would include:

1. Using 23 percent MCF (53 percent TDN as a base, to more realistically approach what is sold as top priced hay.

2. Increase the premium, and the penalty to $2.00 per ton for hay above or below 23 percent MCF, or 53 percent TDN. This more nearly approximates the penalty growers are already taking for lower quality hay, and would make it possible to recoup more of the costs involved in producing high quality alfalfa hay. The $2.00 premium is still lower than the added nutritional value of the increased quality if it were replaced by barley and cotton seed meal, and more accurately reflects the present price of feed grains and alfalfa hay.

3. A 10 percent moisture base is unrealistic, and should be modified in any pricing structure to at least 13 percent moisture. At this level hay will have shrunk from its 17 to 18 percent at baling time. Very little hay is at 10 percent moisture when sold out of first hand unless it has been stored for a long period of time. With this percentage, both have compromised, not the producer only which is the case at 10 percent moisture.

If growers and users would accept these modifications, and recognize that visual inspection so hay can be guaranteed free of weeds, mustiness, dustiness and mold are necessary parts of a contract, then I think we have the basis for common agreement on the value of alfalfa quality.

Table 1 Alfalfa composition at 6 stages of maturity U.C. Davis 1955
Second cut.

	% TDN[1]	ENE[1]	% C.P.	Days growth	Interval growth rate[2]	Tons per acre
Pre bud	60	510	30.9	18	67	0.6
1% bud	56	467	26.9	22	160	1.0
62% bud	53	438	25.2	26	200	1.4
1/10 bloom	52	419	21.3	31	240	2.0
1/2 bloom	49	387	19.1	36	240	2.6
Full bloom	50	400	16.9	43	-57	2.4

ENE as kilocalories/lb.

[1]90% dry matter basis.

[2]Pounds per day per added days of growth.

Table 2. Yield and dollar value relationship between different quality alfalfa.

U.S. Grade	Maturity	Yield T/A	Yield %*	$ value bale-pile T/A**	$ value bale-pile gross/A	$ difference per year	TDN* %
1	50% bud (8)	6.5	77	78	510	--	54
2 leafy	10% bloom (7)	7.4	87	76	562	52	52
2	50% bloom (6)	8.5	100	73	621	59	51

* Percent data based on 3-year average values at U.C. Davis, 1971-73.

** Federal-State Market News, June 14, 1976 for Fresno-Kerman-Madera and Hanford-Tulare, lowest quoted price.

Table 3. Prices needed for equal income for change to higher quality alfalfa hay.

Present production	New production	$/ton needed to compensate	$/ton premium needed
10% bloom	50% bud	86.50	8.50
50% bloom	10% bloom	83.90	7.90
50% bloom	50% bud	95.50	17.50

Table 4. 1975 summary of all samples submitted to Petaluma Hay Analysis.

Cutting	No. of samples	Average TDN %	% above 54% TDN	Average dry matter - %	No.
	85	55.7	82.8	85.0	70
2	113	53.7	43.3	86.3	49
3	121	53.1	26.5	86.4	32
4	66	52.1	11.9	86.6	8
	73	53.2	29.4	85.3	21
	9	55.4	89.4	85.0	8
	467		40.0		188

Table 5. Effect of location on quality. Percent TDN (90% dry matter).

	Bud	1/10 bloom	1/2 bloom
San Joaquin Valley II	56.1	54.7	53.1
San Joaquin Valley IV	59.1	57.8	56.1
Imperial I	58.0	57.8	55.5
Imperial III	59.4	58.5	56.5
Imperial IV	59.1	58.5	57.1

I = Sandy soil
II = Sandy loam
III = Loam
IV = Clay loam

FIGURE 1

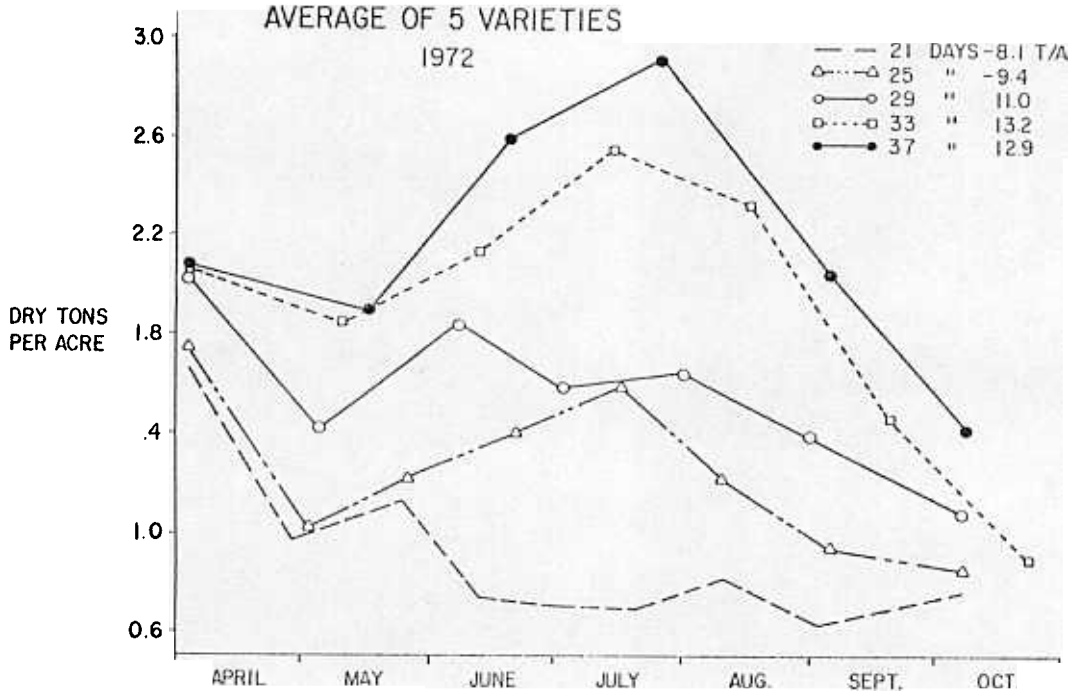

FIGURE 2