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# Alfalfa Hay Quality Survey

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The need for hay standards that precisely express forage feed value to hay producers and buyers has long been recognized. Visual examination of hay provides only an estimate of its feed value. In addition, long-distance transport of much of the hay grown in Oregon further underscores the need for standardized quality evaluation of hay.

## NEW HAY GRADING STANDARDS

The American Forage and Grassland Council and the Federal Grain Inspection service have proposed new hay grading standards based on visual examination and chemical testing procedures. Visual examination evaluates the stage of maturity, leafiness, color, odor and condition, and foreign matter contamination of hay. Chemical analyses evaluate the feeding value of hay by testing for moisture, crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF). A calculation is then made to determine the relative feeding value (RFV) of the hay.

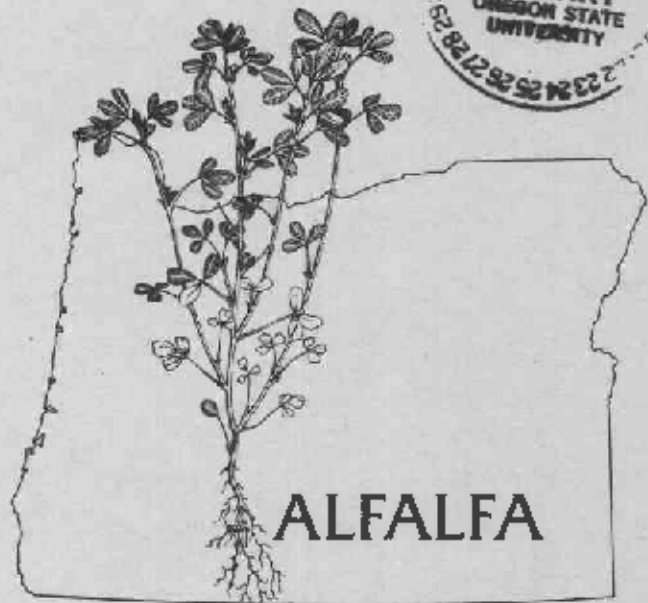
## STATEWIDE SURVEY

To determine how alfalfa hay produced in Oregon would test in this new grading system, an alfalfa hay quality survey was initiated by the Klamath Agricultural Experiment Station. Alfalfa hay was collected from five separate regions of Oregon which correspond to the Oregon Hay Growers Association (OHGA) districts (Figure 1).

During 1977 and 1978, 433 samples, representing 3 or 4 cuttings for each region, were collected. Analyses were performed for CP, NDF, ADF, *in vitro* dry matter digestibility (IVDMD), calcium (Ca), and phosphorus (P).

## RESULTS

Although significant differences among districts and cuttings were observed for some of the analyses, the more important aspect of this hay quality evaluation was the lack of differences



from district and cutting (Figures 2 through 5). The consensus in Oregon has been that certain higher-elevation alfalfa-producing regions were able to produce significantly higher-quality hay. However, these data suggest that factors other than geographical region or cutting are more important in determining hay quality. Considering a sample base of 433 samples from five state districts with three or four cuttings in each, representing two years' data, the chemical variation was quite low. Crude protein concentration mean values for district and cutting varied less than 2 percentage points, as all values were between 16.9 and 18.8 percent CP.

Analyses for NDF and ADF were similarly within a narrow range of values as evidenced by the RFV calculations. Mean

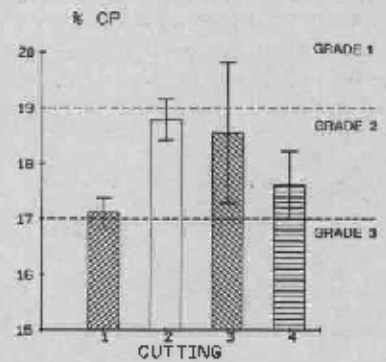
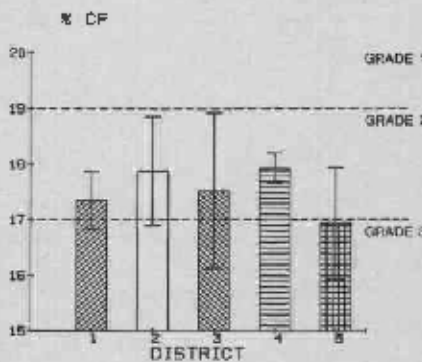


Figure 1. Oregon Hay Growers Association districts. Districts 1 to 5 are characterized by elevations of: <1,500 feet, 3,000 to 3,700 feet, 2,000 to 2,500 feet, >4,000 feet, and <1,500 feet, respectively.

Figure 2. Percent crude protein (CP) and 95 percent confidence intervals of alfalfa hay from the five OHGA districts.

Figure 3. Percent crude protein (CP) and 95 percent confidence intervals of alfalfa hay from four cuttings.

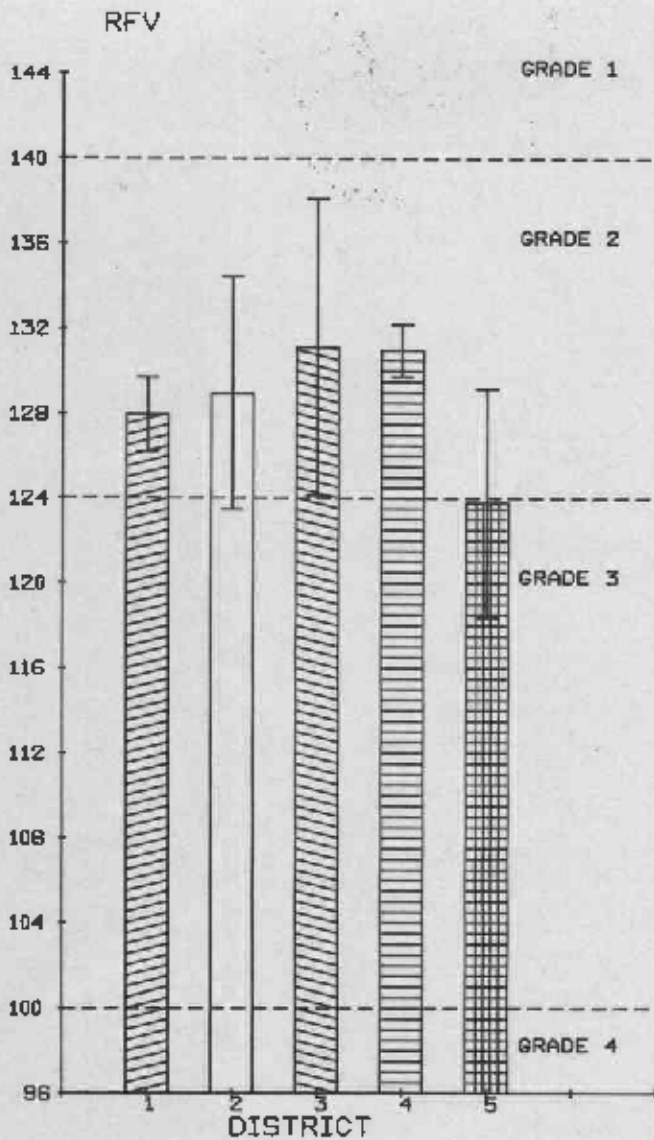


Figure 4. Relative feed values (RFV) and 95 percent confidence intervals of alfalfa hay from the five OHGA districts.

values for RFV for districts 1 through 4 and all cuttings were within 124 to 140, the range presently defined as Grade 2 alfalfa. District variation ranged only seven RFV units.

The consensus that high-altitude hays are of higher quality cannot be wholly discounted by the data in this study, as Districts 2, 3, and 4 were higher in CP and RFV while lower in NDF and ADF. However, the narrow range of values for all analyses does indicate a greater possibility for high-quality alfalfa to be grown in diverse climatic regions and management systems than previously thought.

### CONCLUSIONS

Factors other than location and the cutting during the year are more important in determining hay quality. The most important management decision for producing high-quality alfalfa hay is cutting at the proper stage of growth. Cutting in the late bud stage when plants have a high proportion of leaves and low proportion of indigestible fiber will result in the highest quality hay. Crude protein will be high while NDF and ADF values will be low in this early cut hay (Table 1). Relative feed values (calculated from NDF and ADF) of hay cut at this stage of maturity will be 140 and above.

These data indicate the need for more careful quality examination rather than simply purchasing hay at a premium price

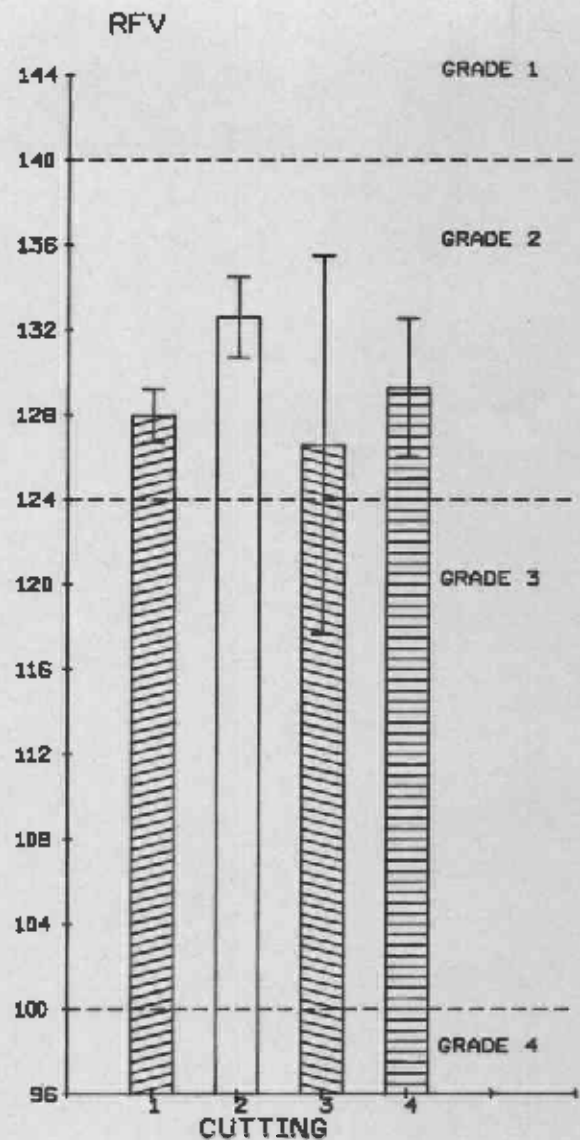


Figure 5. Relative feed value (RFV) and 95 percent confidence intervals of alfalfa hay from four cuttings.

from a particular area. Results may be viewed as representative of a greater potential for obtaining high-quality hay from areas not previously identified for high-quality hay.

Table 1. Proposed market hay grades for alfalfa based on chemical composition—crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), and the calculated relative feed value (RFV).\*

Grade	Stage of maturity	CP	NDF	ADF	RFV
			Percent		
1	Bud	>19	<40	<31	>140
2	Early bloom	17-19	40-45	31-35	124-140
3	Mid bloom	13-16	46-51	36-41	101-123
4	Full bloom	<13	>51	>41	<100

\*Table was compiled from Rohweder, D. A., and J. E. Baylor, 1980, Forage and Grassland Progress, Vol. XX.

This project was initiated in 1977 by Lonnie D. Allison, former agronomist at the Klamath Agricultural Experiment Station, Klamath Falls, and Lester R. Vough, former Extension agronomist, OSU crop science department.