THE NEVADA METHOD FOR PREDICTING ALFALFA QUALITY

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Alfalfa is Nevada's most important agronomic crop. The Nevada Crop and Livestock Reporting Service estimated Nevada's 1980 hay production at 753,000 Tons. A substantial amount of this hay is transported and sold in California. Considerable variation has been observed between predicted forage quality values of the same hay analysed in both States (Speth, 1979). This has led to confusion in hay marketing for Nevada and California alfalfa hay producers and consumers. Because of the variation in predicted feed values the system is under a process of reevaluation. The Nevada system was based upon hay quality evaluation in the early 1960's; however, since that time studies have been conducted with different qualities and forms (baled hay, cubes and pellets) when fed to beef and dairy cattle as well as sheep.

The Basis for the Nevada System of Alfalfa Evaluations

Hays produced in areas with 90, 118, 140 and 239 day growing periods were evaluated in metabolism and digestion studies. In all, there were hays from three areas, three cuttings and four years for a total of 36 lots tested. This information was first reported by Speth et al. (1965) and later by Speth et al. (1978). In that study, crude protein (CP) varied from 11 to 21% and crude fiber from 23 to 43%. The gross energy value of these feeds was 4.3 mcal/kg for all feeds. The average protein, fiber, fat, ash and NFE values were 15.9, 33.9, 2.9, 9.4 and 37.9 percent, respectively. The mean digestion coefficients for these nutrients was 71.5, 49.5, 49.5, 47.4 and 78.2 percent, respectively. The average TDN, digestible energy (DE) and digestible dry matter values were 61.2, 63.5 and 63.9 percent, respectively.

The Nevada Quality Test

The Nevada alfalfa quality evaluation includes the determined drymatter, acid detergent fiber (ADF) and crude protein in addition to predicted crude fiber, digestible protein and net energy for maintenance (NEm) and gain (NEg). From the several chemical fractions that were related to DE, protein and ADF were selected to estimate this value in the Nevada test procedure. Protein was used in addition to ADF because it is a nutrient which has a minimum level which must be supplied in livestock rations. Because of similarity of digestible energy and TDN values expressed as a percentage they have at times been used interchangeably. However, it would have been more precise to use a regression relationship particularly for TDN.

The Nevada TDN value is estimated from the average arrived at from dividing the protein and ADF (using autoclave) predicted TDN by two. For example, an alfalfa sample having 16% protein and 30% ADF would have an estimated TDN value of 61.1% = ((40.12 + 1.47 x 16) + (81.75 - 0.62 x 30))/2. In the Nevada system, all values are based on a 100% dry matter. In addition to the TDN energy value, the feeds NEm and NEg is also tabulated and is calculated from the TDN value (Church, 1977). Many feeds in the literature have crude fiber values so this value was estimated so that the feed tested could be related to others in tables of feed value. Crude fiber was calculated as follows: CF = 3.78 + 1.058 ADF. The digestible protein was estimated from crude protein by subtracting 4.4 from the crude protein value.

Concerns Over the Nevada Evaluation Process

The major concern that users have with the Nevada system is that it is not the same as the California system. In some respects there are few similarities in that different chemical tests are used for the purpose of predicting the feeds digestibility. For example in California MCF is used as a sole index and Nevada uses ADF and protein. Also there is a great variation between predicted values such as TDN. The variation in percentage units of TDN can vary as much as 10 units. Nevada tests are based on 100% drymatter and the California system uses 90% drymatter. All of these factors contribute to the lack of similarity of the two systems of alfalfa evaluation; yet, there is fairly good agreement in ranking alfalfa's relative worth in terms of digestibility. Thus, the real concern is establishing a precise value that gives alfalfa hay its proper worth relative to grass hay, grains or by products.

Improving the Alfalfa Hay Evaluation System

There is one major deficiency in both California and Nevada systems and that is that quality is limited to the feeds relative energy worth with no value placed on the feeds protein and no emphasis placed on the palatability of different hays. The need for placing a value on protein is obvious to one who had occasion to purchase protein supplements during the past several years. The importance of palatability is associated with the realization that greater intake means greater feed efficiency of an animal. In a recent study by Armstrong (1981) it was shown that for each additional pound of grain added to the basic alfalfa diet of growing cattle that the animals total intake was increased by 0.2 pounds. It would seem that low fiber alfalfa hays would also enhance total feed intake. If palatability was a factor in alfalfa evaluation there would be a greater spread in worth between what we now know as low, medium and high quality hays. This, in turn, would give a greater incentive for producing high quality alfalfa hay.

In a recent study by Ulbrich (1981) in which nine different lots of hay were fed to growing steers (mean wt = 930 lb), intake was measured and associated with chemical fractions of the alfalfa hays. Table 1 shows the relationship between the feed MCF values (dry basis) and estimated TDN (based on Meyer and Jones, 1962), estimated total intake and estimated feed efficiency. It is interesting to note that the regression predicted feed efficiency, when ranked using the high fiber feed as 1.00, that this ranking could also have been calculated by multiplying the TDN ranking by the intake ranking. The future forage evaluation system must include intake as well as TDN in the quality estimate.

Table 1. Comparison Value of Low and High Fiber Hays Based Upon Estimated TDN, Estimated Intake and Estimated Feed Efficiency.

	Alfalfa MCF, %		
	26	28	32
Alfalfa TDN, %	58.8	57.1	53.7
Ranking	1.09	1.06	1.00
Alfalfa intake, lb	23.3	22.2	20.1
Ranking	1.16	1.11	1.00
Pounds feed/pound gain	12.6	13.8	16.2
Ranking	1.27	1.18	1.00

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