Officially Graded Hay and Its Chemical Composition


HAY is graded on the basis of its odor and physical appearance. It is assumed that such characteristics are associated in varying degrees with feed value and chemical composition. It is the purpose of this paper to present new and more specific data on these relationships.

The important physical characteristics that can readily be evaluated have been listed by Pollock and Hosterman (6) as follows: (1) stage of maturity or ripeness when cut, (2) percentage of leaves, (3) percentage of natural green color, (4) percentage of foreign material, (5) size and pliability of stems, and (6) aroma.

The U. S. hay standards (8) provide for such an evaluation of hay. Data on the relationship between graded hay and its feeding value are extremely limited. Feeding trials have been conducted in order to determine the value of some officially graded hay. This procedure has been expensive, time-consuming, and often inconclusive, the results applying only to a few types of hay.

This paper reports the chemical analyses of officially graded samples of hay collected from numerous farms as part of a survey study of the quality of hay produced in New Jersey.

PROCEDURE

Hay samples were collected from 10 dairy farms in each of 8 New Jersey counties during the 4 winter feeding periods 1948-49 through 1951-52. The mows of hay were sampled 5 times during the winter, once each month from November through March. A bale "slice" or sample of at least 6 pounds was taken from the hay currently being fed to the dairy animals. Samples were assembled monthly at the New Jersey Experiment Station for official grading.

After the samples were graded, they were ground and subsampled for chemical analysis. The analyses consisted of quantitative determinations of crude protein, crude fat (ether extract), crude fiber, ash, and moisture content. The methods were those of the Association of Official Agricultural Chemists (1). The nitrogen-free extract content of each hay sample was computed by difference. All values other than moisture were based on a 10% moisture basis.

RESULTS AND DISCUSSION

A total of 1,775 samples of hay, representing all hay classes, were collected from New Jersey farms. The important hay species in the various mixtures were red clover, alfalfa, red clover, and timothy. Found in relatively large amounts were alsike clover, ladino clover, bromegrass, orchardgrass, ryegrass, bluegrass, reed canarygrass, red top, and weedy-type grasses. Over 60 types of weeds and foreign material were identified.

On the basis of average legume content, hay classes were predominantly legume and 7 classes grass (See table 1.)

The data in tables 1 and 2 give evidence that as the legume content of the hay decreased, the crude protein and ash decreased and crude fiber increased. This is in substantial agreement with investigations (7, 10) in regard to the naturally higher protein and mineral content and lower carbohydrate content of legumes compared with grasses when cut at a given moisture level.

There were exceptions to these trends that are worthy of note. Classes containing relatively large amounts of red clover (Clover Hay and Clover Mixed Hay) were significantly lower in crude protein and ash than alfalfa hay. The mixed hay classes of similar legume content also were significantly lower in crude protein than alfalfa hay. The grass component of both classes consisted predominantly of immature bromegrass, crabgrass, or timothy. The presence of the immature grass in the mixture decreased the crude protein content of the hay and at the same time reduced the percentage of crude fiber.

Evidence that the requirements for the class "alfalfa hay" are overly strict is suggested by these data. Data from feeding trials support this observation. Gordon, et al, (4) found that feeding dairy heifers Alfalfa Mixed Hay gave greater gains than Alfalfa Heavy Grass Mixed Hay and also Alfalfa Heavy Grass Mixed Hay gave greater gains than Alfalfa Light Grass Mixed Hay. The average chemical composition of hay samples collected from New Jersey farms is presented in table 2.