Effects of hay quality on milk production and hay intake by dairy cows

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ALFALFA HAY usually provides at least half of the roughage used for California milk production by dairy cows during some portion, if not all, of the 365 days of the year. It may be the only source of nutrients for dairy cows on grade B dairies during the winter season. Selection of alfalfa hay is a major management consideration for California dairymen because the nutritive value and feeding quality are highly variable. An accurate gauge of the nutritive value of a given lot of hay is the level of crude fiber it possesses. A method for evaluating nutritive value from the crude fiber content has been developed by the California Experiment Station. Commercial laboratories, using this method, have been available to test samples of hay submitted by progressive dairymen.

A special opportunity to test the hay sampling and evaluation concept occurred in 1965 when, on August 12, a 0.97-inch rain fell in the Sacramento Valley town of Orland, wetting approximately 10 tons of fourth cutting alfalfa hay in the swath. It was sold to Chico State College dairy at a discounted price. The previous cutting of hay from the same field, which had a lower crude fiber content, had also been purchased by the college. Both lots of hay were leafy, retained good green color, were free of weeds or any signs of mustiness, and showed bloom in the bale.

A trial testing production response of milk cows fed the low quality hay as compared with higher quality hay (made from the same field at the previous cutting) was conducted at the Chico State College dairy in cooperation with the University of California Agricultural Extension Service. The higher quality, lower fiber hay is referred to as the “control hay” in this report.

Twenty-two cows were selected for a double reversal trial, and were divided into two groups of 11 cows each, penned in adjoining lots. One cow became ill and was removed from her group; a like animal was taken from the other group to compensate. One group of cows was fed the low quality hay for the first three weeks of the trial. For the next three weeks they were fed the control hay, and then returned to the low quality hay for the final three weeks of the trial. The other group started on the control hay, was switched to the low quality hay during the second period, and returned to the control hay during the third period. Milk production and feed consumption data from the last two weeks of each period were used in the analysis of the results, with the first week used as a change-over period.

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Hay was fed “free choice” morning and evening. Core samples were taken from each bale of hay, and the hay was weighed for each feeding. The weight of the refused hay was recorded each week, and grab samples were taken for analysis.

The cattle in both groups received the same concentrate mix which was fed in the milking parlor at the ratio of 1 lb of concentrate to 4 lbs of milk. A “teaser” of 4 lbs per day was given to all cows. Average concentrate intake by all cows on the trial was 13.8 lbs per day.

Milk weights were recorded at each milking, and proportionate samples of milk were taken to make a weekly composite for fat and solids-not-fat determinations. The Babcock testing method was used for fat, and the Golding bead testing method was used for solids-not-fat determinations.

The U.C. modified crude fiber content (MCF) method for prediction of total digestible nutrients was used on all hay samples. Crude protein analyses were conducted on all feed samples. The results of these analyses are shown in table 1. The control hay was 0.85% higher in protein and 6.43% lower in MCF than the lower quality hay.

Milk production data are shown in table 2. The average amount of milk produced during the trial was 39.1 lbs per day. When fed the control hay, the cows produced 2.3 lbs more than when fed the low quality hay. There were differences of 0.08 lb of milk fat, 2.2 lbs of 4% fat-corrected milk (FCM), 0.26 lb of solids-not-fat (SNF) and 0.14% SNF in favor of the control hay. All of the above differences were statistically highly significant (P<0.01). Of the measurements recorded, only the milk-fat percentage showed no significant difference between treatments.

The palatability of the low quality hay also was affected as evidenced by the hay consumption figures in table 3. Average dry matter consumption of hay was 27.3 lbs per day with a difference of 5.79 lbs in favor of the control hay. The crude protein intake was 1.43 lbs greater on the control hay. Both of these differences also were statistically highly significant (P<0.01).

The economic analysis of the trial would be difficult to extend to other management conditions. The decrease in feed costs in this trial, due to the decreased consumption of the lower priced, low quality hay, was greater than the monetary value of the milk lost due to the low quality hay. However, it should be recognized that the trial lasted only nine weeks and the cattle were fed the low quality hay for periods of only three weeks. The effects of feeding low quality hay might have brought about a greater decrease in production and loss in income if the fat reserves of the cows fed the lower quality hay were depleted by a longer feeding period.

The results of this trial demonstrate the depression in hay intake and milk production that takes place when poor quality hay is fed to dairy cows. Grade B dairymen may be able to make short-term savings in feed costs by using discounted low quality hay. However, grade A dairymen desiring to maintain a continuous high level of milk production in their herds must continually feed high quality hay. The economic advantages in purchasing discounted low quality hay, if they exist, may be nullified at a later date if the cows deplete their body fat reserves.

The best method for assuring the purchase of high quality hay remains the modified crude fiber analysis for prediction of total digestible nutrient content developed by the California Experiment Station. When this chemical analysis is used in conjunction with visual inspection of the hay, the dairymen be sure that he is using the best tools available today for evaluation of hay quality.

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