

# Dairy Cattle

## **NUTRITION and MANAGEMENT**

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### Feeding Value of Reconstituted Sorghum Grain for Dairy Cows

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#### Story in Brief

Rations containing finely ground air-dry and reconstituted (70 percent dry matter) sorghum grain were compared in a feeding trial using 21 lactating dairy cows. The grain comprised 80 percent of a concentrate mixture on a dry basis. This mixture and alfalfa hay were fed in sufficient quantity to provide all the cows would consume, with only the restriction that concentrates comprise no more than 60 percent of the total dry matter intake.

Reconstituted grain was consumed more readily than ground grain, possibly because of the small amount of molasses in the concentrate mixture. Milk yield and composition were similar for cows fed grain processed by the two methods. Apparent digestibility of different components of the ration and gross efficiency of feed utilization were not affected by ration treatments. Reconstituted sorghum grain and finely ground grain were equal in feeding value for high producing dairy cows on a dry basis.

#### Introduction

The feeding value of reconstituted and finely ground sorghum grain for lactating dairy cows has been compared in two previous experiments. In 1973, workers at Texas A&M reported an increase in actual milk yield and net efficiency of cows fed reconstituted grain compared to cows fed finely ground grain; however, milk fat percentage was decreased. In contrast to previous work at this station (OK MP-96, 1976), milk yield of cows fed reconstituted grain was nearly the same as that of cows fed finely ground grain, and milk fat percentage was slightly higher. No differences were observed in gross or net efficiency of feed utilization. Similarly, other researchers noted no differences in production responses of lactating cows fed high moisture harvested sorghum grain (81 percent DM) preserved with organic acids compared to cows fed dried grain.

In the previous trial at this station, average feed intake and milk yield of cows were lower than desired in current dairy operations, leaving some question about application of the results to high producing herds. Thus, the objective of this study was to compare the feeding value of reconstituted and finely ground sorghum grain for high producing cows.

#### Materials and Methods

Sorghum grain was reconstituted to 30 percent moisture content and stored anaerobically in double polyethylene bags for at least three weeks prior to feeding. Very little spoilage occurred and the material appeared the same as high moisture grain

stored in oxygen-limiting structures. The air-dry grain was finely ground, using a 1/16 inch screen, resulting in particle size of 350  $\mu\text{m}$  geometric mean diameter. Sorghum grain comprised 80 percent of concentrate mixture (Table 1) on a dry matter basis.

Reconstituted grain was rolled before feeding and mixed with an appropriate amount of supplement to give the same proportion of ingredients as in the mixture with ground grain. Alfalfa hay was the sole roughage source for the cows.

During a preliminary period, 21 lactating cows (17 Holsteins and four Ayrshires) were adjusted to a ration of approximately 60 percent grain concentrates and 40 percent hay by limiting the amount of grain to this percentage of total intake. At about eight weeks after calving, the cows were assigned randomly to ration sequences according to a switchback design. The trial consisted of three six-week periods during which each cow received one type of grain, then the other, and finally the original type again.

Sufficient feed was given the cows so that there was refusal of at least 10 percent of either grain concentrates or hay. The only restriction was an attempt to keep the percentage of concentrates from exceeding 60 percent of total dry matter intake.

Milk yields were recorded twice daily, and samples collected at four consecutive milkings each week were composited for determination of milk fat and total solids percentage. Milk fat percentage was determined with a Foss Milko-Tester Mk II, and total solids was determined by drying a 3-ml sample in a forced-air oven for four hrs at 100 C.

Body weights of cows were recorded on three consecutive days at the start of the trial and during the last week of each test period. Digestibility of ration components by 14 cows was determined during the fifth week of each period with chromic oxide as an indicator. Rumen fluid samples were collected from 14 cows three to four hrs after grain feeding during the last week of each period for VFA analysis.

## Results and Discussion

Total dry matter intake was similar for cows fed rations containing reconstituted and finely ground dry sorghum grain. However, intake of dry matter as grain concentrates was consistently higher when cows were fed reconstituted grain than when fed ground grain. The apparent advantage in acceptability of the concentrate mixture containing reconstituted grain as compared to the mixture with ground grain was in contrast to results in the previous trial wherein total intake was lower.

The small amount of molasses in the concentrate mixtures used in this trial (Table 1) may have limited acceptability of the dry grain mixture, since concentrate mixtures with finely ground grain and 7 percent dried or liquid molasses were readily consumed by high producing cows in earlier experiments at this station (OK MP-87, 1972).

Milk yield of cows fed reconstituted grain was similar to that of cows fed ground grain (Table 2), even though the reconstituted grain was consumed more readily. Overall, daily yield of the cows in this trial was higher than that observed in similar trials, both at this station and elsewhere, and high enough that the results may be applied to high producing dairy herds. Average milk yield for all the cows at the outset of the trial was 76 lb/day. Cows in both groups gained weight during the trial as expected with the feeding conditions imposed; however, no advantage was noted for either treatment group.

Milk fat and non-fat solids percentages were similar for the two groups. Milk fat test for cows fed reconstituted grain was only slightly lower than that of cows fed dry ground grain which was consistent with observations on molar percentages of rumen VFA.

Although grain concentrates comprised a larger percentage of dry matter intake, on the average, when cows were fed reconstituted grain than when fed dry grain (55.8

**Table 1. Composition of concentrate mixture.**

Ingredient	Percent
Sorghum grain	80.0
Soybean meal (44%)	10.0
Oats, crimped	7.5
Molasses, liquid	1.0
Dicalcium phosphate	1.0
Salt	.5

**Table 2. Responses of cows fed reconstituted and ground sorghum grain.**

Item	Processing method	
	Finely Ground	Reconstituted
Feed DM intake		
Grain concentrate, lb/day	23.3	25.0
Alfalfa hay, lb/day	20.8	19.8
Milk yield		
Actual, lb/day	62.5	61.6
Fat, %	3.42	3.34
NFS, %	8.57	8.66
Feed efficiency		
Milk/total feed DM	1.42	1.39

vs. 52.8 percent), the percentage of concentrates exceeded 60 percent in only a few cases. Thus, it appears that no problem with milk fat depression should be expected from feeding cows reconstituted grain where the proportion of concentrates in the total ration is kept within acceptable limits.

Apparent digestibility of total ration dry matter, organic matter and protein were only slightly higher when cows were fed reconstituted grain compared to when they were fed ground grain. Similar results were obtained in a previous trial and are of interest in comparison to other work where sorghum grain comprised a larger percentage of the total ration. It appears that improvement in digestibility of the total ration due to reconstituting sorghum grain can be demonstrated only when the grain comprises a large part of the ration.

Finely ground and reconstituted sorghum grain were found to have equal feeding value on a dry basis. Thus, 100 lb of air-dry finely ground grain would be equal in feeding value to about 125 lb of reconstituted grain. However, reconstituted grain would be expected to be superior to coarsely ground grain, since the latter was 7 to 9 percent lower in feeding value than finely ground grain (OK MP-90, 1973).