

# Response of Different Sorghum Seed Classes to Reconstitution

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## Story in Brief

Three different varieties of grain sorghum differing in seed class (Waxy, Normal and Normal-BR) grown in Years 1 and 2 plus an additional Normal-BR in Year 3 were utilized to study the effect of variety on response to reconstitution. *In vitro* dry matter disappearance (DMD) on dry, finely ground samples of the grain sorghum showed the Waxy and Normal seed classes to be similar ( $P > .05$ ). These varieties were superior ( $P < .05$ ) to the dry, finely ground Normal-BR in Years 1 and 3. After reconstitution to 30 percent moisture for 21 days, the DMD values for the Normal-BR were generally elevated to a level similar to the Waxy and Normal seed classes.

These limited studies suggest varieties of grain sorghum may respond differently to reconstitution and that reconstitution may be especially useful for improving the digestibility of bird resistant sorghums. Generally, reconstitution appears to produce an improvement in digestibility over dry, fine grinding of sorghum and an equalization among varieties (i.e., less difference in digestibility is observed among seed classes when reconstituted than when dry, finely ground).

## Introduction

A major consideration in feeding grain sorghum as an energy source for ruminants is its apparently variable and lower feeding quality compared to corn. Possibly, much variability is due to the effect of variety or seed type. The effect of variety as mediated by grain processing is an area that is not well understood. Variable responses to processing of grain sorghum have been observed in many trials. The effect of variety may alter the processing response due to large variation among varieties.

The process of reconstituting grain sorghum to about 30 percent moisture and storing for 21 days under anaerobic conditions has been studied extensively. Reconstitution has often given a highly favorable response but the magnitude of the response has been variable. Generally, most trials do not report the variety or type of grain sorghum utilized. Therefore, variability may be due, at least in part, to varietal effects. Consequently, the purpose of this study was to examine the response of varieties differing widely in nutritive characteristics to reconstitution.

## Materials and Methods

Three grain sorghum varieties in Years 1 and 2 and four varieties in Year 3 were utilized to study reconstitution response. All grains were grown under similar dryland conditions for three consecutive years. Varieties and seed classifications are illustrated in Table 1.

A 200 g sample of whole grain was reconstituted to 30 percent moisture, placed in glass bottles, gassed with CO<sub>2</sub> and stored for 21 days. After the reconstitution period, each sample was ground through a 20-mesh screen in a laboratory Wiley mill prior to analysis. Dry ice was utilized to facilitate the grinding of the wet samples. Untreated grain from each variety was also finely ground (20-mesh screen) for analysis and comparison with the reconstituted grains.

*In vitro* dry matter disappearance (DMD) studies were used to measure ruminal digestibility of the grains. Fresh rumen fluid from a concentrate-fed steer was strained, mixed with buffer and placed in 50-ml centrifuge tubes containing 0.4 g of the ground sample. DMD was determined by difference after a 24-hr incubation period. All data were subjected to an analysis of variance according to Steel and Torrie (1960). Differences between means were detected using Tukey's HSD procedure protected by a preliminary F-test.

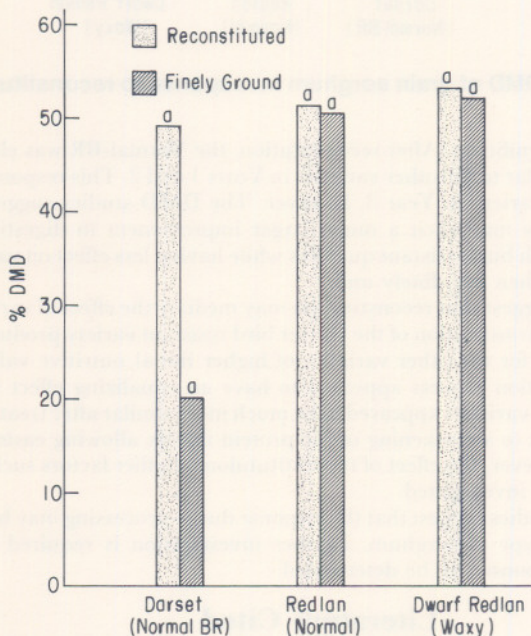
## Results and Discussion

*In vitro* dry matter disappearance (DMD) studies indicated that the reconstitution process produced a favorable response in all three years. In Years 1 and 3 (Figures 1 and 3) the dry, finely ground Normal-BR sorghum had a significantly lower ( $P < .05$ ) DMD than the Waxy or Normal seed classes. The Normal-BR was also lowest in Year 2

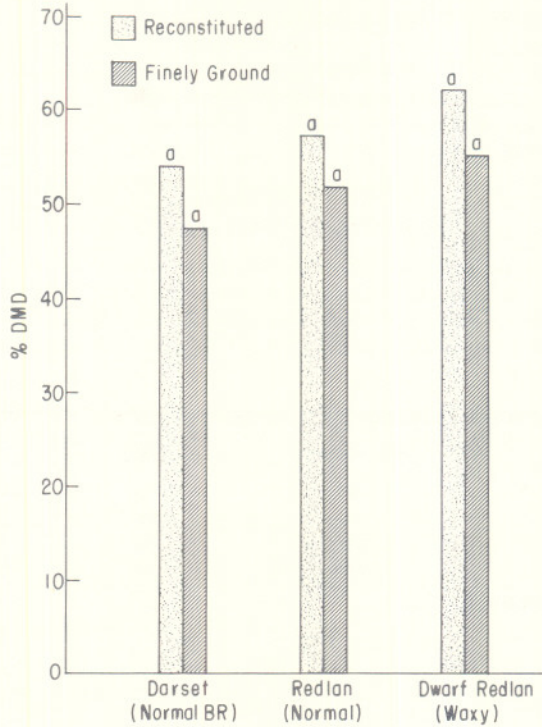
**Table 1. Descriptive characteristics of grain sorghum varieties.**

Variety	Bird resistant	Waxy	Seed class
Dwarf Redlan	no	yes	Waxy
Redlan	no	no	Normal
Darset	yes	no	Normal-BR
ROKY 78*	yes	no	Normal-BR

\*ROKY 78 represented only in Year 3.



**Figure 1. 24-hour DMD of grain sorghums in response to reconstitution (Year 1).**



**Figure 2. 24-hour DMD of grain sorghum in response to reconstitution (Year 2).**

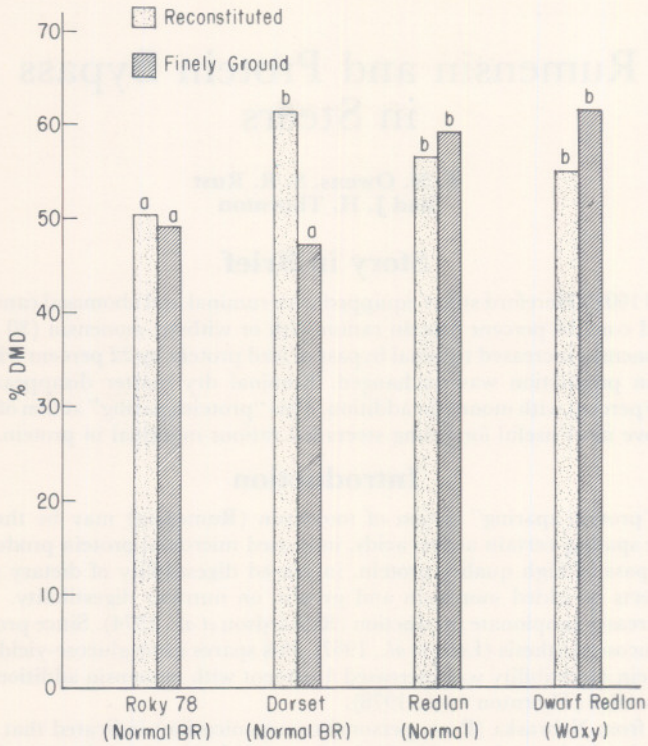
(Figure 2) but not significant. After reconstitution, the Normal-BR was elevated to a level statistically similar to the other varieties in Years 1 and 2. This response was true for only the Darset variety in Year 3, however. The DMD studies suggest that the reconstitution process may elicit a much larger improvement in digestibility from sorghum varieties with bird resistant qualities while having less effect on varieties that are better digested when dry, finely und.

These studies suggest that reconstitution may mediate the effect of varietal differences. Specifically, reconstitution of the Darset bird resistant variety produces a much larger response than for the other varieties of higher initial nutritive value. In this study, the reconstitution process appeared to have an equalizing effect in that the digestibility across all varieties appeared to be much more similar after treatment. This effect is probably due to a weakening of the protein matrix allowing easier access to starch granules. However, the effect of reconstitution on other factors such as tannin content has not been investigated.

These limited studies suggest that the response due to processing may be mediated by variety or seed type of sorghum. Further investigation is required before the generality of this response can be determined.

### Literature Cited

Steel, R. G. D. and J. H. Torrie. 1960. Principles and Procedures of Statistics. McGraw-Hill Book Co., New York.



**Figure 3. 24-hour DMD of grain sorghums in response to reconstitution (Year 3).**