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Digestibility of Wet and Dry Distillers Grains from the Fermentation of Corn or Sorghum

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Summary

A lamb digestibility study was conducted to evaluate differences in digestibility between distillers byproducts produced from the fermentation of corn or sorghum. Sixteen lambs were assigned randomly to one of four treatments consisting of corn wet distillers grains, corn dried distillers grains plus solubles, sorghum wet distillers grains, and sorghum dried distillers grains plus solubles. Fiber digestibility did not differ among treatments. Crude protein and organic matter digestibility were highest for corn wet distillers grains but lowest for corn dried distillers grains plus solubles. Sorghum wet distillers grains were higher in organic matter digestibility than sorghum dried distillers grains plus solubles. The nutritive content and feeding value of distillers byproducts may be effected by type of grain fermented and drying the grains with the solubles.

Introduction

Research conducted at the University of Nebraska has evaluated wet and dry distillers byproducts as energy sources for cattle. The majority of the research has been conducted with distillers byproducts resulting from the fermentation of corn. However, in the dry milling industry various cereal grains may be used to produce ethanol and distillers byproducts. The resulting byproducts have the potential to have a different feeding value when compared to byproducts produced from corn. A Nebraska trial (1995 Nebraska Beef Report, pp. 25-26) conducted by Lodge et al. indicated steers consuming diets containing distillers byproducts (40% of diet DM) produced from the fermentation of primarily sorghum gained less and were less efficient than previous research with corn byproducts would have predicted. These data imply that distillers byproducts produced from grain sorghum may have a lower feeding value than corn based distillers byproducts. One explanation for this difference in performance may be related to differences in digestibility between corn and sorghum distillers byproducts. Therefore, a lamb digestibility trial was conducted to evaluate the digestibility of wet and dried distillers byproducts produced from the fermentation of corn or sorghum.

Procedure

Sixteen crossbred wether lambs (121 lb) were randomly assigned to one of four treatments consisting of the following: 1) corn wet distillers grains, 2) sorghum wet distillers grains, 3) sorghum dried distillers grains plus solubles, 4) corn dried distillers grains plus solubles. Sorghum wet grains and sorghum dried distillers grains plus solubles were the same as the byproducts used by Lodge et al. (1995 Nebraska Beef Report, pp. 25-26); however the sorghum dried distillers grains plus solubles were from a different fermentation batch. Corn wet distillers grains were produced by a commercial dry milling plant (High Plains Corp., York, NE). Diets consisted of 80% distillers byproduct, 10% molasses, 8% alfalfa hay, and 2% dry supplement (DM basis). Diets were fed at 3.0% (DM basis) of body weight. The trial consisted of a 7-day adaptation period and a 7-day fecal collection period and was replicated twice. No lamb received the same diet in both replications.

Individual feeds, feces and orts were oven dried at 140°F, ground to pass through a 1 mm screen (Wiley Mill) and analyzed for dry matter, neutral detergent fiber, Kjeldahl nitrogen, and ash. Distillers byproducts were also analyzed for lipid content using chloroform/methanol extraction and starch content. Feces were analyzed for neutral detergent insoluble nitrogen to calculate true nitrogen digestibility of distillers byproducts.

Results

Sorghum distillers byproducts numerically contained more crude protein and starch than corn distillers byproducts (Table 1). Corn wet

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Table 1. Nutrient composition of corn and sorghum distillers byproducts (% of DM)

Item	CWDG[a]	SWDG[a]	SDDGS[a]	CDDGS[a]
Crude Protein	29.6	31.6	31.4	29.2
Lipid	13.7	11.3	11.8	11.4
NDF	52.0	45.4	51.1	51.3
Starch	4.6	10.2	7.4	5.1
Ash	1.2	2.5	1.8	2.0

[a]CWDG = corn wet distillers grains; SWDG = sorghum wet distillers grains; SDDGS = sorghum dried distillers grains plus solubles; CDDGS = corn dried distillers grains plus solubles.

distillers grains contained more lipid than all the other byproducts.

Apparent organic matter, apparent crude protein, and true crude protein digestibilities were highest (P<.10) with corn wet distillers grains diet (Table 2). Apparent organic matter digestibility of sorghum wet distillers grains diet was higher (P<.10) than either sorghum or corn dried distillers grains plus solubles. Apparent and true crude protein diet digestibilities of sorghum wet distillers grains and sorghum dried distillers grains plus solubles were higher than corn dried distillers grains plus solubles. Neutral detergent fiber digestibility was not different among treatments.

Table 2. Digestibility % of corn and sorghum distillers byproducts

Item	CWDG[a]	SWDG[a]	SDDGS[a]	CDDGS[a]
Apparent OM	85.69[b]	80.8[c]	73.7[d]	71.6[d]
NDF	77.8	75.9	76.3	71.7
Apparent protein	82.8[b]	77.3[c]	74.2[c]	65.5[d]
True protein[e]	93.8[b]	89.4[c]	88.1[c]	78.4[d]

[a]CWDG = corn wet distillers grains; SWDG = sorghum wet distillers grains; SDDGS = sorghum dried distillers grains plus solubles; CDDGS = corn dried distillers grains plus solubles.
[b,c,d]Means within a row with different superscripts differ (P<.10).
[e]Estimated by determining neutral detergent insoluble nitrogen in feces.

These data indicate that the nutritive content and feeding value of distillers byproducts may be affected by type of grain fermented and drying the grains with condensed solubles.

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