

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Beef Cattle Reports

Animal Science Department

January 1996

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

Shanna Lodge

University of Nebraska-Lincoln

Rick Stock

University of Nebraska-Lincoln, rstock3@Unl.edu

Terry J. Klopfenstein

University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Dan Herold

University of Nebraska-Lincoln

Follow this and additional works at: <https://digitalcommons.unl.edu/animalscinbcr>



Part of the [Animal Sciences Commons](#)

Lodge, Shanna; Stock, Rick; Klopfenstein, Terry J.; and Herold, Dan, "Digestibility of Wet and Dry Distillers Grains from the Fermentation of Corn or Sorghum" (1996). *Nebraska Beef Cattle Reports*. 477.

<https://digitalcommons.unl.edu/animalscinbcr/477>

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Beef Cattle Reports by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

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

Shanna Lodge
Rick Stock
Terry Klopfenstein
Dan Herold¹

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

(Continued on next page)

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

^aCWDG = 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

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

^aCWDG = 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 ($P < .10$).

^eEstimated by determining neutral detergent insoluble nitrogen in feces.

different among treatments.

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.

¹Shanna Lodge, graduate student, Rick Stock, and Terry Klopfenstein, Professors; Dan Herold, research technician, Animal Science.

Use of Direct Fed Microbials to Alleviate Subacute Acidosis

Shanna Lodge
Terry Klopfenstein
Rick Stock
Dan Herold¹

Summary

Five ruminally-fistulated steers were used in a 5 × 5 Latin square design to determine the effect of four different direct fed microbial products on subacute acidosis. Treatments included 1) control, 2) *Lactobacillus acidophilus* (LA), 3) *Saccharomyces cerevisiae* (YC), 4) *Lactobacillus acidophilus* and *Saccharomyces cerevisiae* (LA+YC), and 5) *Lactobacillus acidophilus*, *Saccharomyces cerevisiae*, and *Streptococcus faecium* (LA+YC+SF). Steers were fed a basal diet containing 50% concentrate and 50% roughage (DM basis). Rumen fluid was collected at 24 and 12 hours before dosing to determine a steady state for each animal. Treatments had no effect on steady state pH, VFA concentration, acetate plus butyrate to propionate ratio, or lactate production. Acidosis was induced by intraruminally dosing a 50:50 blend of fine ground corn and dry rolled wheat (DM basis) at 1.6% of body

weight. Acetate plus butyrate to propionate ratio was highest for LA+YC+SF and lowest for LA. The average pH for the control diet was the lowest during the acidosis challenge compared to all other treatments. These data indicate that products containing *Lactobacillus acidophilus*, *Saccharomyces cerevisiae*, or *Streptococcus faecium* may alter rumen function and may help to alleviate subacute acidosis by stabilizing rumen pH.

Introduction

Direct fed microbials are feed additives composed of live cultures of microorganisms that are currently being used in the feedlot industry to improve animal performance. Reported beneficial effects include increased feed intake and weight gain. The efficacy of these supplements have been associated with their abilities to alter rumen function, such as volatile fatty acid production, stabilization of pH, and reduction of the amount of lactate produced. This experiment was conducted to determine the effect of the direct fed microbials on rumen steady state and to evaluate their ability to alleviate subacute acidosis.

Procedure

Five ruminally fistulated steers (900 lb) were used in a 5 X 5 Latin square. Six additional ruminally fistulated steers were used as donors of ruminal contents and were fed a diet of either alfalfa (1 steer), grass hay (3 steers), 86% dry rolled corn and 7.5% alfalfa (1 steer), or corncob/soybean meal (1 steer). Steers were randomly allotted to treatments. Treatments consisted of 1) control, 2) *Lactobacillus acidophilus* (LA), 3) *Saccharomyces cerevisiae* (YC), 4) LA + YC, and 5) LA + YC + *Streptococcus faecium*. All direct fed microbials were refrigerated and stored in vials as freeze dried powder. From day 1 - 12 steers were fed a basal diet via automatic feeders every three hours and fed at 1.8% of body weight. The animals received a total of 7.1 g of direct fed microbial per day which contained 1×10^9 colony forming units of each microbial source when included in the treatment. Microbials were added directly to the feed twice per day. The basal diet consisted of 30% dry rolled corn, 33% corn silage, 33% alfalfa, and 4% dry supplement (DM basis). No Rumensin or Tylan was included in the