Energy Value of Wet Distillers Grains in High Forage Diets

Brandon Nuttelman
University of Nebraska-Lincoln

Matt K. Luebbe
University of Nebraska - Lincoln, mluebbe2@unl.edu

Joshua R. Benton
University of Nebraska-Lincoln, jbenton2@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Leslie Aaron Stalker
University of Nebraska-Lincoln, stalkera@byui.edu

See next page for additional authors

Authors
Brandon Nuttelman, Matt K. Luebbe, Joshua R. Benton, Terry J. Klopfenstein, Leslie Aaron Stalker, and Galen E. Erickson

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L. Aaron Stalker
Galen E. Erickson[1]

Summary

One hundred sixty crossbred steers were used to determine the energy value of wet distillers grains in high forage diets. By design, steers had similar intakes and gains across treatments. Diets included either wet distillers grains (WDGS) or dry rolled corn, sorghum silage, grass hay and supplement (DRC). Diets were formulated to meet degradable intake protein and metabolizable protein requirements. The energy value of wet distillers grains was calculated using the National Research Council model (1996). In this study, wet distillers grains contained 130% of the energy of dry rolled corn when fed in forage-based diets.

Introduction

In forage-based diets, feeding starch as an energy source can suppress forage digestion. In the dry milling process, starch is removed from corn to produce ethanol. Therefore, replacing corn with WDGS can reduce the negative associative affects that the energy from starch can have on fiber digestion. In feedlot rations, the energy value of WDGS ranges from 100% to 140% of the value of corn. In forage-based diets, dried distillers grains have been shown to contain 118% to 130% of the energy value of DRC depending upon level fed (*2003 Nebraska Beef Report*, pp. 8-10). However, research evaluating the energy value of WDGS in forage-based diets is limited. Therefore, the objective of this study was to determine the energy value of WDGS relative to dry rolled corn (DRC) in forage-based diets.

Procedure

One hundred sixty crossbred steers (630 ± 41 lb) were used in a 67-day growing trial to compare the energy value of WDGS to DRC in a forage-based diet. Calves were blocked into two weight groups, stratified within block and then randomly assigned to one of ten pens (16 steers/pen). Pens were assigned randomly to one of two treatment diets: either 1) WDGS or 2) DRC. Five days prior to collecting initial and final BW, steers were limit fed a common diet to reduce variation in gut fill. The limit-fed diet contained 47.5% alfalfa hay, 47.5% wet corn gluten feed and 5.0% supplement. Weights were collected two consecutive days following each limit-feeding period.

Diets were formulated using the NRC (1996) model and were formulated to meet energy and metabolizable protein (MP) requirements for a targeted gain of 2.25 lb/day. For diet formulation, WDGS was assumed to contain 127% the energy value of DRC (*2003 Nebraska Beef Report*, pp. 8-10). Bunks were evaluated daily and managed so that intakes were equal across both treatments. Feed refusals were collected weekly and DM of the feed refused was determined using a 60°C forced air oven. Dry matter refused was subtracted from DM offered to determine DMI.

For both treatments, sorghum silage was fixed at 35% of the diet and grass hay was adjusted according to WDGS and DRC levels (Table 1). Analysis for fat content, % neutral detergent fiber (NDF), and % crude protein (CP) were conducted on individual feed ingredients (Table 2). Supplement for both diets included urea to meet degradable intake protein requirements. To prevent a performance response due to protein, Soypass® was included in the DRC supplement to provide undegradable intake protein to meet the metabolizable protein requirement.

Table 1. Diet composition.

	Composition, %DM	
Ingredient	WDGS	DRC
WDGS	25.00	—
DRC	—	33.60
Grass hay	39.05	26.41
Sorghum silage	35.00	35.00
Soypass®	—	3.35
Selenium	—	0.010
Limestone	0.24	0.24
Urea	0.30	0.90
Tallow	0.02	0.12
Salt	0.30	0.30
Trace mineral premix	0.05	0.05
Vitamin premix	0.015	0.015

The NRC (1996) model predicts animal performance using feed intake and dietary energy content. Therefore, energy content of the feed can be predicted if animal performance and daily feed intake are known. Intake, diet composition, weights and weight gain were used to calculate the energy value of WDGS in the treatment diet. The energy value of DRC was calculated similarly so that results for WDGS could be expressed relative to those for corn.

Data were analyzed using the MIXED procedure of SAS. The model included block and dietary treatment. Pen was the experimental unit (5 pens/treatment). Differences were considered significant when $P \leq 0.05$.

Results

Initial BW was not different ($P = 0.48$, Table 2). By design, DM intake was similar between treatments. Although not different ($P > 0.11$), ADG and feed-to-gain ratio (F:G) were numerically improved for

WDGS (0.17 and 0.46, respectively). Using the NRC (1996) model, animal performance was used to determine energy values for the DRC diet.

The total digestible nutrients (TDN) value for corn was set at 83%, for hay at 52% and for sorghum silage at 65%. Net energy (NE) adjusters were set at 100%. The NE adjusters were reduced to 98.96% for calculating the energy value of the WDGS because of the 0.17 lb/day greater gain. The resulting TDN value of the WDGS was 108%. Therefore, the estimated energy value of WDGS was 130% that of corn (108 ÷ 83).

The energy values for DDGS determined previously were 130% when DDGS was fed at 10% of diet dry matter and 118% when fed at 33% of ration dry matter. The value in this study is higher than would be predicted at the 25% level in the diet. Without a direct comparison, we cannot conclude that WDGS has more energy in forage diets than DDGS. This trial confirms that distillers grains (wet or dry) have a high energy value relative to corn. This is likely due to the low level of starch and energy density of fat, undegraded protein and corn fiber.

Table 2. Animal performance.

Item	DRC	WDGS	SEM	*P*-Value
Initial BW, lb	629	630	1	0.48
Final BW, lb	811	824	6	0.07
DMI, lb/day	17.9	17.7	0.7	0.72
ADG, lb	2.72	2.89	0.09	0.11
F:G	6.61	6.15	0.37	0.25

[1]Brandon L. Nuttelman, graduate student; Mathew K. Luebbe, research technician; Josh R. Benton, research technician; Terry J. Klopfenstein, professor; Galen E. Erickson, associate professor; Animal Science, Lincoln, Neb. L. Aaron Stalker, assistant professor, West Central Research and Extension Center, North Platte, Neb.