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Comparison of Wet or Dry Distillers Grains Plus Solubles to Corn as an Energy Source in Forage-Based Diets

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Summary

Four experiments were conducted comparing wet or dry distillers grains plus solubles to each other or to corn as an energy source in forage-based diets. Diets included dry distillers grains plus solubles, wet distillers grains plus solubles or dry-rolled corn, with sorghum silage, grass hay and supplement. Data were pooled to generate ADG at differing inclusions allowing energy value of wet distillers grains plus solubles to be calculated relative to dry-rolled corn. The energy value of distillers grains plus solubles fed at 15% of diet DM was 137% and fed at 30% of the diet DM was 136% relative to dry-rolled corn. Wet and dry distillers grains plus solubles had equal energy values.

Introduction

Previous research showed the benefit of utilizing distillers byproducts in finishing diets in place of corn. However, the energy value of distillers byproducts in high-forage diets is not as well defined because they have been used primarily as protein sources. A study compared dry-rolled corn (DRC) and dried distillers grains plus solubles (DDGS) at two supplementation levels in a forage based diet and determined the energy value relative to DRC to be 118-130% that of corn (*2003 Nebraska Beef Cattle Report*, pp. 8-10). A meta-analysis based on prediction equations developed from 20 feedlot cattle finishing experiments suggests greater energy value for wet distillers grains plus solubles (WDGS; 130 to 143% between 20-40% inclusion diet DM) than DDGS (112% for any inclusion diet DM; *2010 Nebraska Beef Cattle Report,* p. 61). Few direct comparisons between wet and dry DGS in forage diets have been made.

The objective was to compare DRC, DDGS and WDGS as energy sources in forage based diets and determine the energy value of WDGS relative to DRC.

Procedure

Four growing experiments were used in this analysis (*2008 Nebraska Beef Cattle Report*, pp. 29-31; *2009 Nebraska Beef Cattle Report*, pp. 28-29; *2010 Nebraska Beef Cattle Report*, pp. 43-45; *2011 Nebraska Beef Cattle Report*, pp. 20-21). Data from two of the experiments were combined to determine the relative feeding values of WDGS and DDGS. In all experiments, protein was adequate in all diets so that gain and feed efficiency responses are due to energy and not due to protein.

Pooled Analysis

Data from the three experiments containing both DRC and WDGS were pooled in order to predict the energy value of WDGS relative to DRC. Using regression analysis, estimates were made for the amount of DRC in the diet to provide equal ADG to 15 and 30% WDGS. The regression analysis was used to estimate ADG at different concentrations. This analysis was needed in order to use the same net energy (NE) adjuster values for both the DRC and WDGS diets. Block et al., (*2001 Nebraska Beef Cattle Report,* pp. 117-119) reported that NE adjuster values changed with rate of ADG, declining as ADG increased. To facilitate the comparison of energy values of DRC and WDGS, it was necessary to do the evaluation at equal ADG.

Dry-rolled corn and WDGS replaced both grass hay and sorghum silage as the inclusion increased. The change in concentration of DRC or WDGS determined the calculated change in both hay and sorghum silage. This allowed the calculation of amounts of hay and silage in each of the three diets. Because DDGS was not included in two experiments, there were insufficient observations for DDGS and, therefore, no DDGS data were included in the pooled data.

Pooled data were analyzed using the GLIMIX procedure of SAS (SAS Institute, Inc., Cary, N.C.). Model effects included trial, type of energy source (DRC or WDGS), block within trial and inclusion within energy source (15 or 30% WDGS and 27.74 or 54.71% DRC). Inclusion of energy source was treated as a covariate. Regression analysis produced the following equations used to predict ADG at differing levels: DRC ($y = 0.02$ (**± 0.02**) $x + 1.59$ (± 0.12)); WDGS ($y = 0.04$ (**± 0.02**) $x + 1.61$ (± 0.12)).

Results

Pooled Analysis

The unadjusted average cattle performance values from the three trials are shown in Table 1. The predicted DRC inclusions at 15 and 30% WDGS were 27.74 and 54.71%, respectively (Figure 1), to achieve equal gains. Predictions for the DRC inclusions were done by regressing DGS or DRC inclusion against ADG. Using the observed ADG at 15% inclusion WDGS, we used regression to determine DRC inclusion at the same ADG. The inclusion of DRC diet equivalent to 15% WDGS was evaluated with the NRC model. Net energy adjuster of 103.2 was needed to predict the observed gain. Based on Loy et al., (*2003 Nebraska Beef Cattle Report*, pp. 8-10), the DRC was given an energy value of 83% TDN. The same NE adjuster

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Table 1. Energy value of wet distillers grains (WDGS) compared to corn.[1]

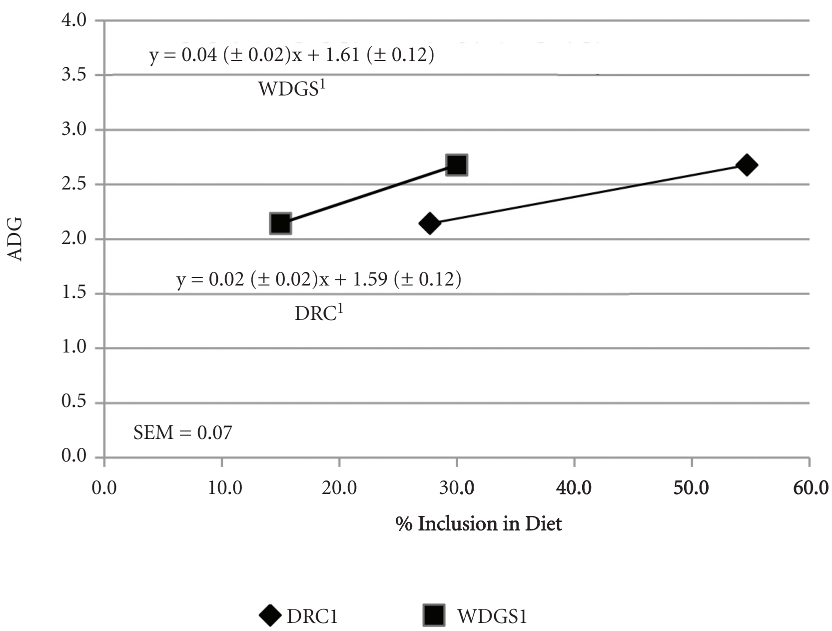
	Corn	WDGS
% of diet	35.9	23.3
DMI, lb/day	16.5	16.4
ADG, lb/day	2.37	2.48
Feed/gain	6.99	6.67

[1]Average of three trials (1 to 2 levels/trial).

Table 2. Value of dry versus wet distillers grains.

	DDGS[1]	WDGS[1]	SEM
DMI, lb/day			
Trial 1[2]	16.9	15.4	.61
Trial 4[3]	16.2	15.8	.44
ADG, lb/day			
Trial 1	2.48	2.37	.15
Trial 4	2.13	2.11	.07
Feed: Gain			
Trial 1	6.80	6.49	.27
Trial 4	7.58	7.41	.35

[1]DDGS = dry distillers grains plus solubles.
WDGS = wet distillers grains plus solubles.
[2]Average of 3 levels (24.7% diet dm).
[3]Average of 2 levels (22.5% diet dm).



[1]DRC — 22-57% inclusion dry-rolled corn; WDGS — 15-30% inclusion wet distillers grains plus solubles.

Figure 1. Regression analysis of pooled data for growing steers evaluating the energy value of WDGS relative to DRC.

was used with the 15% WDGS diet. The energy value of the WDGS was changed until the ADG for that diet (2.1 lb/day) was achieved. That energy value was 113.5% TDN which is 137% (113.5/83) the value of DRC.

The same process was used to estimate the TDN content of the DGS when fed at 30% of diet dry matter. In this case, the DRC diet contained 54.71% DRC and a NE adjuster of 96.8 was needed to predict the ADG of 2.7 lb/day. The energy value of the WDGS was 112.7% TDN which is 136% the value of DRC.

Wet Versus Dry DGS

Without a direct comparison in all four experiments, we cannot conclude that WDGS has more energy in forage diets than DDGS. However, data from Experiment 1 and Experiment 4 (Table 2) show there is no difference in energy value between WDGS and DDGS. There were no statistical differences in growth performance between DDGS and WDGS.

Implications

These experiments reiterate that distillers grains (dry or wet) have a high energy value relative to supplemented corn in forage-based diets. The moisture content of DGS does not affect the energy value relative to DRC in a forage-based diet, however inclusion of DGS responds quadratically after reaching 35% of the diet DM. The energy density of fat, undegradable protein, and corn fiber are the possible reasons contributing to greater energy value compared to corn as a supplement.

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