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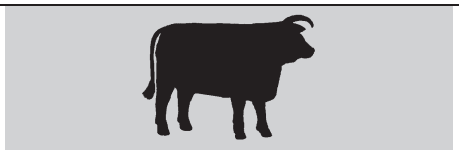

Effects of reduced-fat modified wet distillers grains with solubles on the performance of limit-fed beef cows[1]

M. J. Faulkner,* P. M. Walker,*[2] PAS, R. L. Atkinson,† L. A. Forster,‡ K. L. Jones,† and J. M. Carmack*

*Department of Agriculture, Illinois State University, Normal 61761;
†Department of Animal Science, Food, and Nutrition, Southern Illinois University, Carbondale 62901; and ‡Archer Daniels Midland Co., Decatur, IL 62526

ABSTRACT

The objective of this study was to evaluate 3 inclusion rates for modified wet distillers grains with solubles containing 5.6 to 8.0% fat (WDGS) when limit-fed to beef cows during late gestation and early lactation. Angus × Simmental crossbred cows (n = 128) in the third trimester were blocked by parity (first parity and 2 or more parities) and stratified within parity by BW, subject to variation in BCS, to 16 pens. Four diets were fed until completion of a timed AI. Control cows were fed corn silage-, shelled corn-, and soybean meal-based diets to provide 12% CP [treatment (T) 1]. In the treatment diets, WDGS replaced shelled corn, soybean meal, and a portion of the corn silage to provide 12% (T2), 16% (T3), or 20% CP (T4). Analyzed CP values were 12.0, 12.5, 15.7, and 19.0%, for T1, T2, T3, and T4, respectively. Mean DMI per day was 7.80 ± 1.01, 7.96 ± 1.01, 8.55 ± 1.28, and 8.63 ± 1.11 kg for T1, T2, T3, and T4, respectively. No differences (P > 0.05) between treatments were observed for calving ease score, calf birth weight, calf BW, and cow BCS at the end of the feeding period. There was a linear (P = 0.03) increase in cow BW change in cattle fed increasing levels of WDGS and a quadratic response (P = 0.03) in milk production, with production increasing in T3 compared with T4 and T2 cattle. Cows fed increased levels of WDGS performed equally or superior to cows fed shelled corn- and soybean meal-based diets.

Key words: beef cow, performance, reduced-fat modified wet distillers grains

INTRODUCTION

Feed costs account for greater than 60% of total annual cow costs and are identified as the largest factor influencing profit and loss in the cow-calf enterprise (Miller et al., 2001). With increasing corn prices, feeding ethanol co-products, such as lower-fat modified wet distillers grains with solubles (**WDGS**), has become economically attractive to cow-calf producers. Distillers grains (**DGS**) included in diets at levels up to 15% can be considered a protein source, and DGS fed at levels greater than 15% can be considered an energy source (Klopfenstein et al., 2008). Using DGS as both a protein and energy source in beef cow diets can be economically attractive but can result in overfeeding protein and fat.

The mechanism by which excessive dietary N affects reproduction in beef cattle is not well known (Dziuk and Bellows, 1983). High-N diets have been associated with reduced reproductive performance in dairy cattle (Jordan et al., 1983; Elrod and Butler; 1993, Laven and Drew, 1999), although these findings have been questioned (Laven et al., 2007). Diets containing DGS can be higher in fat than typical shelled corn (**SC**) and solvent-extracted soybean meal (**SBM**) diets. Supplementation with fat may provide a nutritional mechanism to enhance reproduction in beef

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[2] Corresponding author: pwalker@ilstu.edu

cows. In gestating heifers supplemented with fat, Bellows et al. (2001) observed increased pregnancy rates without differences in BW or BCS.

Distillers grains serve as a beneficial supplement to forages that are low in P and protein. Research by Anderson et al. (2006) showed increased milk production in dairy cows when DGS (wet or dry) were fed compared with a control diet, with a tendency for greater milk production when feeding wet DGS compared with dried DGS. Anderson et al. (2006) also observed a tendency for greater milk production when feeding 20% (vs. 10%) of the ration DM as either wet or dry DGS.

Limited information has been published regarding the continual supplementation of WDGS in prepartum and postpartum cow diets on cow and calf performance and on the reproductive performance of the cow. We hypothesized that WDGS as a replacement for SC and SBM would have no adverse effects on cow and calf performance; however, increasing WDGS levels would increase calf birth weight and negatively affect dystocia because of excess dietary CP. Therefore, the objectives of this study were to determine the effects of including selected dietary levels of WDGS on the performance of limit-fed beef cows during late gestation and early lactation. The criteria evaluated included cow BW change, cow BCS change, calving ease score (**CES**), calf birth weight, calf BW change, cow conception rate, and cow milk production.

MATERIALS AND METHODS

Animal Care and Use

This study was approved by the Animal Care and Use Committee of Illinois State University (protocol no. 25-2007).

Cattle and Diets

One hundred twenty-eight Angus × Simmental crossbred winter-calving cows were housed on dry lots at the Illinois State University Farm. Cows were housed in an open-front cattle shed with concrete confinement lots, automatic water fountains, and fence-line feed bunks. Each pen provided 29.75 m^2 of outdoor and 14.19 m^2 of under-roof pen space per cow-calf pair. Cows were limit-fed dietary treatments as a TMR once daily at fence-line bunks at 0800 h for a 163-d feeding period during the last trimester of gestation (n = 89 d before birth of the first calf) and early lactation until timed AI, which occurred approximately 45 d postpartum.

Cows were blocked by parity into 2 groups (block 1 = first parity; block 2 = 2 or more parities). Cows within block 1 were stratified by BW into 4 treatment pens, subject to shifting cows of similar BW among pens to equalize BCS. Cows within block 2 were stratified by BW into 12 treatment pens, subject to shifting cows of similar BW among pens to equalize BCS. Each pen contained 8 cows. Experimental pens within a block were randomly assigned to 1 of 4 dietary treatments (n = 4 pens/treatment) to examine the effects of WDGS on cow-calf performance. The control diet consisted of a traditional SC-SBM-corn silage diet formulated to contain 12% CP on a DM basis and to meet or exceed NRC (2000) requirements for energy, Ca, and P during gestation and lactation. The treatment diets were formulated to include WDGS replacing SC, SBM, and a portion of the corn silage to provide 12, 16, or 20% CP on a DM basis. The WDGS used in this study was produced by a dry-grind process with front-end, partial degermination of the corn kernel, which resulted in WDGS containing 6.98 ± 1.22% crude fat and 24.17 ± 2.22% CP. The WDGS fed in this study was delivered on 1 date and stored in a concrete bunker silo measuring 3.66 m tall × 24.38 m long × 6.10 m wide. The top of the WDGS was leveled, hand sprinkled with salt at the rate of 4.9 kg/m^2, and covered with a plastic sheet. The WDGS was removed from the face daily on an as-needed basis.

All cows were fed to maintain similar BCS and BW changes. All cows were weighed on 2 consecutive days to obtain average starting and ending BW. Starting and ending BCS of the cows were determined by visual appraisal and were obtained by averaging the BCS of 2 technicians working independently. Scores within the BCS system ranged from 1 to 9, where 1 = emaciated and 9 = fat (Herd and Sprott, 1996).

To maintain similar BW and BCS changes in the cows across cattle pens, periodic changes in daily allotments of corn silage and either SC or WDGS were made by adding the same ratio of corn silage to SC and corn silage to WDGS at each adjustment for each dietary treatment. Once every 28 d, the feeding technician visually evaluated the BCS of each cow in each pen and averaged the scores to obtain a pen-average BCS. The objective was to maintain the average BCS for each pen of cows in a BCS range of 5 to 6. For the purpose of dietary adjustments, the energy of WDGS was assumed to have an ME value similar to those of SC and dried distillers grains with solubles (**DDGS**; NRC, 2000). Dietary adjustments in the treatment (**TRT**) and control (**CNTL**) diets were not formulated to be isonitrogenous. Corn silage, SC, and WDGS were increased based on their estimated ME values to maintain similar cow BCS. A monensin (Rumensin, Elanco, Greenfield, IN) and thiamine premix (fed to supply 200 mg/d per cow of monensin and 100 mg/d per cow of thiamine to aid in the prevention of polioencephalomalacia; NRC, 2001) was added to each TRT and CNTL TMR diet at the rate of 90.8 g/cow per day. Calcium carbonate was added to each TMR to provide similar ratios of Ca to P. All feed ingredients were mixed in a Reel Auggie TMR Horizontal Batch Mixer (model no. 3120, Kuhn Knight Inc., Brodhead, WI) before feeding. In addition to the TMR, all cows were allowed free-choice access to a commercial mineral mixture containing a minimum of 12.0% Ca, 12.0% P, 15.8% NaCl, 0.8% Mg, 1.2% K, 790 mg/kg of Cu, 53 mg/kg of Se, 3,150 mg/kg of Zn, and 149,318 IU/kg of vitamin A. Calves were offered