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Comparison of Corn Coproducts and Corn Residue Bales with Alfalfa Mixed Hay on Beef Cow-Calf Performance, Lactation, and Feed Costs

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ABSTRACT

Two experiments were conducted to evaluate the effects of a winter feeding strategy on the performance, lactation, reproduction, and feed costs of spring-calving, lactating beef cows. In Exp. 1, Angus (n = 66) and Simmental (n = 70) cows were allotted to 1 of 4 treatments: 1) distillers dried grains with solubles (DDGS) and free-choice corn residue bales; 2) corn bran and DDGS and free-choice corn residue bales; 3) corn bran and high-protein distillers dried grains and free-choice corn residue bales; or 4) free-choice alfalfa mixed hay. In Exp. 2, Angus (n = 72) and Simmental (n = 92) cows were allotted to 1 of 4 treatments: 1) free-choice corn residue bale and 6.5 kg DDGS; 2) 6.4 kg ground corn residue bale and 6.5 kg DDGS; 3) 4.5 kg ground corn residue bale and 7.5 kg DDGS; and 4) free-choice alfalfa mixed hay. In both experiments, cows with free-choice hay intake lost more BW than cows fed coproduct and corn residue bales, but there were no differences in milk production or calf ADG. Three-year average price data were used to calculate feed costs (corn residue, $55/ton; DDGS, $124.71/ton; and hay, $131.67/ton). In Exp. 2, the hay diet was more expensive than the 3 DDGS and corn residue diets ($2.50 vs. $1.44/cow·per day, respectively). Machinery costs were also considered for each diet with herd sizes from 50 to 300 cows. Herd size dictated which winter feeding strategy was the least expensive. Feeding corn coproducts with corn residue bales can result in acceptable performance and reduced feed costs compared with traditional hay diets.

Key words: coproduct, corn residue, cow-calf, lactating, winter feeding

INTRODUCTION

One of the greatest expenses in beef cow-calf production is feed costs. Feed costs constitute more than 60% of the total costs in a beef cow-calf operation (Miller et al., 2001). With recent increases in hay and grain prices, this expense could be even higher. For a cow-calf producer, the most expensive time to feed the cow is during the winter months, when pasture is limited or when the cows must be maintained on dry lots. It is important for producers to feed a nutritionally balanced diet, especially during early lactation (Hess et al., 2005), because nutritional balance affects both cow and calf performance.

Traditionally, cows are fed hay in the winter because of its ease of feeding. As feed costs continue to rise, hay feeding can become costly. Recently, hay prices have reached record high prices, with the average price for alfalfa hay in 2008 reaching $172/ton (National Agricultural Statistics Service, 2009). Costs associated with feeding hay represent 33% of the total feed cost per cow (Strohbehn, 2001). Hay waste potentially magnifies the cost. Miller et al. (2007) reported 40% hay waste when cows were offered free-choice access to round bales in a fence-line feeder. Lower quality replacement roughage, such as baled

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corn residue, with supplementation may be an economical alternative.

As the demand for ethanol continues to increase, more distillers grains are becoming available for feeding. These corn coproduct feeds are very popular because they are an excellent source of energy and protein while being less expensive than alternative supplements. Distillers grains are a high-energy and high-protein source, with fat and protein concentrations of approximately 11 and 30%, as well as being a source of high P (NRC, 1996). With recent advancements in the ethanol industry, new biorefining technologies result in different coproducts. Further research is needed comparing the new and different types of coproducts in beef cow-calf diets to determine the least-cost approach.

In addition, if it is determined that feeding corn coproducts and corn residue bales can reduce feed costs, then evaluation of the feeding method (free-choice corn residue bales vs. ground corn residue bales) is necessary as well. The objectives of this study were to evaluate the use of coproducts and baled corn residue to reduce feed costs for spring-calving lactating beef cows in a dry-lot system as well as to compare free-choice access of corn residue bales with TMR containing ground corn residue bales.

MATERIALS AND METHODS

Exp. 1

Experimental Animals. Angus (n = 66) and Simmental (n = 70) spring-calving (January to March) cows nursing calves at the Orr Research Center (Baylis, IL) were used to evaluate the effects of the winter feeding strategy on performance, lactation, and feed costs of beef cow-calf production. Animals used in this trial were managed according to the guidelines recommended in the Guide for the Care and Use of Agriculture Animals in Agriculture Research and Teaching (Consortium, 1988). All experimental procedures followed those approved by the University of Illinois Laboratory Animal Care Advisory Committee.

Management and Diets. The feedstuffs used were distillers dried grains with solubles (**DDGS**), high-protein, low-fat distillers dried grains (**HP**), corn bran (hereafter, "bran"), alfalfa mixed hay (large square bales stored inside), and corn residue (large square bales stored inside). Feed analyses are shown in Table 1. Cows were randomly allotted to 1 of 4 dietary treatments at calving: 1) 6.5 kg/d DDGS and free-choice corn residue bales (**DDGS** treatment); 2) 4.4 kg/d bran and 2.2 kg/d DDGS and free-choice corn residue bales (**bran/DDGS** treatment); 3) 5.1 kg/d bran and 1.5 kg/d HP and free-choice corn residue bales (**bran/HP** treatment); or 4) free-choice alfalfa mixed hay (hereafter, "hay" treatment). Coproduct supplements (1, 2, and 3) were formulated to be isocaloric and to meet the average of Simmental and Angus cow maintenance and lactation energy requirements. The bran/DDGS and bran/HP diets were also isonitrogenous and were formulated to meet protein requirements (NRC, 1996). The DDGS and hay treatments were not isonitrogenous but exceeded protein requirements (NRC, 1996). Cows were maintained in 11.0 × 10.7 m concrete lots with a 7 × 7 m open-front shed. Coproduct supplements (1, 2, and 3) were pen-fed once daily in 7.3-m fence-line bunks, and corn residue and alfalfa mixed hay bales were fed in 3.7-m fence-line bale feeders. Corn residue bale and alfalfa mixed hay bale disappearances were calculated by weighing back refusals and subtracting that weight from initial bale weights. Cows were blocked by calving date and randomly assigned to 16 pens (12 pens had 9 cows and 4 pens had 7 cows) after calving, resulting in 4 pens per treatment. Two cows were removed from the study (1 cow on the bran/HP treatment and 1 cow on the bran/DDGS treatment) for reasons unrelated to treatments.

Performance, Lactation, and Reproduction Analysis. Within 24 h of calving, cows and calves were weighed and allotted. Calf birth weights were used as initial calf BW. Cow BW and BCS, taken after calving and before feeding, were used as initial cow BW and BCS. Milk production was estimated using the weigh-suckle-weigh technique at an average of 57 ± 13.6 d postpartum. Twenty-four-hour milk production estimates were determined using a 12-h weigh-suckle-weigh technique (Beal et al., 1990). Six hours after the weigh-suckle-weigh measurement, a subsample of 6 cows per treatment were milked using a commercial portable milk machine (Porta Milker, The Coburn Company Inc., Whitewater, WI). Cows were administered 20 USP units of oxytocin (Phoenix Scientific, St. Joseph, MO) intravenously within 2 min of milking to initiate milk letdown. Milk was sampled and sent to Dairy Lab Services Inc. (Dubuque, IA) for compositional analysis. At an average of 64 ± 13.6 d postpartum, the dietary treatments ended, and final cow shrunk BW and calf BW were taken. After the conclusion of the dietary treatments, all cows were fed 6.5 kg DDGS and free-choice corn residue bales until the completion of synchronized AI. Cows were synchronized using the CoSynch+CIDR procedure (Bremer et al., 2004) and were artificially inseminated at an average of 68 ± 13.6 d postpartum. After AI, all cows went to pasture as a group. First-service conception rates were determined via transrectal ultrasonography at 41 d after AI.

Feed Cost Calculations. Three-year (2006 to 2008) average price data for feedstuffs (alfalfa mixed hay, $131.67/ton; DDGS, $137.08/ton; HP, $182.28/ton; and bran, $96.02/ton) were used for feed cost calculations. Price data for mixed alfalfa hay was attained from annual commodity reports (2006 to 2008; National Agricultural Statistics Service, 2009). Price data for DDGS, HP, and bran were attained from Dakota Gold Research Association (Sioux Falls, SD; K. Karges, personal communication). Three-year price data for corn residue bales could not be found; thus, the authors estimated a value of $55/ton.