The Professional Animal Scientist 23 (2007):83–90

Effects of Distillers Dried Grains with Solubles as a Protein Source in a Creep Feed. 1. Suckling Calf and Dam Performance

P. A Lancaster, J. B. Corners, L. N. Thompson, M. R. Ellersieck, and J. E. Williams[1]
Department of Animal Sciences, University of Missouri, Columbia 65211

ABSTRACT

A 2- yr study was performed to evaluate the effect of corn distillers dried grains with solubles (DDGS) vs. soybean meal (SBM) as the protein source in a creep feed. Thirty-six steer calves were used in each of the 2 yr to compare the performance of traditionally noncreep-fed, control weaned calves with those offered creep feed with either DDGS or SBM beginning 68 d prior to weaning. The creep supplements consisted of a 2:1 ratio of soy hulls and cracked corn with the protein source. In yr 1 and 2, creep-fed steers had greater (P < 0.01) ADG than noncreep-fed steers (1.0 vs. 0.7 kg/d and 1.0 vs. 0.9 kg/d in yr 1 and 2, respectively); however, weaning weights were only greater (P < 0.05) in yr 1 (231.0 vs. 206.0 kg, respectively). In both years, protein source had no effect (P > 0.10) on ADG, supplemental DMI, and supplemental feed efficiency. In yr 1, cost per kilogram of supplemental gain for DDGS tended to be less (P < 0.10) than SBM steers ($0.89 vs. $1.07, respectively). In spite of this fact, the total supplemental feed cost was lower (P < 0.01) in yr 2 for DDGS vs. SBM steers ($13.88 vs. $18.30 per head, respectively), even though supplemental DMI and supplemental gain were not different between treatments. In conclusion, when used in a creep feed, DDGS provided similar performance at a lower cost as compared with SBM; both protein sources in a creep ration increased ADG of calves.

Key words: creep feed, calf, corn distillers grains

INTRODUCTION

Corn distillers dried grains with solubles (**DDGS**) originates as a coproduct of ethanol production. Its highly digestible fiber content and high ruminally undegradable protein (**RUP**) content make it an excellent supplement for growing calves. Approximately 52% of the protein in DDGS is ruminally undegradable (NRC, 2000). This characteristic provides ruminants with an excellent source of amino acids for absorption in the small intestine. Supplementation of DDGS increased ADG of steers grazing medium-quality native summer range (Karges et al., 1992).

After 90 d of lactation, a greater proportion of the calf's nutrient intake is supplied by forage (Hollingsworth-Jenkins, 1994; Loy et al., 2002). For a spring calving herd, the forage quality of pasture declines as summer progresses while nutrient requirements of the calf rapidly increase. Providing a creep ration to nursing calves grazing forage has been an excellent management strategy to increase weaning weight (Martin et al., 1981). Nursing calves have a higher protein requirement because the rate of lean tissue growth is greatest at an early age (Black and Griffiths, 1975). Consequently, feeding a source of protein with a greater proportion of RUP may increase postruminal supply of limiting amino acids for growth in nursing calves grazing medium-quality native grass (Hollingsworth-Jenkins, 1994), thus increasing lean tissue accretion. Thomas (1986) stated that creep feeding would be profitable when calf prices are high relative to feed costs. Since DDGS is economically priced as a protein source, its use as a protein source may be a management strategy that lowers creep feed costs and improves gain of nursing calves.

Several reports have evaluated DDGS as a protein source for grow-

[1]Corresponding author: williamsje@missouri.edu

ing calves (Willis et al., 1981; Corners, 2004) as well as a protein source in a creep ration (Reed et al., 2006). In this study, the objective of this experiment was to compare DDGS vs. soybean meal (**SBM**) as protein and energy source in a creep ration for nursing steer calves as well as the subsequent performance of these calves in the feedlot.

TABLE 1. Creep supplements fed to steers

	Year 1		Year 2	
	SBM[1]	DDGS	SBM	DDGS
Ingredient, % of DM				
Cracked corn	28.04	20.04	26.45	19.78
Soybean hulls	57.14	45.26	54.14	40.68
DDGS	—	32.92	—	33.23
SBM	14.04	—	13.13	—
Limestone	0.78	0.79	2.01	2.47
Dicalcium phosphate	—	—	2.61	2.18
Molasses	—	—	1.66	1.67
Trace mineral[2]	—	—	—	—
Chemical analysis				
DM, %	87.76	88.26	86.90	87.24
NDF, % of DM	43.87	52.13	50.15	52.09
CP, % of DM	16.99	17.0	15.32	13.72
RUP,[3] % of CP	41.12	56.9	39.71	48.63
NE_m, Mcal/kg DM	2.04	2.07	1.94	1.97
NE_g, Mcal/kg DM	1.38	1.41	1.31	1.34

[1]SBM = soybean meal; DDGS = distillers dried grains with solubles.

[2]The trace mineral provided 100 g of Fe/kg, 100 g of Mn/kg, 100 g of Zn/kg, 20 g of Cu/kg, 500 mg of Co/kg, 1,000 mg of I/kg.

[3]RUP = ruminally undegradable protein.

MATERIALS AND METHODS

Animals and Management

Thirty-six steer calves with dams were used each year of a 2-yr study to test the effects of DDGS as a protein source in a creep feed. Only steers from dams of 3 yr of age or older were used. Steers originated from 4 sires in yr 1, but sires were not equally represented in each treatment or pasture. However, in yr 2, steers originated from 4 sires that were equally represented within treatments by design but not within pasture. Each year was divided into 2 phases: a creep and a feedlot phase. The feedlot phase will be presented in a companion paper.

In yr 1, steers (159.9 ± 26.9 kg initial BW) were allotted by age (122.4 ± 17 d) to 1 of 6 4-ha pastures with 2 pastures per treatment. In yr 2, steers (184.3 ± 12.8 kg initial BW) were blocked by age (148.3 ± 5.4 d) and sire and randomly assigned to treatments. There were 2 sires with 2 blocks of steers and 2 sires with 4 blocks. Blocks were randomly assigned to 3 of the endophyte-free tall fescue pastures used in yr 1. Thus, in yr 2 each sire and pasture were equally represented within each treatment. The experimental design was changed from yr 1 in an attempt to separate the effects of DDGS and SBM, which was the main objective of this study. For yr 2, these changes in design eliminated the effects of calf sire and calf age, as well as pasture quality and quantity on dietary treatment.

The treatments were 1) noncreep fed (control); 2) creep-fed with DDGS; or 3) creep-fed with SBM as the protein sources. Creep supplements were formulated to contain similar levels of CP and energy with DDGS and SBM supplying similar amounts of CP but different amounts of RUP (Table 1). Creep supplements consisted of soybean hulls and cracked corn in a 2:1 ratio with the protein source. Trace minerals were provided as a block in each pasture. In yr 1, white granular salt was added to the diet in an attempt to limit intake to approximately 1.6 to 2.0 kg/d of DM per head. Salt content was increased from 0 to 12% of the supplement (as-fed basis) as the creep phase progressed. In yr 2, salt was not used because calves were individually hand-fed their supplements to limit the variation in DM intake. Steers were individually fed their respective supplements daily starting July 23, 2003. Steers were sorted from dams, placed in individual stanchions, and allowed 30 min to consume a maximum of 1.8 kg/d of DM per head. Intake was limited in each of the 2 yr because previous research has shown that limiting the intake of creep supplement reduces forage substitution and improves supplemental efficiency (Cremin et al., 1991; Faulkner et al., 1994) and, most likely, profitability.

In yr 1, endophyte-free tall fescue pastures were strip-grazed by the use of 5-cm wide, white electric fence tape. Cattle were confined to 0.81 ha at the start of the study and given an additional 0.40 ha when forage was grazed to an average observed height of 8 to10 cm. This continued throughout the course of the creep phase of the study. Creep feeders were placed 23 m from the automatic drinkers in each pasture that required a feeder. In yr 2, initial grazing allowance was increased to 1.62 ha because twice the number of cow-calf pairs were located on each endophyte-free tall fescue pasture. Since yr 2 was a dry year, cow-calf pairs