INFLUENCE OF DRIED DISTILLERS GRAINS ON FEEDLOT PERFORMANCE AND CARCASS CHARACTERISTICS OF FINISHING LAMBS

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Impact Statement

Dried distillers grains replacing up to 20% of the barley portion of a barley and alfalfa based finishing ration had no negative effect on lamb performance or carcass traits.

Introduction

Coproducts from the ethanol industry are increasingly available in the northern Great Plains as the ethanol industry continues to expand. Dried distillers grain (DDG), one such coproduct, is an excellent source of energy and protein for beef cattle and sheep (Lardy, 2003). North Dakota, Minnesota, and South Dakota annually produced about 900,000 tons of DDG, approximately 80% of which are fed to ruminants. Research in beef cattle backgrounding and finishing diets report that DDG can be fed as a source of supplemental protein and/or energy at levels up to 20% of the diet dry matter (Lardy, 2003). However, DDG are high in potassium, phosphorus, and sulfur, and care must be used when feeding DDG at the upper limits of the recommendation. Little research has evaluated the inclusion of dried distillers grains as a replacement for barley in lamb finishing rations. While it is widely accepted that DDG are an excellent source of protein and energy, the unique problems of feeding feedstuffs high in phosphorus and sulfur to sheep warrant additional research. Maintaining a calcium to phosphorus ratio of 2:1 or greater for the prevention of urinary calculi may become difficult as the level of DDG included in lamb finishing rations increases. This study was designed to evaluate how lambs respond to increasing levels of DDG in a finishing ration.

Materials and Methods

A randomized complete design was used to evaluate the influence of DDG in lamb finishing diets. One-hundred twenty six wethers (72 ± 0 lbs initial BW) were stratified by weight and breed (western white-faced Rambouillet and western white-faced Rambouillet X Katahdin) and assigned randomly to 9 pens (14 wethers/pen). Pens were then assigned to one of three diets; Control, 10 % replacement of barley with DDG (**10%**), or 20% replacement of barley with DDG (**20%**; Table 1). Wethers were fed a finishing diet for 70 days. The control diet consisted of 72% barley and 25% alfalfa hay. Rations were formulated as to maintain a Ca:P ratio of 2:1 or greater and sulfur below the toxicity range (0.40% of diet; Table 1). Rations were mixed and ground through a grinder-mixer and provided ad-libitum via bulk feeders. Wethers were weighed on day 0, 35, and 70. Initial and final weights were an average of two-day weights. Following the 70 day finishing period, wethers were harvested and carcass data collected. Feedlot performance and carcass trait data were analyzed as a randomized complete design using the GLM procedure of SAS (SAS Inst. Inc., Cary, NY). The model included treatment. Contrast statements included 1) Control vs DDG inclusion; and 2) linear effect of DDG inclusion.

Results

The effects of treatments on feedlot performance and carcass traits are shown in Table 2. Treatment did not affect any of the response variables evaluated ($P \geq 0.22$). Average daily gain averaged 0.73 lbs/day, resulting in hot carcass weights averaging 64.5 lbs. Fat depth, body wall thickness, and ribeye area average 0.21 in, 0.94 in, and 2.6 in^2, respectively. An average quality grade of 3 and yield grade of 2.5 were observed.

Discussion

Dried distillers grains replacing up to 20% of the barley portion of a barley and alfalfa based finishing ration had no negative effect on lamb performance or carcass traits. The performance and carcass data in this trial compare similar to other research as summarized by Lardy (2003) for beef cattle and Erickson et al. (1989) in finishing lambs. Erickson et al. (1989) provided up to 28% of a finishing ration as DDG and observed no negative affects on performance. The major difference between our trial and that of Erickson et al. (1989) is the source of DDG. For their trial, 65% of the DDG came from barley and 35% from corn. Today, the majority of the DDG products regionally available are byproducts of corn.

In our trial, the crude protein levels of the DDG rations are in excess of the requirements for lambs during this stage of production (NRC, 1985) and additional limestone was added to maintain a Ca:P ratio of 2:1. Future research is needed to determine if adequate performance can be maintained while utilizing lower quality forages than alfalfa with DDG replacing a portion of the concentrate in the diet. Additionally, future research should evaluate increased inclusion of DDG, beyond 20% of the concentrate portion of the diet. While Ca:P ratios may be able to be maintained, diet palatability may begin to decrease, resulting in decreased performance. Additionally, inclusion above 20% of the concentrate portion may result in sulfur concentrations greater than toxicity values reported by the NRC (1985). Sulfur toxicity may result in decreased intake and performance as well as health problems associated with sulfur binding to copper, resulting in copper deficiencies.

Implications

The expansion of the ethanol industry in the region may result in an increase in the availability of dried distillers grains. When appropriately priced relative to corn and/or barley, dried distillers grains can effectively replace up to 20% of the concentrate portion of a barley-based lamb finishing ration with no negative effects on feedlot performance or carcass traits.

Literature Cited

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Table 1. Dietary ingredient and nutrient composition of control and dried distillers grain diets

Ingredient	Diets[a]		
	Control	10%	20%
	%, DM basis		
Barley	72.2	65	57.1
Dried distillers grain	---	7.5	15.0
Alfalfa	25.0	25.0	25.0
Ammonium Chloride	0.49	0.49	0.49
Trace mineral[b]	0.49	0.49	0.49
CTC[c]	0.60	0.60	0.60
Limestone[d]	1.20	1.30	1.30
Nutrient Concentration			
CP, %	16.2	17.7	19.0
TDN, %	78.7	78.8	78.9
ADF, %	11.7	12.3	12.8
Sulfur, %[e]	0.19	0.28	0.36
Ca:P	2.34	2.30	2.17

[a]Control = 0% replacement of barley with dried distillers grains; 10 = replacement of 10% of barley with dried distillers grains; 20 = replacement of 20% of barley with dried distillers grains.
[b]Trace mineral concentrations were: 95.5% NaCl, 3,500 ppm Zn, 2,000 ppm Fe, 1,800 ppm Mn, 350 ppm Cu, 100 ppm I, and 60 ppm Co.
[c]CTC (4G) was formulated to provide 48 g/ton chlortetracycline.
[d]Limestone addition was formulated to maintain a Ca:P of 2.0 or greater.
[e]Sulfur may be toxic at 0.40% of diet.

Table 2. The influence of dried distillers grains on feedlot lamb performance and carcass characteristics

Item	Treatment[a]				*P*-value[c]	
	Control	10%	20%	SEM[b]	Control vs DDG	Linear
Gain (lbs)	48	54	51	2.5	0.54	0.39
Average Daily Gain (lbs/day)	0.69	0.77	0.73	0.03	0.41	0.41
Hot Carcass Weight (lbs)	65	64	65	0.6	0.22	0.86
Fat Depth (in)	0.22	0.21	0.20	0.02	0.58	0.29
Body Wall Thickness (in)	0.98	0.90	0.95	0.03	0.29	0.40
Ribeye Area (in^2)	2.5	2.6	2.6	0.08	0.96	0.73
Quality Grade[d]	3	3	3	0	---	---
Yield Grade	2.6	2.5	2.5	0.13	0.85	0.50

[a]Control = 0% replacement of barley with dried distillers grains; 10 = replacement of 10% of barley with dried distillers grains; 20 = replacement of 20% of barley with dried distillers grains.
[b]Standard Error of Mean; n = 3 .
[c]*P*-value for Control vs DDG treatments and linear affect of dried distillers grains inclusion.
[d]1 = utility; 2 = good; 3 = choice; 4 = prime.