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 30% of the corn portion of a corn and alfalfa based finishing ration increased lamb performance and had no negative effect on lamb 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 concentrate in lamb finishing rations. Schauer et al. (2005) reported that DDG can be included at levels up to 15% of a finishing ration with no negative affect on lamb performance or carcass traits. 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 forty four wethers (54 ± 0.3 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 (16 wethers/pen). Pens were then assigned to one of three diets; 0% replacement of corn with DDG (**Control**), 15 % replacement of corn with DDG (**15%**), or 30% replacement of corn with DDG (3**0%**; Table 1). Wethers were fed a finishing diet for 119 days. The control diet consisted of 73% corn and 25% alfalfa hay. Rations were formulated as to maintain a Ca:P ratio of 2:1 or greater and sulfur was monitored (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, 28, 56, 84, and 119. Initial and final weights were an average of two-day weights. Following the 119 day finishing period, wethers were harvested and carcass data collected at Iowa Lamb Corp, Hawarden, IA. 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. Final weight, gain, ADG, mortality, and ribeye area were affected by treatment ($P \leq 0.05$). Final weight and total gain increased linearly ($P = 0.04$ and $P = 0.02$, respectively) as level of DDG inclusion increased. Subsequently, ADG increased linearly ($P = 0.02$). However, intake was not affected ($P = 0.67$), resulting in a Feed:Gain ratio that was not different ($P = 0.20$) than Control. While the majority of carcass traits were not affected by treatment ($P \geq 0.42$), ribeye area increased ($P = 0.01$) in a similar trend to total gain and ADG. Hot carcass weight averaged 69 lbs, resulting in carcasses averaging choice with a yield grade of 3.8 and 45% boneless closely trimmed retail cuts.

Discussion

Dried distillers grains replacing up to 30% of the corn portion of a corn and alfalfa based finishing ration improved lamb weight gain, resulting in an increased ribeye area. Other researchers suggest that DDG can be an effective replacement of concentrate with no affect of livestock performance compared to control rations. Erickson et al. (1989) provided up to 28% of a finishing ration as DDG and observed no negative affects on performance. Similarly, Schauer et al. (2005) replaced up to 15% of the total ration with DDG and found no difference in lamb performance or carcass traits. However, our data suggests an increase in performance from increasing levels of DDG. 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). In the CON ration, CP may be limiting as corn CP concentrations are substantially lower than DDG CP concentrations. 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 30% of the concentrate portion of the diet. While Ca:P ratios may be able to be maintained, diet palatability may begin to decrease as additional limestone is added, resulting in decreased performance. Additionally, inclusion above 30% 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, performance, and potentially polio 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 30% of the concentrate portion of a corn-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

	Diets[a]		
Ingredient	Control	15%	30%
	%, DM basis		
Corn	73.0	61.5	50.1
Dried distillers grain	---	11.25	22.5
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]	0.50	0.70	0.90
Nutrient Concentration			
CP, %	11.7	14.6	18.4
TDN, %	82.2	82.8	84.6
ADF, %	9.5	10.6	11.8
Sulfur, %[e]	0.14	0.21	0.30
Ca, %	0.65	0.77	1.19
P, %	0.27	0.36	0.43

[a]Control = 0% replacement of corn with dried distillers grains; 15 = replacement of 15% of corn with dried distillers grains; 30 = replacement of 30% of corn with dried distillers grains.
[b]Trace mineral: 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

	Treatment[a]				*P*-value[c]	
Item	Control	15%	30%	SEM[b]	Control vs DDG	Linear
Initial Wt, lbs	54	54	55	0.27	0.13	0.42
Final Wt, lbs	124	124	129	1.48	0.04	0.04
Gain, lbs	66	68	74	1.86	0.06	0.02
Average Daily Gain, lbs/day	0.45	0.52	0.60	0.03	0.13	0.02
Dry Matter Intake, lbs/hd/d	4.13	4.23	4.23	0.09	1.0	0.45
F:G	9.33	8.2	7.1	0.76	0.34	0.08
Mortality	2	1	0.3	0.4	0.27	0.02
Hot Carcass Weight, lbs	69	70	70	1.5	1.0	0.65
Leg score	12	12	12	0.3	1.0	1.0
Conformation score	11	12	12	0.3	1.0	0.50
Fat Depth, in	0.35	0.34	0.32	0.02	0.65	0.47
Body Wall Thickness, in	0.99	1.00	1.02	0.04	0.77	0.60
Ribeye Area, in^2	2.5	2.5	2.6	0.02	0.05	0.01
Quality Grade[d]	Choice	Choice	Choice	0.2	0.27	1.0
Yield Grade	3.9	3.8	3.6	0.2	0.65	0.47
%BCTRC[e]	44.7	44.4	44.6	0.3	0.59	0.93

[a]Control = 0% replacement of barley with dried distillers grains; 15 = replacement of 15% of barley with dried distillers grains; 30 = replacement of 30% 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]Utility, Good, Choice, or Prime.
[e]% boneless closely trimmed retail cuts (49.936-(0.0848*D5)-(4.376*E5)-(3.53*F5)+(2.456*G5)).