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A Comparison of Corn or Soybean Hull Based Diets with Dried Distillers Grain with Solubles (DDGS) as the Protein Source in Finishing Diets Comparing Lamb Growth, Feed Efficiency, and Carcass Merit

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OBECTIVES

To evaluate growth, carcass merit and mineral status in wether lambs fed finishing diets formulated with dried distillers grain with solubles (DDGS) and soybean hulls (SH).

MATERIALS AND METHODS

Sixteen Polypay wethers were individually housed in 0.9 m x 1.5 m pens in the Animal and Range Science metabolism facility to record animal feed intake. After shearing lambs were adjusted to the indoor environment and their treatment diet during a 7-d acclimation period. Pelleted diets were formulated to have similar nutrient composition based on tabular values (15 % crude protein and 2.7 Mcal/kg ME). Dietary ingredients for the diets fed in this trial are reported in Table 1. Calcium to phosphorus ratio of the corn based diet was 1.7 to 1 and the SH based diet 3.6 to 1. Lambs were fed for 56 d with feed intake data and animal weight recorded at 14-d intervals. Lambs were harvested at a commercial packing plant, and livers were collected and transported on ice to our laboratory. Liver tissue samples were collected and frozen for subsequent mineral analyses. Carcass data (hot carcass weight, fat thickness, body wall thickness, ribeye area and USDA yield and quality grades) were collected approximately 24 hr after harvest.

Data were analyzed statistically as a completely randomized design with individual animal as the experimental unit. Differences in least squares means for growth performance, carcass characteristics, and mineral status that resulted from treatment were separated using the PDIFF option of SAS.

RESULTS

Lamb growth performance, feed efficiency and carcass data measurements are reported in Table 2. Average daily gain was similar for lambs regardless of ingredient composition of the finishing diet. However, lambs fed SH-DDGS consumed more feed ($P \leq 0.002$) to grow at a similar rate and therefore, had less efficient feed conversion ($P \leq 0.001$) compared to lambs finished on the Corn-DDGS diet. Lower feed efficiency for the SH-DDGS fed lambs could be related to a lower energy-density for this diet than expected or less efficient use of energy due to a greater rate of gastrointestinal tract passage associated with higher dry matter intake for the SH-DDGS diet.

Other lamb nutrition research has consistently shown high-voluntary intake for SH-formulated diets when used as a replacement for traditional energy feeds. The indication that dietary ingredient composition and particularly the inclusion of co-products may impact feed efficiencies and dry matter intake warrants further investigation.

Table 2 also shows the carcass data for the objective measurements hot carcass weight, fat depth, body wall thickness, loin eye area and the subjective USDA quality and yield grade estimates. Lambs finished on the treatment diets had similar carcass merit although the lambs finished on the SH-DDGS diet tended (P = 0.08) to have more subcutaneous back fat and numerically smaller loin eye area (P = 0.15) when compared to lambs finished on the Corn-DDGS diet. Body wall thickness was similar between treatment groups of carcasses. Research has shown that body wall thickness and hot carcass weight are the two most significant variables to estimate lamb carcass cutability.

Liver tissue mineral concentrations are reported in Table 3. Copper concentration was higher (P = 0.04) for lambs fed the SH-DDGS diet. Soybean hulls are known to have higher copper concentrations than traditional lamb finishing diet ingredients yet below the levels considered toxic. Most reported copper concentrations for SH range from 15 to 18 ppm. Although the liver copper concentration was significantly higher there was no evidence of copper toxicity for any lambs in the finishing trial or at harvest.

Table 1. Diet Composition (% DM Basis)

Ingredient	Corn-DDGS	SH-DDGS
Corn	37.00	----
Soybean hulls	----	84.65
DDGS	31.65	10.00
Alfalfa pellets	15.00	----
Oat hulls	11.00	----
Liquid molasses	2.50	2.50
Limestone	1.00	1.00
White salt	1.00	1.00
Ammonium chloride	0.50	0.50
TM micro mix	0.25	0.25
Decoxx	0.10	0.10
Total	100	100

Table 2. Growth performance and carcass data

Trait measured	Treatment Corn-DDGS	SH-DDGS	SE	P <
Initial wt (kg)	43.40	44.10	0.92	0.58
Final wt (kg)	61.40	61.60	1.17	0.89
ADG (kg/d)	0.32	0.31	0.011	0.62
DMI (kg/d)	1.58	1.91	0.06	0.002
Feed:Gain	4.94	6.16	0.16	0.001
Gain:Feed	0.204	0.163	0.006	0.001
Hot carcass wt (kg)	33.0	32.7	0.81	0.80
Body wall thickness (cm)	3.30	3.30	0.21	0.92
Back fat (cm)	0.76	1.00	0.10	0.08
Loin eye area (cm^2)	17.6	16.50	0.53	0.15
USDA yield grade	3.50	3.30	0.18	0.33
USDA quality grade	CH	CH	----	----

Table 3. Liver tissue mineral concentrations

Mineral	Treatment Corn-DDGS (ppm)	SH-DDGS (ppm)	SE	P <
Calcium	55.6	56.1	2.04	0.870
Copper	48.8	73.8	7.89	0.040
Iron	90.1	115.6	6.36	0.010
Manganese	5.3	3.4	0.17	0.001
Molybdenum	1.5	1.4	0.05	0.100
Zinc	35.9	36.7	0.90	0.550
Magnesium	186.8	172.7	1.68	0.001
Sodium	757.9	834.3	26.80	0.060
Potassium	2717	2617	20.10	0.003
Phosphorus	4357	4216	68.60	0.170