2014

Effects of glycerol and sire breed on growth and carcass traits of finishing wether lambs

R.M. Beck
South Dakota State University

A.E. Wertz-Lutz
South Dakota State University

C.L. Wright
South Dakota State University

J.E. Held
South Dakota State University

SHEEP 2014-7

Effects of glycerol and sire breed on growth and carcass traits of finishing wether lambs

R. M. Beck, A. E. Wertz-Lutz, C. L. Wright, J. E. Held, R. D. Zelinsky, C. L. Delvaux

OBJECTIVES

To evaluate crude glycerin as an energy source for finishing lambs and to determine the effect of sire breed on finishing lamb growth performance and carcass characteristics. In light of previous research, the hypothesis for this experiment was that glycerol would have an energy value similar to that of corn when fed in high concentrate diets to finishing lambs.

MATERIALS AND METHODS

The trial consisted of seventy-two crossbred wether lambs of two different sire breeds, Hampshire or Southdown. Body weights, feed intake and carcass data were recorded in order to determine if substituting 0, 5, or 10% glycerol for corn had an impact on average daily gain, feed efficiency, and carcass characteristics. Experimental design was a 2 x 3 factorial arrangement of treatments to determine the effects of sire breed and replacing corn with glycerol on growth performance and carcass characteristics. Wethers were separated by sire breed and randomly assigned to 24 pens, with 3 lambs per pen, such that initial body weights were similar among pens within a breed (initial BW Hampshire 34.7 ± 0.3 kg, Southdown 32.2 ± 0.3 kg). Glycerol treatments were assigned to 4 pen replicates by sire breed. The control diet ingredients consisted mainly of soyhulls and corn, and treatment diets were similar with the exception of replacing 5 or 10% of the corn in the diet with glycerol (Table 1). All diets were pelletized to reduce sorting and offered ad libitum using self-feeders. Diets were not formulated to be isonitrogenous, as glycerol does not contain any crude protein to replace that lost by removing corn from the diet, but they met or exceeded the animals requirement (NRC, 2007). Diets were formulated to be isocaloric by assuming that glycerol has an energy value similar to corn. The formulated composition of the diets is shown in Table 2. Body weights were recorded at 21-d intervals, with initial and final weights the average of 2 consecutive-day weights. Lambs were harvested at the Iowa Lamb Corporation facility (Hawarden, IA) after 64 d on feed and carcass data was recorded after a 24-h chill.

Experimental design was a completely randomized design with a 2 x 3 factorial arrangement of treatments. Growth performance data were analyzed for the main effects of dietary treatment, breed, and the interaction between dietary treatment and breed using the GLM procedure of SAS with pen as the experimental unit. Means were separated using the LSMEANS statement with the PDIFF option in SAS. Carcass data were analyzed for the main effects of dietary treatment, breed, and the interaction between dietary treatment and breed using the GLM procedure of SAS with animal as the experimental unit. Means were separated using the LSMEANS statement with

the PDIFF option in SAS, and frequency of quality grades was separated using Chi-squared analysis. Significance was declared at $P \leq 0.05$.

RESULTS AND DISCUSSION

Sire breed did have an effect on overall growth performance of the lambs. Hampshire-sired lambs had heavier initial and final weights and a higher average daily gain (ADG) than Southdown-sired lambs (Table 3). Dietary treatment had no significant effects on growth performance of the lambs. Initial and final body weights, ADG, dry matter intake (DMI), and feed efficiency (G:F) were not different among glycerol treatments (Table 4). There was no interaction between sire breed and dietary treatment.

Sire breed also affected carcass characteristics of the lambs. Hampshire-sired lambs had heavier hot carcass weights (HCW), less subcutaneous fat, and lower yield grades than Southdown-sired lambs (Table 5). Hampshire-sired lambs also tended to have larger longissimus muscle area than Southdown-sired lambs *(P* = 0.07). Dietary treatment did not have an effect on carcass characteristics of the lambs. Hot carcass weight, subcutaneous fat thickness, body wall thickness, longissimus muscle area, and yield grade were all similar among treatments (Table 6). Again, the interaction between dietary treatment and sire breed was not significant.

As expected, sire breed did affect lamb growth performance and carcass traits. Hampshire-sired lambs exhibited heavier live weights and higher ADG than Southdown-sired lambs in the growth performance trial. However, it is important to note that feed efficiency was not significantly different between the two sire breeds, indicating that Southdown-sired lambs grew as efficiently as Hampshire-sired lambs. Measurements of carcass characteristics revealed that Hampshire-sired lambs had heavier HCW, less subcutaneous fat, lower yield grades, and a tendency to have larger longissimus muscle area than Southdown-sired lambs. Chi-squared analysis also indicated that Hampshire-sired lambs had a lower incidence of grading Prime than Southdown-sired lambs *(P* = 0.02).

Growth performance and carcass characteristics were not affected by replacing up to 10% of corn in the diet with glycerol. These results support the initial hypothesis for this experiment that glycerol has an energy value similar to that of corn when fed in high concentrate diets to finishing lambs. Utilizing glycerol in finishing lamb diets may help producers save money on feed input costs however more research in this area would provide additional insight as to the advantages and disadvantages of feeding glycerol to ruminants.

Table 1. Ingredient composition of diets (DM basis)

	Glycerol (%)		
Ingredient	0	5	10
Soybean hulls	25.0	25.0	25.0
Corn	62.4	57.4	52.4
Glycerol	0.0	5.0	10.0
Soybean meal	10.0	10.0	10.0
Supplement[a]	2.6	2.6	2.6

[a]Contains 0.5% urea, 1.0% limestone, 0.5% ammonium chloride, 0.1% decoquinate, 0.5% sheep trace mineral salt.

Table 2. Formulated dietary composition (DM basis)

	Glycerol (%)		
Formulated composition	0	5	10
DM (%)	88.10	88.60	89.10
CP (%)	13.73	13.34	12.96
DIP (%)	60.86	61.25	61.66
ME (mcal/kg)	3.04	3.04	3.04
NDF (%)	22.66	22.20	21.75
ADF (%)	13.90	13.79	13.67
Ca (%)	0.60	0.60	0.60
P (%)	0.23	0.22	0.21

Table 3. Effect of sire breed on growth performance of lambs

	Sire breed			
Item	Hampshire	Southdown	SEM	P <
Initial BW (kg)	34.70	32.20	0.27	0.001
Final BW (kg)	57.90	53.40	0.82	0.001
ADG (kg)	0.36	0.33	0.01	0.05
DMI (kg/d)	1.55	1.51	0.05	0.53
G:F (kg)	0.23	0.22	0.01	0.16

Table 4. Effect of dietary treatment on growth performance of lambs

	Glycerol (%)				
Item	0	5	10	SEM	P <
Initial BW (kg)	33.5	33.7	33.2	0.33	0.57
Final BW (kg)	56.6	54.8	55.7	1.00	0.43
ADG (kg)	0.36	0.33	0.35	0.01	0.24
DMI (kg/d)	1.58	1.47	1.53	0.06	0.40
G:F (kg)	0.23	0.23	0.23	0.01	0.90

Table 5. Effect of sire breed on carcass characteristics of lambs

	Sire breed			
Item	Hampshire	Southdown	SEM	P <
HCW (kg)	33.96	29.33	0.42	0.02
Fat (cm)	0.51	0.66	0.04	0.01
BWTH (cm)	2.82	2.90	0.07	0.44
LM area (cm^2)	19.48	18.06	0.21	0.07
YG	2.80	3.20	0.12	0.01

HCW = Hot carcass weight.
BWTH = Body wall thickness.
LM = Longissimus muscle.
YG = USDA yield grade.

Table 6. Effect of dietary treatment on carcass characteristics of lambs

	Glycerol (%)				
Item	0	5	10	SEM	P
HCW (kg)	30.50	33.12	32.66	0.51	0.53
Fat (cm)	0.56	0.53	0.64	0.04	0.33
BWTH (cm)	2.90	2.84	2.87	0.08	0.93
LM area (cm^2)	18.77	18.83	18.64	0.26	0.98
YG	3.00	2.90	3.10	0.15	0.76

HCW = Hot carcass weight.
BWTH = Body wall thickness.
LM = Longissimus muscle.
YG = USDA yield grade.