2014

Effects of Increasing the Energy Density of a Lactating Ewe Diet by Replacing Hay with Soyhulls (SH) and Dried Distillers Grains with Solubles (DDGS)

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SHEEP 2014-4

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OBJECTIVES

To evaluate the effects of increasing the ewe's dietary energy by replacing hay with SH and DDGS on milk production, nutrient composition, lamb growth, and changes in ewe body weight and body condition score (BCS).

MATERIALS AND METHODS

Sixteen Polypay-sired ewes rearing twin lambs were selected within a narrow post-partum period and individually housed in 1.8 m x 4.8 m pens for an 8-wk lactation period. Ewes were assigned randomly to one of four dietary treatments and fed at a rate of 3.5% (DMB) of initial post-partum body weight. The dietary treatments were 1) Hay-SBM 2) Hay-DDGS 3) SH40-DDGS and 4) SH60-DDGS. The ingredients and physical form offered in these dietary treatments were the same as described in the previously reported metabolism trial (Table 1). Lamb weigh-suckle-weigh was used each week to estimate ewe milk production. In this procedure, to quantify ewe milk production the lambs were withheld from the dam for 3 h, weighed followed by an udder zeroing period and reweighed. This process was repeated four times in a 12 h period to calculate daily production. Milk samples were collected following the weigh-suckle-weigh for subsequent nutrient analyses.

Lamb and ewe performance data were analyzed statistically as a completely randomized design. The model accounted for variation that resulted from animal and dietary treatment. Differences in least squares means for performance that resulted from dietary treatment were separated using the PDIFF option of SAS. Milk production and milk composition data were analyzed statistically as repeated measures in time with a model that accounted for variation that resulted from ewe-lamb pair, treatment, week of lactation, and the interaction of treatment and week of lactation. Differences in least squares means for milk production and milk composition that resulted from treatment and week of lactation were separated using the PDIFF option of SAS.

RESULTS AND DISCUSSION

Preliminary statistical analysis for animal performance responses to increasing dietary energy intake from co-products during lactation is summarized in Table 2. Milk production was affected ($P < 0.001$) when more energy dense co-products were substituted in lactation diets. Ewes receiving the highest energy dense diet SH60-DDGS numerically produced the greatest quantity of milk, with the lowest production in the Hay-DDGS treatment group. Milk fat, milk protein

and total milk solids also were affected ($P < 0.001$). Lamb body weight gain was affected ($P < 0.001$) by the dietary treatment offered to the dam. Lamb gain is higher ($P < 0.001$) in the SH40-DDGS and SH60-DDGS treatments, where milk production is the highest ($P < 0.001$) and ewe weight loss is numerically lower. Further statistical tests will be applied to evaluate treatment differences in this study. Using the co-products SH and DDGS in this study to increase the energy density for lactation diets appeared to have no detrimental impact on measured animal performance or observed health status.

Table 1. Feed Ingredient Composition

	HAY-SBM	HAY-DDGS	SH40-DDGS	SH60-DDGS
Item	%DMB			
Grass hay	60.00	60.00	20.00	0.00
Soy hulls	0.00	0.00	40.00	60.00
Corn	25.62	12.75	22.78	28.06
SBM	11.64	0.00	0.00	0.00
DDGS	0.00	25.39	15.34	10.00
Urea	1.00	0.45	0.40	0.40
Dical	0.39	0.05	0.40	0.60
Limestone	0.85	0.86	0.58	0.44
TMS	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00
	Nutrient Composition DMB			
CP (%)	13.85	13.85	13.85	13.85
DIP (%)	45.60	45.76	45.70	45.93
ME (mcals/kg)	2.40	2.51	2.82	2.97
Ca (%)	0.68	0.68	0.68	0.68
P (%)	0.34	0.34	0.34	0.34
NDF (%)	45.56	51.99	46.10	43.10
ADF (%)	27.60	29.49	29.54	29.53

Table 2. Milk production, milk composition, and ewe body condition

	Treatment					
	HAY-SBM	HAY-DDGS	SH40-DDGS	SH60-DDGS	SE	P <
Ewe body weight						
Initial wt (kg)	84.4	86.0	86.8	88.6	5.21	0.95
Final wt (kg)	72.4	77.3	79.7	80.5	6.29	0.80
BW change (kg)	-12.0	- 8.75	- 7.16	- 8.18	2.21	0.46
Ewe BCS[a]						
Initial BCS	3.1	3.1	3.2	3.1	0.23	0.98
Final BCS	2.1	2.3	2.7	2.8	0.29	0.30
BW change BCS	- 1.0	- 0.81	- 0.50	- 0.25	0.25	0.21
Milk Composition						
Milk production (kg/d)	2.07	1.95	2.57	3.27	0.07	0.001
Total milk solids (%)	16.31	18.65	16.35	15.52	0.27	0.001
Milk protein (%)	5.25	5.63	5.19	5.03	0.10	0.001
Milk fat (%)	5.66	7.28	5.45	4.58	0.33	0.001
Lamb Performance						
Initial wt (kg)	6.32	7.05	6.37	7.07	0.41	0.40
Final wt (kg)	15.98	17.37	19.13	21.05	0.65	0.001
BW gain	9.66	10.32	12.76	13.98	0.64	0.001

[a] Body Condition Score: 1 = poor condition 5 = good condition