The Effect of Protein Level On Feedlot Performance And Carcass Characteristics Of Texas Rambouillet Ewes

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ABSTRACT

Aged Rambouillet ewes, 5 to 7 years old, are usually culled in Texas. Some producers have chosen to feed their aged ewes high energy diets, a feedlot practice, before they send them to harvest. This practice may prove to be profitable as the ewes will gain extra weight and bring more money at sale time. Research on the feedlot performance of aged ewes is very limited. The purpose of this research is to compare different protein level on feedlot performance (rate and efficiency of gain) and carcass composition in aged Rambouillet ewes. A total of 28 ewes were blocked by weight and BCS and randomly assigned to a pen. The pens measured 3.048 m by 9.144 m. The trial consisted of 28 ewes placed in one of 14 pens with two ewes per pen. Pens were allocated to one of three different treatments consisting of four pens on WH (wheat hay), five pens on SBH (soybean hulls), and five pens on GR (grain ration). These treatments resulted in varying amounts of protein. Ewes were weighed every 28 days and kept on trial for 84 days. Carcass characteristics were measured after carcasses were chilled for 24 hours. Performance was greater ($P<0.05$) for ewes on GR for total gain, ADG as well as BCS and BCS change. Feed efficiency was also better ($P<0.05$) for GR as compared to WH and SBH. Ewes on GR had greater ($P<0.05$) fat depth at the twelfth rib than SBH or WH and SBH ewes were fatter than WH with no differences ($P>0.05$) across treatments in carcass weights or dressing percents. Upon evaluation of the economic data, the feeding of aged ewes in a down market appears to be unprofitable and actually resulted in a loss. However, if the market remained steady, profit could be gained by feeding aged ewes. This research only shows that further focus of commercial operations is needed to determine the actual profitability of feeding aged ewes.

KEYWORDS: Sheep, Protein, Carcass

INTRODUCTION

Sheep production in West Central Texas is a large constituent of the agricultural economy of the area. The West Texas region is considered the top sheep producing region in the nation (USDA-AMS, 1997). According to the United States Department of Agriculture – National Agriculture Statistics Service (USDA-NASS), the West Central

region of Texas had an inventory of 857,000 head of sheep in 2003. This comprises 76 percent of all sheep in Texas (USDA-NASS, 2003). In 1997 sheep, lamb, and wool sales totaled 97 million dollars in Texas. Most of this was from the sale of red meat, especially that of lambs. Yet, a part of this red meat also comes from the sale of older ewes.

The termination of wool subsidies made sheep producers turn their focus from wool production to red meat production. Sheep operations in West Central Texas make most of their money from the sale of feeder lambs to feedlots (Personal communication, A.H. Denis, Denis Ranch, Vancourt, TX). On a per farm basis, there is a thin margin between profit and loss on sheep operations. Therefore, any extra from any venue, such as sales of cull ewes fed to a higher weight, can be the difference between profit and loss.

Aged ewes, 5 to 7 years old, are usually ewes that the producer has decided not to breed anymore. The ewes are usually sent to harvest facilities after their last lamb is weaned, as an effort to minimize the cost of maintenance for the operation. Some producers have chosen to feed their aged ewes high energy diets, a feedlot practice, before they send them to harvest. This practice may prove to be profitable as the ewes will gain extra weight and bring more money at sale time.

Research on the feedlot performance of aged ewes is very limited. Therefore, little is known about how aged ewes perform in feedlot situations. The purpose of this research is to compare protein level on feedlot performance (rate and efficiency of gain) and carcass composition in aged Rambouillet ewes.

MATERIALS AND METHODS

Animals and Feeding

This study was conducted at the Angelo State University Management, Instruction, and Research Center (MIR Center), located in Tom Green County north of San Angelo, Texas. A total of 28 Rambouillet ewes greater than 4 years of age averaging 53 kg were used for this trial. The ewes were blocked by weight and BCS and assigned to 14 pens of two ewes per pen. Pens were allocated to one of the three different treatments consisting of four pens on WH, five pens on SBH, and five pens on GR, which was prepared at the MIR Center, (Table 1) containing varying levels of protein. All treatments met or exceeded NRC requirement for maintenance in ewes (NRC, 1985a). Ewes had *ad libitum* access to feed and fresh water for the 84d trial. Feed refusals were removed and weighed each time a new batch of feed was placed in the feeders so that feed efficiency could be calculated, including ADG, gain:feed ratio, cost of gain, and profit. Feed efficiency was calculated by dividing the kg of gain by kg of feed. Percent of maintenance CP and percent of maintenance TDN were calculated for each diet. Ewes were kept in pens measuring 3.048 m by 9.144 m. Upon arrival ewes were tagged and weighed and treated with an anthelmintic.

Data Collection

Ewes were individually weighed on day zero, 28, 56, and 84 to determine feedlot performance for each treatment. At initial and final weigh days, ewes were evaluated and given a BCS on a scale of zero to five, zero being extremely emaciated and five being excessively obese. Evaluation was done by palpation method as described in the Sheep Production Handbook (American Sheep Industry Association, 1996). At d 84 of the trial, ewes were harvested following normal commercial conditions at Rancher's

Lamb of Texas Inc., and carcasses were spray chilled at 2°C for 20 to 24 hours. Carcasses were then evaluated for backfat thickness at the twelfth rib. Dressing percent was also calculated by taking the hot carcass weight (HCW) and dividing it by the live weight and multiplying it by 100.

Table 1. Ingredients and nutrient density for WH, SBH, and GR fed *ad libitum* for 84 d.

	Treatment[a]		
Item	WH	SBH	GR
	----------% as fed----------		
Ingredients			
Sorghum grain	-	-	45
Soybean hulls	-	100	22.5
Alfalfa pellets	-	-	17
Cottonseed meal	-	-	10
Cane molasses	-	-	3
Mineral premix	-	-	2.5
Wheat hay	100	-	-
	----------DM----------		
Nutrient Density			
Crude Protein(CP), %	15.4	14.3	17
NE_g, Mcal/kg	0.6	0.7	1.2
Neutral Detergent Fiber, %	51.4	59.8	34.3
Acid Detergent Fiber, %	28.7	40.2	25.7
TDN, %	59	63	76

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration

Statistical Analysis

The trial was a completely randomized block design with a pen of two ewes being the experimental unit. The General Linear Model procedure (SAS Inst. Inc., Cary, NC) was used to determine the effect of protein level on feedlot performance and carcass characteristics. Analysis of variance and Fisher's protected LSD test was used to determine statistical significance at a predetermined $\alpha = 0.05$.

RESULTS AND DISCUSSION

Feed Analysis

Chemical analysis of all three feed treatments was conducted by Dairy One Inc., Ithaca, NY. Although the CP levels in SBH were lower than WH, TDN values were lowest in WH followed by SBH and then GR. Table 2 shows the percent of maintenance CP and TDN which the ewes ingested for each treatment. Maintenance CP and TDN levels were obtained from the NRC (1985a).

Performance Data

Ewes were blocked by weight and initial BCS. No differences (P>0.05) were found for weight and initial BCS (Table 3). The total number of ewes on trial was 28 in 14 different pens. The 14 pens were four pens on WH, five pens on SBH, and five pens

on GR. Table 3 shows the least square means of final body weight (BW), gain, ADG, final BCS, and BCS change. No differences (P>0.05) were observed for the mean final weights. Although the ewes on GR gained more than the other treatments, they averaged a lighter initial weight numerically, therefore, the final weights tended to average to the same weight. Both total gain and ADG were significantly higher (P<0.05) for GR when compared to WH and SBH. Ewes on GR increased an average of 19.7 kg, which was 15 kg and 10.6 kg more than WH and SBH, respectively. This result agrees with Fluharty and McClure (1997), Hinds et al. (1965), and Hudson et al. (1967) who found increases in ADG and final weight in growing lambs when they increased the recommended NRC protein requirement. The final BCS and BCS change were also different (P<0.05) for SBH and GR from WH.

Table 2. Percent of maintenance crude protein and total digestible nutrients which pens of Texas Rambouillet ewes were ingesting per treatment.

	Treatment[a]		
Item	WH	SBH	GR
N	4	5	5
% of maintenance CP	166	258	405
% of maintenance TDN	109	195	311

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration

Table 3. Least square means of initial weight and BCS, and the effect of protein level on feedlot performance of pens (two ewes/pen) of Texas Rambouillet ewes.

	Treatment[a]			
Item	WH	SBH	GR	SE[b]
N	4	5	5	
Initial wt (kg)	113	108	100.2	6.8
Initial BCS(avg/animal)	2.25	1.97	1.96	0.17
Final BW, kg	122.4	126.2	139.8	8.5
Total Gain, kg	9.4[c]	18.22[c]	39.4[d]	4.5
ADG. kg/d	0.1[c]	0.22[c]	0.46[d]	0.06
Final BCS(avg/animal)	1.72[c]	2.83[d]	3.28[d]	0.18
BCS change(avg/animal)	0.53[c]	0.85[d]	1.31[d]	0.21

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration.
[b]Standard error of estimate.
[c,d]Means in the same row with uncommon superscripts differ P < 0.05.

Table 4 displays the intake and feed efficiency least square means for the three treatments. All three treatments significantly differed (P<0.05) from each other in intake. A difference in intake greatly differed between WH and GR from 199.6 to 393.2 kg per pen, respectively, a difference of 193.6 kg. A significant difference (P<0.05) was seen in efficiency when GR was compared to WH and SBH. GR ewes gained 0.10 kg per kg of feed consumed, while WH and SBH ewes only gained 0.03 kg and 0.06 kg, respectively, per kg of feed consumed. Fluharty and McClure (1997) also found an increase (P<0.01) in dry matter intake, but observed no difference in feed efficiency when protein level was increased in lamb rations. In another study, done by Braman et al. (1973), lambs and steers fed protein supplements had significantly higher feed efficiencies. Lana et al. (1997) observed no improvement in ADG or feed efficiency. The effects of protein

increases in a ration are greater when a ration is low in protein than a ration high in protein where energy is readily available (Zinn and Owens, 1993).

Table 4. Least square means of intake, feed efficiency, and the effect of protein level on carcass characteristics of pens (two ewes/pen) of Texas Rambouillet ewes.

	Treatment[a]			
Item	WH	SBH	GR	SE[b]
N	4	5	5	
Intake, kg	199.6[e]	308[f]	393.2[g]	31.6
Efficiency, kg gain/kg feed	0.03[e]	0.06[e]	0.10[f]	0.015
Fat depth[c]. cm	0.45[e]	0.57[e]	1.07[f]	0.05
Hot carcass weight, kg	52.2	55.5	61.9	4.3
Dressing percent[d]	42.8	44.9	48.0	2.21

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration.
[b]Standard error of estimate.
[c]Fat depth measurement at the twelfth rib (avg/animal).
[d]Dressing percent = hot carcass weight/live weight.
[e,f,g]Means in the same row with uncommon superscripts differ $P < 0.05$.

Carcass Data

In this study fat depth, at the twelfth rib, hot carcass weight, and dressing percent were observed (Table 5). The fat depth of GR ewes was significantly different ($P<0.05$) from that of SBH and WH. WH and SBH fat depth measurements were not significantly different ($P>0.05$), but tended to increase as protein level increased. No differences ($P>0.05$) were found in hot carcass weight and dressing percent measurements. There was a tendency for weight to increase as protein level increased. Overall protein had only a slight effect on carcass composition other than fat depth. This agrees with the findings of Braman et al. (1973) on steers and lambs and Prior et al. (1977) with cattle.

Economic Data

Table 5 shows the cost of the WH, SBH, and GR feeds. The average price of WH was $70 per 909.1 kg (USDA-NASS, 2003) which equated to $0.08 per kg. The prices for SBH and GR were obtained from the financial records of the MIR Center and calculated to $0.12 and $0.14 per kg, respectively. The highest protein, GR, was $61.94 per 909.1 kg more than lowest protein WH.

Table 5. Analysis of treatment cost.

	Treatment[a]		
Item	WH	SBH	GR
Price per 909.1 kg	$70.00	$106.00	$131.94
Price per kg	$ 0.08	$ 0.12	$ 0.14

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration

Table 6 shows the least square means of the economic data for this trial. Ewes were sold at the harvest facility for $0.55/kg of carcass weight. No differences ($P>0.05$) were found between any of the treatments for carcass value. Total feed cost, cost of gain,

and profit were not statistically tested, only calculated on averages. Table 6 shows that all treatments were at a loss. Yet, since the smallest cost of gain is $1.70/kg, and the ewes only bring $0.55/kg, this seems to imply that feeding out aged ewes is non-profitable. However, at the time these ewes were bought the price of slaughter ewes was high because supply was low, and when ewes were sold prices were low. If the market had remained steady from purchase to sale the profit margin would have been positive.

Table 6. Least square means of economic data (U.S. dollars) for pens (two ewes/pen) of Texas Rambouillet ewes.

	Treatment[a]			
Item	WH	SBH	GR	SE[b]
n	4	5	5	
Purchase price[c], $	107.66	107.66	107.66	
Carcass value[d], $	66.83	68.93	76.37	5.27
Total feed cost[e], $	15.06	37.57	55.49	
Cost of gain kg[f], $	2.19	2.63	1.70	
Profit[g], $	-55.89	-76.30	-86.78	

[a]WH = wheat hay, SBH = soybean hulls, GR = grain ration.
[b]Standard error of estimate.
[c]Average price of ewes at beginning of trial.
[d]Average value ewes were sold for.
[e]Average cost of ration per ewe.
[f]Cost of ration per weight gain in kg.
[g]Profit = (carcass value) – (purchase rice + tot feed cost).

CONCLUSIONS

Results from this trial show increased gain rates and more weight in aged ewes on the higher protein treatment. In addition, the fat depth at the twelfth rib increases with increasing protein level. Overall, this trial showed a loss of money occurs when feeding out aged ewes; however, if market conditions remain steady the cost of gain should be profitable. Further research is needed to determine the actual profitability of feeding aged ewes on an actual operation situation where the operator does not have to purchase the ewes.

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