

The Effect of Different Protein Concentrations in the Diet of Fattening Dorper and Pelibuey Lambs

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Abstract: The objective of the present study was to evaluate 3 protein levels (14, 16 and 18%) in the diet of fattening Dorper and Pelibuey. For this aim 24 weaned male lambs of 2 breeds (12 Dorper and 12 Pelibuey) averaging 18 kg of body weight and 3 month of age. Animals were individually lodged with water *ad libitum* in a 70 days trial. Feed intake, body gain and carcass were evaluated and the resulting data were submitted to ANOVA. Daily intake and Average Daily Gain (ADG) were similar among breeds ($p>0.05$), a slight increase on ADG was observed with high protein in the diet ($p>0.05$). Carcass yield (kg and %) and back fat was higher in the Dorper lambs ($p<0.05$), but similar between the different protein levels ($p>0.05$). Chops were unaffected by the breed ($p>0.05$), however protein levels increased their diameter ($p<0.05$), no interaction was detected on the parameter. In conclusion, protein level has a minor effect on lamb performance in wool and hair sheep.

Key words: Breed of the lamb, protein concentration, performance, diet, fattening, dorper, lambs

INTRODUCTION

The primary objectives of the sheep industry is to provide protein for human consumption. In Los Altos de Jalisco in Mexico, wool and hair sheep are popular breeds reared for this purpose. Therefore, all the inputs that would increase meat gain must be considered and studied, for many years protein source in animal feed has been considered to be a limiting factor, regardless of the genetic background of the sheep breed studied (Fluharty and McClure, 1997; Legleiter *et al.*, 2005; Machado da Rocha *et al.*, 2004; Titi *et al.*, 2000). The fattening animal consume certain amount of protein and nitrogen containing ingredients of the diet in order to stimulate, synergically with the sugars, the microbial yield at rumen level (Bohnert *et al.*, 1999; Dabiri and Thonney, 2004; Legleiter *et al.*, 2005; Richardson *et al.*, 2003). Both dietary protein and microbial protein is further used by the animal to fuel for body functions and growth (Archibeque *et al.*, 2007; Atkinson *et al.*, 2007; Bohnert *et al.*, 1999; Cole, 1999; Suliman and Babiker, 2007; Swenson *et al.*, 1999).

The source as well as the amount of the nitrogen has a direct impact on the microbial yield and on the animal performance, especially in small ruminants selected

for fast growth or/and gain (Haddad *et al.*, 2001). Nevertheless, regardless of the nutrient source some research has shown that increasing the level of protein in high grain diets increases the sheep performance (Dabiri and Thonney, 2004; Haddad *et al.*, 2001; Machado da Rocha *et al.*, 2004; Richardson *et al.*, 2003; Suliman and Babiker, 2007). In these studies, the range of protein evaluated in sheep diet was 10-20% in a dry matter basis.

However, no published studies were found in which the Pelibuey or Dorper lambs fed high grain diets were used to assess the effect of different levels of protein from soy bean meal.

MATERIALS AND METHODS

Twenty four male lambs of pure breeds (12 Dorper and 12 Pelibuey) recently weaned (initial average weight 18 kg and 3 month of age) were lodged in individual crates (2×2 m), with cement floor. The animals were randomly assigned to one of the three levels of protein in the diet (14, 16 and 18%; dry matter) and 2.8 Mcal of metabolizable energy. Also the diet contained minerals to fill the National Research Council (2007) requirement for sheep. Each treatment had 3 repetitions.

The experiment consisted in a fattening period of 70 days during which the feed and water was available *ad libitum*. The initial body weight was use as co-variable for daily gain. At the end of the experiment the weight gain, feed consumption and carcass yield was assessed. After the sacrifice the content of the rumen and intestine was drained with saline solution and immediately weighted. All the animals were sacrificed following the Animal Ethics Committee regulations.

The statistical analysis of the data was performed as a randomized model for a 2×3 factorial arrangement. An alpha of 0.05 was established to declare differences among treatments. And when they existed the Duncan test was used to separate the means.

RESULTS AND DISCUSSION

Feed intake averaged 0.998 g day⁻¹. Consumption was unchanged by the breed of the lamb (p>0.05; 0.995 vs. 1.000 kg day⁻¹ for Dorper and Pelibuey, respectively). Furthermore, the parameter was similar among the level of protein in the feed (p>0.05; 1.035, 0.959 and 1.000 kg day⁻¹ for 14, 16 and 18% of protein, respectively). The interaction breed×protein level did not affect the consumption (p>0.05). Fluharty and McClure (1997) using Hampshire×Targhee lambs reported an increased in the feed intake with the 25% augmentation of the protein recommendation of the National Research Council (2007).

On the other hand, the feed to gain ratio averaged 3.791 and was similar among the breeds used (p>0.05), however, the protein level reduced the ratio (p<0.05; 4.12, 3.64, 3.57 for 14, 16 and 18%, respectively). No interaction breed×protein level was observed (p>0.05). The mean of the final weight was 36.257 kg and was unchanged (p>0.05) by the protein level or by the interaction of this with the breed. On the other hand, the Dorper showed more final weight (p<0.05; 37.254 vs. 35.284 kg) compared with the pelibuey breed. The averaged daily gain of weight (kg) was similar between breed and level of protein (Table 1) and unaffected by their interaction. Fluharty and

McClure (1997) using crossbred (Hampshire×Targhee) lambs, reported an augmentation of gain when the protein level was raised.

The carcass weight averaged 18.587 kg and the breed had a high effect (p<0.05). The protein level and the interaction with the breed of the animal did not affect the parameter (p>0.05). When the carcass was expressed as percent, was unaffected by breed used (p>0.05; average 51.23%), the level of protein in the diet (14, 16 and 18%; 51.78, 51.35 and 50.53%, respectively) or their interaction (Table 1). Back fat was higher for Dorper (2.82 vs. 1.91 mm, p<0.05) compared to Pelibuey, but was unchanged by the dietary protein level (p>0.05; 2.15, 2.45 and 2.48 mm, for 14, 16 and 18% of protein, respectively). The back fat was no affected by the interaction breed×protein level (p>0.05; Table 1).

Kidney fat was similar between breed (p>0.05; 0.712 vs. 0.691 kg, for Dorper and Pelibuey), with the different protein levels a tendency of change was observed for (p = 0.075; 0.69, 0.79 and 0.61 kg, for 14, 16 and 18%, respectively), no effect of the interaction was shown (p>0.05). On the other hand, the *Longissimus dorsi* diameter averaged 28.61 cm and was no affected by the breed (p>0.05; 28.83 vs. 28.72 cm; for Dorper and Pelibuey) or their interaction with the protein level (p>0.05). However, the protein concentration in the diet increased the diameter (p<0.05).

The mean weight of the empty reticulum-rumen complex was 1.049 kg and changed with the breed (p<0.05; 1.104 vs. 0.995 kg; Dorper and Pelibuey, respectively), but was unchanged by the protein level or the interaction (p>0.05). The wet empty intestine (weight or percent) was higher in the Dorper compared to the Pelibuey breed (1.53 vs. 1.43 kg; 4.13 vs. 4.06%; p>0.05). The empty organ was similar among the protein levels (1.517, 1.399 and 1.531 kg; 14, 16 and 18% of the nutrient, respectively, p = 0.0689). No interaction effect was observed (p>0.05). Fluharty and McClure (1997) reported that with increasing the protein level in the diet, the organ mass tended to augment, especially those viscera where the protein is stored.

Table 1: Lamb performance with the interaction of 2 breed and 3 levels of protein

	Dorper			Pelibuey		
	14	16	18	14	16	18
Weight						
Live weight (kg)	37.16	37.22	37.37	34.56	34.62	36.67
Carcass (kg)	19.82	19.22	18.74	17.41	17.67	18.67
Percent	53.08	51.65	50.15	50.47	51.05	50.91
Kidney fat (kg)	0.74	0.82	0.57	0.64	0.76	0.67
Back fat (mm)	2.87	2.81	2.77	1.42	2.10	2.18
<i>Longissimus dorsi</i> (cm)	26.50	28.25	31.75	23.25	30.25	32.66
Reticulo-rumen (kg)	1.11	1.07	1.13	0.92	1.03	1.03
Intestine (kg)	1.62	1.46	1.53	1.42	1.34	1.53
Percent	4.37	3.93	4.10	4.07	3.90	4.20
Head (kg)	1.29	1.28	1.30	1.25	1.17	1.22
Percent	3.46	3.45	3.50	3.64	3.42	3.35

CONCLUSION

Based on the experimental findings, the protein level in the diet has little or no effect on the performance of Dorper or Pelibuey lambs during the fattening.

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