

RELATION BETWEEN COLD CARCASS WEIGHT AND TISSUE DEPTH IN GR SITE. Effect of breed and sex in pure and crossbred heavy lambs of 5 months of age.

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INTRODUCTION

The sheep meat production in Uruguay is an export alternative. Thus, it is necessary to consider the quality standards required by consumers (particularly by those of high economical capacity), related to the production of lean carcasses that allow a high yield of saleable meat as well as a good appearance. This type of product is different from the chilled boned meat coming from wethers, traditionally produced in our country.

Along the last three years, information referred to the contribution of meat genotypes (Bianchi *et al.*, 1997) as sire breeds in terminal crossings in terms of lamb survival, growth rate and carcass characteristics, has been published (Bianchi *et al.*, 1999; Garibotto *et al.*, 2000).

In this work it is described the effect of the sire breed (Corriedale, Australian Merino, Texel, Hampshire Down, Southdown, Île de France, Suffolk and Milchschaft), the maternal breed (Corriedale and Australian Merino) and the sex (male, cryptorchid, wether and female) on the relation between cold carcass weight and tissue depth in the GR site in heavy lambs of 5 month of age.

MATERIALS AND METHODS

1025 records of cold carcass weight ($17,2 \pm 3,4$ kg and $16,2 \pm 2,7$ kg, males and females, respectively) and GR ($10,4 \pm 4,0$ mm and $14,6 \pm 5,3$ mm, males and females, respectively) coming from 7 trials made in Uruguay in 5 places during 3 years (Bianchi *et al.*, 1999; Garibotto *et al.*, 2000; Bianchi *et al.*, not published) are analyzed. The lambs were the offspring of 57 Corriedale, Australian Merino, Texel, Hampshire Down, Southdown, Île de France, Suffolk and Milchschaft rams with Corriedale and Australian Merino ewes, slaughtered at $37,3 \pm 6,3$ kg and $34,1 \pm 5$ kg, males and females, respectively.

After 24 hours at 3°C the carcasses were weighted and the tissue depth in the GR site (Kirtton and Johnson, 1979) was measured.

The sex effect was studied on 4 categories: a) entire males, b) wethers, c) cryptorchids (Hudson *et al.*, 1968) and d) females. The treatments assigned to the males was made at random in the first month of live considering weight differences and birth dates.

The relation between tissue depth in the GR site (GR) and cold carcass weight (CCW) was analyzed through the coefficient of correlation of Pearson. It was used a model that considers the heterogeneity of coefficients of regression of the different genotypes and/or sexes provided by MIXED procedure of the SAS statistical package, version 6,12 (SAS, Inc. Institute, 1998).

RESULTS AND DISCUSSION

Effect of sire and maternal breed

The association between GR and CCW in pure Corriedale and crossbred male lambs showed a strong positive correlation (0,73 and 0,81, crossbred and pure lambs, respectively; Table 1). However, a significant sire effect ($P \leq 0,10$) was detected. While the increase of 1 kg in carcass weight meant more than 1,07 mm of GR in pure Corriedale, in crossbred lambs the increase was of 0,91 mm (Table 1). This is particularly valid for Île de France and Milchschaft crossbred lambs. Texel and Suffolk crosses showed intermediate *b* values; pure Corriedale, Hampshire Down and Southdown crossbred lambs showed the highest ones (Table 1). There was not a sire breed significant effect when the maternal breed was Australian Merino (0,71 vs 0,73, $P > 0,10$, *b* values, pure Australian Merino and crossbred lambs, respectively).

Figure 1 shows the relation between CCW and GR in Southdown sired lambs with different maternal breed. Southdown sire results are shown because there was not significant sire effect ($P > 0,10$). Additionally, assuming that the choice of the maternal breed can modify the association between CCW and GR, it is advisable to evaluate those genotypes which showed the less favourable GR values.

According to these results it would seem that the choice of the maternal breed is of minor importance when the aim is to attain higher carcass weight without fat excess (1,087 vs. 0,914, $P > 0,10$, *b* values, Corriedale and Australian Merino ewes, respectively).

Effect of sex and its manipulation

Figure 2 shows the sex effect (entire males vs. females) on the relation between CCW and GR for pure Corriedale, Australian Merino and crossbred lambs.

In addition to the strong positive association found between CCW and GR. (the correlation was higher than 0,7, both for males and females), a significant sex effect on the slope of the curve that represents the relation between GR. and CCW was found (0,8649 vs. 1,337, $P \leq 0,0001$, *b* values, entire males and females, respectively). The values of *b* suggest a higher probability that the female lamb carcasses may be included in a cheaper price category because of the high fat content. Taking GR values considered as optimum for the production of heavy carcasses in Australia, records of Figure 2 suggest that females should not exceed 15 kg of CCW. On the other hand, males carcasses weights of 20-21 kg would still be acceptable. Bennett *et al.* (1991), suggest that female lambs must be slaughtered when younger and lighter than male lambs in order to produce carcasses with similar fat contents.

Sex manipulation had a significant effect ($P \leq 0,05$) (Table 2). While the increase of 1 kg in carcass weight meant 1,069 mm more of GR. in wether lambs, in cryptorchid or entire male lambs GR values increased 0,579 and 0,676 mm, respectively.

CONCLUSIONS

The results obtained from this study suggest:

- the choice of the sire breed is an important decision commercial – wise, since the lamb producers must try to avoid prices rebates due to fat excess as well as taking advantages of better prices paid for heavier carcasses.
- cryptorchid technique can be a solution to solve the difficulty of breeding entire animals and still produce lean carcasses.

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Table 1. Intercept, obtained coefficients of regression (standard error), correlation and determination from the following model: $CCW = \mu + \beta * GR + \beta_i * R_i * GR + \varepsilon$, for the relation between CCW and GR.

	Pure Corriedale	Île de France	Milchschaf	Texel	Suffolk	Southdown	Hampshire Down	Average of crossbred
Intercept	- 7.123	- 0.058	- 4.539	- 3.890	- 8.784	- 7.877	- 7.609	- 5.833
Regression coefficient ¹	1.071 ^a	0.557 ^d	0.710 ^{ad}	0.858 ^{bc}	0.950 ^{abcd}	1.087 ^{ab}	1.037 ^{ab}	0.918 ^b
(s.e.)	(± 0.077)	(± 0.116)	(± 0.126)	(± 0.069)	(± 0.314)	(± 0.130)	(± 0.117)	(± 0.046)
Correlation coefficients	0.81	0.63	0.73	0.69	0.87	0.88	0.77	0.73
R ²	0.65	0.40	0.54	0.47	0.76	0.78	0.59	0.53

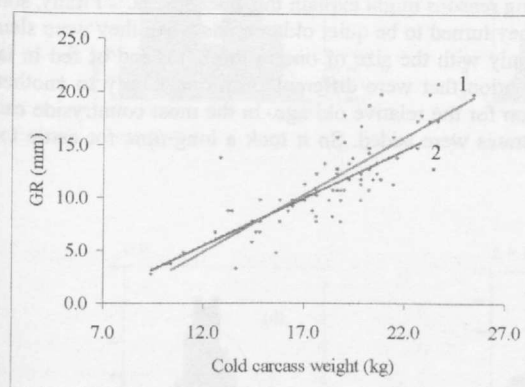
1: Regression coefficient in the same line followed by different letter differ significantly $P \leq 0.10$.

Table 2. Intercept, obtained coefficients of regression (standard error), correlation and determination from the following model: $CCW = \mu + \beta * GR + \beta_i * S_i * GR + \varepsilon$, for the relation between CCW and GR.

	Entire male	Lambs Cryptorchid	Wether
Intercept	- 2.418	- 0.595	- 6.843
Regression coefficient ¹	0.676 ^b	0.579 ^b	0.1069 ^a
(s.e.)	(± 0.137)	(± 0.155)	(± 0.139)
Correlation coefficients	0.62	0.61	0.71
R ²	0.38	0.37	0.51

1: Regression coefficient in the same line followed by different letter differ significantly $P \leq 0.05$.

Figure 1. Relation between CCW and GR site in crossbred lambs.



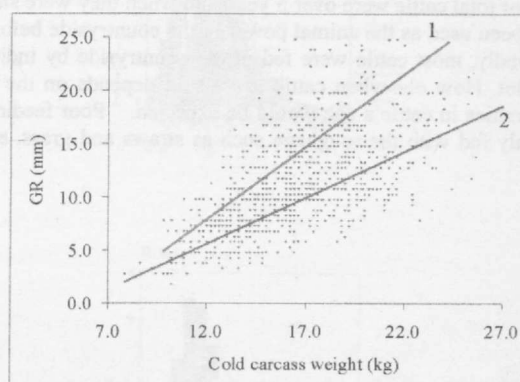
1. Southdown x Corriedale

$$y = - 7.877 + 1.087 (\pm 0.118) * CCW \quad R^2 = 0.7767$$

2. Southdown x Merino

$$y = - 5.248 + 0.914 (\pm 0.114) * CCW \quad R^2 = 0.5624$$

Figure 2. Relation between CCW and GR site in male and female lambs.



1. Female

$$y = - 8.143 + 1.364 (\pm 0.054) * CCW \quad R^2 = 0.5375$$

2. Male

$$y = - 4.491 + 0.865 (\pm 0.038) * CCW \quad R^2 = 0.5475$$