

CARCASS CHARACTERISTICS AND MEAT QUALITY OF MERINO EWES CROSSED WITH SIX SIRE BREEDS

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Introduction

Fluctuations in the ratio between wool and meat prices and low wool prices have resulted in the emphasis on the two products changing markedly. Commercial producers often seek other ways to exploit short-term benefits resulting from an increase in the price of meat than within flock selection, without compromising the wool-producing capacity of their ewe flocks (Cloete *et al.*, 2004b). Crossbreeding of Merino ewes with mutton type rams in a terminal crossbreeding system may be considered to realize this goal (Kleeman *et al.*, 1983). The production of commercial crossbred slaughter lambs results in lambs with a higher birth weight, better growth performance up to the age of weaning and these lambs should reach mature slaughtering weight in an intensive fattening system faster (Doloksaribu *et al.*, 2000, Snowden and Duckett, 2003). In the South African scenario little research has been done using Merino ewes as dam line in a crossbreeding program. The purpose of this study was to evaluate the meat quality of Merino and Merino crossbred lambs. Ram breeds that were used were Dorper, Ile de France (IdF), SA Mutton Merino (SAMM), Merino Landsheep (ML), Suffolk and Dorper rams, while purebred Merinos were used as control.

Materials and Methods

The experiment was carried out on the Tygerhoek experimental farm in the Southern Cape of South Africa. The ewes were randomly allocated to single sire-mating groups (equal number of ewes were assigned to each breed). Approximately 20 ewes were mated with two rams of each sire breed (i.e. 40 in total for each ram genotype). One ram of each breed was retained for breeding, to provide sire links across the two years. Data included 274 slaughter and carcass records of lambs. It was intended to slaughter all lambs at a live weight of 45 kg but this objective was not reached and the lambs were slaughtered at a live weight of 42 kg. Lambs were slaughtered at a commercial abattoir using standard South African slaughter techniques for this species (Cloete *et al.*, 2004a). The following carcass measurements were taken (according to the procedures described by Cloete *et al.*, 2004a): Cold carcass weight, fat depth at the 13th rib 25 mm from the midline and between the 3rd and 4th lumbar vertebrae 25 mm from the midline. The pH of the *M. longissimus dorsi* was measured at two different times, namely 45 minutes and 48 hours after slaughter (Cloete *et al.*, 2005). The *M. longissimus dorsi lumborum* was dissected from the 1st to the 6th lumbar vertebrae and used for the following analyses as described by Cloete *et al.* (2005): cooking loss, drip loss, colour and meat tenderness.

The random effect of sire within breed group was generally not significant for the respective slaughter traits, and these effects are not presented. For slaughter traits and carcass characteristics, all the traits were statistically analysed with and without slaughter weight as a covariant, in the cases where slaughter weight had no significant effect the data were presented without correction for difference in slaughter weight.

Results and Discussion

Purebred Merino lambs were slaughtered at 340±7 days of age, which was on average between 40 - 50 days later than the crossbred lambs (Table 1). The crossbred lambs were also between 9 - 11 % heavier at slaughter than purebred Merinos. The fat cover of the purebred Merino and ML cross lambs were lower than that of the other crossbred lambs. Dorper and Dorper crossbred lambs had the thickest ($P < 0.05$) fat cover at the 13th rib and between the 3rd and 4th lumbar vertebrae (Table 1). These two breeds are regarded as early maturing breeds, which tend to put on more fat at the same live weight than late maturing breeds. Initial pH measurements (45 min after slaughter) did not differ between the different breed combinations. However, final pH values (measured 48 hours after slaughter) of Merino, IdF cross and ML cross lambs were higher than those of Dorper and Dorper sired lambs. Cooking loss of the muscle from Merino lambs was higher than that of the crossbred lambs, but no differences were found for drip loss between the different breed combinations.

Table1: Least square means (\pm se) depicting carcass traits and fat depths of Merino and Merino crossbred lambs (with slaughter mass as co-variant).

Trait	Sire breed					
	Merino	Dorper	IdF	ML	Suffolk	Dorper
Slaughter age (days)	340 \pm 7 ^a	289 \pm 5 ^{cd}	278 \pm 7 ^d	282 \pm 7 ^{cd}	300 \pm 7 ^b	296 \pm 6 ^{bc}
Slaughter weight (kg)	38.7 \pm 0.8 ^b	43.0 \pm 0.6 ^a	43.2 \pm 0.8 ^a	43.5 \pm 0.8 ^a	42.7 \pm 0.8 ^a	43.2 \pm 0.6 ^a
Backfat depth (13 th rib) (mm)	1.73 \pm 0.20 ^c	2.76 \pm 0.14 ^a	2.15 \pm 0.19 ^b	1.78 \pm 0.18 ^c	2.14 \pm 0.18 ^b	2.67 \pm 0.14 ^a
Backfat depth (3 rd and 4 th lumbar) (mm)	2.13 \pm 0.21 ^c	3.29 \pm 0.15 ^a	3.01 \pm 0.20 ^a	1.88 \pm 0.20 ^c	2.64 \pm 0.19 ^b	3.40 \pm 0.16 ^a

^{abc}Means in the same row with different superscripts differ ($P < 0.05$)

No differences were found in the L* colour reading, but the a* value of the muscle from purebred Merino lambs were higher than that of all the other breed combinations. This higher a* value could be linked to the higher ultimate pH of the muscle from the purebred Merino lambs (Cloete *et al.*, 2005b). The *M. longissimus dorsi* did not differ between the different crossbred combinations for shearing value.

Table2: Least square means (\pm se) depicting meat quality traits of Merino and Merino crossbred

Trait	Sire breed					
	Merino	Dorper	IdF	ML	Suffolk	Dorper
pH45	6.47 \pm 0.07	6.49 \pm 0.05	6.47 \pm 0.07	6.41 \pm 0.07	6.59 \pm 0.07	6.47 \pm 0.05
pH48	5.61 \pm 0.02 ^a	5.54 \pm 0.01 ^b	5.58 \pm 0.02 ^a	5.59 \pm 0.02 ^a	5.56 \pm 0.02 ^{ab}	5.56 \pm 0.01 ^b
Cooking loss %	30.5 \pm 0.7 ^a	27.2 \pm 0.7 ^b	27.9 \pm 0.7 ^b	29.9 \pm 0.7 ^{ab}	27.9 \pm 0.7 ^b	28.2 \pm 0.7 ^b
Drip loss %	0.95 \pm 0.08	0.98 \pm 0.07	1.00 \pm 0.07	1.08 \pm 0.07	1.02 \pm 0.07	1.13 \pm 0.08
Colour L*	35.2 \pm 0.4	34.9 \pm 0.3	35.8 \pm 0.4	36.0 \pm 0.3	35.4 \pm 0.3	34.8 \pm 0.4
a*	15.1 \pm 0.5 ^a	12.8 \pm 0.4 ^c	12.9 \pm 0.4 ^c	13.7 \pm 0.4 ^b	13.8 \pm 0.4 ^b	14.2 \pm 0.5 ^b
b*	8.33 \pm 0.33 ^{ab}	8.31 \pm 0.3 ^{ab}	8.29 \pm 0.31 ^{ab}	8.49 \pm 0.30 ^{ab}	7.94 \pm 0.29 ^b	9.33 \pm 0.33 ^a
Shearing value (N)	80.7 \pm 4.9	69.3 \pm 4.5	77.2 \pm 4.6	83.8 \pm 4.5	85.2 \pm 4.4	74.4 \pm 5.0

Conclusions

Although the number of rams used per breed in this investigation was low and these results should thus be interpreted with due caution, the variation between sires within breed group was generally not significant. The sampling of sires within crossbred group thus does not appear to have influenced the outcomes of the study markedly and any differences could thus be attributed to breed and not to the sampling of sires between breeds. This study shows that crossbred lambs reached slaughter weight at an earlier age than purebred Merino lambs. No conclusive advantages as pertaining to the physical meat quality characteristics evaluated in favour of any of the terminal sire breeds on Merino ewes were noted.

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