

SLAUGHTER CHARACTERISTICS OF SOUTH AFRICAN BOER GOATS AND DOHNE MERINO SHEEP

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I. INTRODUCTION

Goat production plays an important role in the South-African agricultural economy, with meat production being its main purpose [1]. The South African red meat carcass classification system class carcasses based on age, sex, the conformation of the carcass and subcutaneous fat cover. This provides consumers a tool to evaluate the type and composition of a carcass and the producer to produce according to market demand [2]. However, the classification system does not have the ability to distinguish between differences in fat deposition across different fat depots as experienced between goats and sheep. The fat deposition at different ages and weights differs between sheep and goats, and thus subcutaneous fat cover (as described by the classification system) may not be a reliable predictor of lean yield for goat carcasses [3]. The aim of this study was to evaluate and compare the effect of specie and sex on the carcass composition, physical meat quality and fat depth of identically aged and reared Boer goats and Dohne Merino sheep consuming the same diet under feedlot conditions.

II. MATERIALS AND METHODS

The study was approved by the University of Stellenbosch Research Ethics Committee: Animal Care and Use (ACU-2019-9099). The study examined 18 Boer goat castrates, 20 Boer goat does, 10 Dohne Merino wethers, and 10 Dohne Merino ewes that were raised under identical conditions. At 120 days of age, the kids and lambs were weaned and introduced to a feedlot. Both species were fed the same feedlot diet *ad libitum* as two separate meals provided in the morning and afternoon. All animals were slaughtered, at 12 months of age and the carcass composition and physical meat quality characteristics were evaluated and compared. The carcass composition of each animal was indirectly determined using the three-rib cut method at the 9th to 12th rib [4; 5]. The relative yields of bone, muscle and dissectible fat were calculated. The subcutaneous fat depth was measured at the 13th rib on the *longissimus lumborum* (LL) using an electronic caliper. The Warner-Bratzler shear force values were determined and the proximate analysis of the moisture, protein, fat and ash content of the LL was performed in duplicate for each sample. The statistical analysis of the carcass quality data collected was carried out with the ANOVA procedure from Statistica version 14. Comparisons of the main effects of sex and species were analysed, as well as the interaction. Differences between the effects were considered significant at the 95% confidence level ($P \leq 0.05$) and tendencies declared at a 90% confidence level ($P \leq 0.10$).

III. RESULTS AND DISCUSSION

Results on carcass data are presented in Table 1. No difference was found between the slaughter- and cold carcass weights of Boer goats (63.8kg; 32.4kg) and Dohne Merinos (61.6kg; 30.9 kg). The slaughter and cold carcass weights of the castrates (65.3kg; 33.2kg) were significantly higher than that of the females (60.1kg; 30.1kg) ($P=0.01$). The dressing percentage for Dohne Merinos (50.1%) and Boer goats (49.5%) in this study fall within the 42.7% to 55.4% range expected for sheep and goats [6;7]. Boer goat castrates presented a similar dressing percentage (51.0%) to Dohne Merino wethers (50.0%), Boer goat does (47.9%) and Dohne Merino ewes (49.9%). Dohne Merinos (8.3mm) deposited a significantly larger amount of fat on the longissimus lumborum than Boer goats (4.6mm) ($P < 0.01$) at the same age, due to Dohne Merinos maturing earlier than Boer goats and also due to different patterns of fat deposition. Dohne Merino ewes had the highest percentage of fat tissue estimated at the three-rib cut (52.0%) and it differed from Boer goat castrates (42.0%) ($P=0.02$) and Dohne Merino wethers (36.1%) ($P=0.01$), but not from Boer goat does (45.6%) ($P=0.11$). Dohne Merino ewes had the lowest proportion of lean muscle tissue (37.6%) and differed significantly from Boer goat castrates (50.5%) ($P < 0.01$), does (47.5%) ($P < 0.01$) and Dohne Merino wethers (50.3%) ($P < 0.01$).

Table 1 Slaughter characteristics of Boer goat castrates and does compared to Dohne Merino castrates and ewes slaughtered at one year of age (least square means \pm standard error)

Main effect		Slaughter weight (kg)	Cold carcass weight (kg)	Dressing percentage (%)	Loin fat depth (mm)
Sex	Castrate	65.3 ^a \pm 1.4	33.2 ^a \pm 0.9	50.7 \pm 1.4	6.2 \pm 0.4
	Female	60.6 ^b \pm 1.4	30.1 ^b \pm 0.9	48.9 \pm 1.4	6.8 \pm 0.4
Species	Boer goat	63.8 \pm 1.2	32.4 \pm 0.7	49.5 \pm 1.2	4.6 ^b \pm 0.3
	Dohne Merino	61.6 \pm 1.6	30.9 \pm 1.0	50.1 \pm 1.6	8.3 ^a \pm 0.5

^{a-b} Column means with different superscripts differ significantly ($P \leq 0.05$)

Dohne Merino wethers (13.6%) as well as ewes (10.4%) had significantly more bone in the three-rib cut than the Boer goat castrates (7.4%) and does (6.9%). When the proportional yield of fat plus muscle tissue was expressed as a ratio to the yield of bone, Boer goat does had the greatest relative soft tissue yield (17.4:1), followed by Boer goat castrates (12.4:1), Dohne Merino ewes (8.6:1) and Dohne Merino wethers with the lowest relative yield (6.4:1). Species ($P=0.36$) and sex ($P=0.26$) had no significant influence on the shear force values of meat samples obtained. A tendency was found ($P=0.09$) for higher shear force values in meat from Boer goat does (48.8N) compared to that obtained from Boer goat castrates (33.9N). No significant difference was found for the percentage moisture (70.4%), ash (1.2%) or protein content (22.0%) in the LL due to the main effect of sex or species. The fat percentage of the LL, did not differ ($P>0.05$) between the sexes. However, the fat % differed significantly between species ($P=0.01$), with Dohne Merinos depositing substantially more muscle fat (6.4%) than Boer goats (4.9%).

IV. CONCLUSION

The results of this study suggested that Boer goats may be a suitable option for feedlot production due to their higher lean muscle yield and lower fat and bone tissue compared to sheep. Goat meat may also be a healthy food option for health-conscious consumers, due to its low fat content [8]. The sensory characteristics of Boer goat meat may however differ from that of sheep due to the difference in marbling fat. Further research is currently done on sheep and goat meat samples obtained in the same study to compare quality characteristics and consumer acceptability of goat and sheep meat in terms of thaw loss, cooking loss, pH, palatability, aroma and flavour.

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