COMPARISON OF THE MEAT AND CARCASS CHARACTERISTICS OF THE KARAKUL, DAMARA AND DORPER

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ABSTRACT

In a trial conducted at Gellap-Ost Experimental Farm 100 Damara, 100 Dorper and 100 Karakul lambs were matched with regard to ADG, fat thickness, rib-eye area, meat:bone ratio, total moisture, expressible moisture, cooking loss and shear force. Half the lambs' tails were docked.

Breed, sex and tail were the three variants investigated statistically and results corrected for slaughter age (co-variant). Breed had a significant influence on virtually all these traits. Sex had no influence on any trait. Tail influenced the meat:bone ratio significantly. Karakul and Damara matured earlier than Dorper lambs. Since the Dorper is selected for growth and superior carcass characteristics, it had the highest ADG and the largest carcasses with the best conformation scores. The Karakul, selected for pelts, had the juiciest meat. The Damara, a less improved breed, had the driest and toughest meat. The Damara and Karakul have small carcasses with an acceptable fat cover, while the Dorper has a larger carcass which is very lean.

Results are corrected for slaughter age and might differ when corrected to physiological age. It is impossible to determine the best muttonbreed on laboratory results only; a sensory evaluation panel was needed to determine the palatability of each breed.

MATERIALS AND METHODS

The experiment was carried out from September 1987 until October 1989 on the Gellap-Ost Experimental Farm near Keetmanshoop. 100 Lambs, 50 ewes and 50 wethers, of each breed, Damara, Dorper and Karakul, (Total: 300 lambs) were used in the trial. Half of these lamb' tails were docked and the other half were left intact. They were randomly allocated into three slaughter age groups and slaughtered at the age of 3, 5 and 7 months (+/- 14 days).

The animals were weighed every second week. Gain per day of age (GDA) and average daily gain (ADG) could be calculated from this data.

In the abattoir standard measurements were taken and also the length and width of the rib-eye and five different fat thickness measurements. The average of the five fat thickness measurements was calculated. All 300 carcasses were dissected into muscle, fat and bone fractions. Meat samples were collected from all sheep and analysed in the Agricultural Laboratory for Shear force (Warner - Bratzler) and Moisture (total moisture, cooking loss and expressible moisture) (Carver press).

Statistical analyses were carried out with *Statgraphics*. The results were corrected for slaughter age enabling the researcher to compare all 300 sheep with each other. A multiple analysis of variance (ANOVA) was carried out with breed, tail and sex as variants. Their influence on certain carcass characteristics was determined as presented in Table 1. All calculations were based on a significance level of 95%.

RESULTS AND DISCUSSION

Daily gain

As expected, the Dorper, being selected for growth and meat production (Bosman, Van Niekerk and Rayner, 1988), grew significantly faster than the Karakul and Damara (Figure 1, Table 1). As discussed below, the Karakul and Damara are early maturing, depositing fat earlier and therefore growing slower (Batt, 1980).

Table 1: Daily Gain (g/day)

Karakul	148 a
Damara	150 a
Dorper	180 b

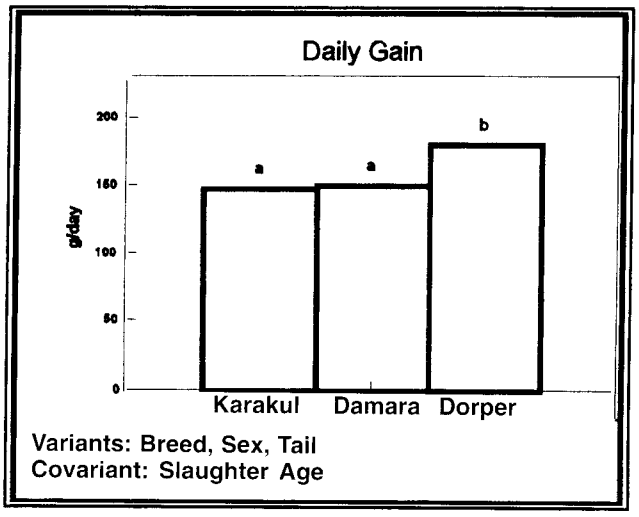

Figure 1: Daily Gain (g/day)

Fat cover

Fat thickness was measured on five different sites along the back - 25 mm and 50 mm from the centre of the rump, 25 mm from the middle of the lumbar vertebrae, 25 mm from the middle between the 12th and 13th rib and 25 mm and 50 mm from the middle of the back over the rib-eye. From these, average fat thickness was calculated. The results indicated that the Dorper is late-maturing (Terblanche, 1979), while the Karakul and Damara are similar types. They mature earlier than the Dorper and have a thicker fat-cover at the same age.

Table 2: Fat Thickness (mm)

Karakul	3.05 a
Damara	3.37 a
Dorper	1.33 b

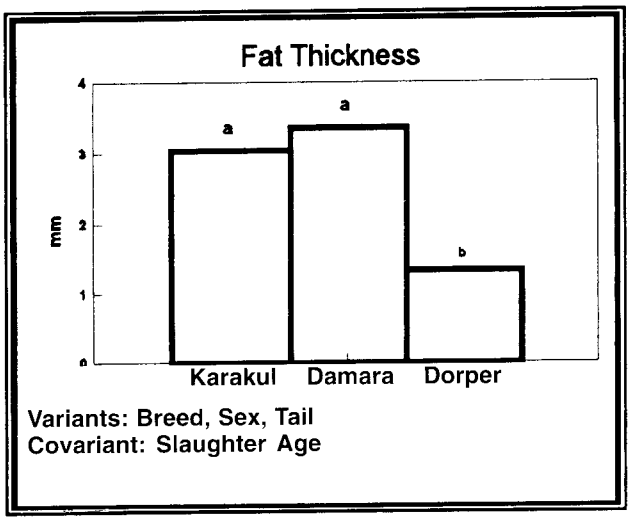

Figure 2: Average Fat Thickness (mm)

Rib eye area

The Dorper, being selected for good carcass traits (Terblanche, 1979), was not only heavier but also larger than the other two breeds. The larger carcasses consequently resulted in the larger rib-eye areas. (The area was calculated as l x b).

Table 3: Rib Eye Area (1xb) mm²

Karakul	1150 a
Damara	1195 a
Dorper	1590 b

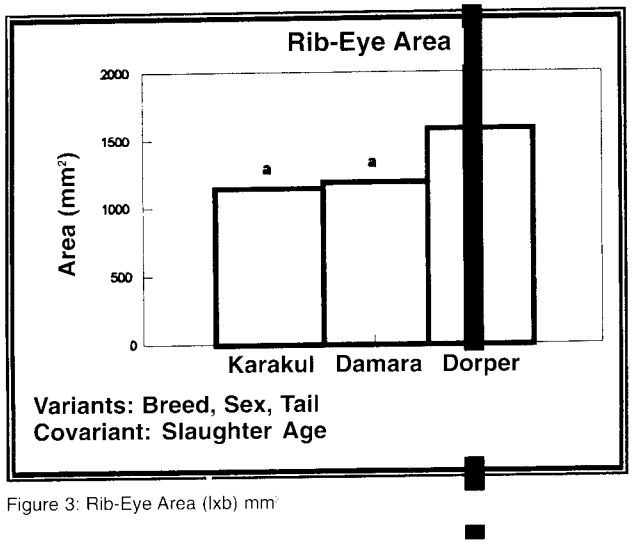

Figure 3: Rib-Eye Area (lxb) mm²

Meat:Bone ratio

The meat:bone ratio (meat is defined as muscle, fat and connective tissue) was significantly influenced by breed and tail. The Karakul and Damara have approximately 440 g less meat per kilogram bone than the Dorper. This can be ascribed to the fact that the Dorper is selected for a superior carcass (Terblanche, 1979), while the Karakul is bred primarily for its pelts (Terblanche, 1979) while the Damara as a less improved native breed. The Karakul and Damara did not differ significantly. (Figure 4, Table 4).

Table 4: Meat: Bone Ration (affect of breed)

Karakul	3.99 a
Damara	3.96 a
Dorper	4.43 b

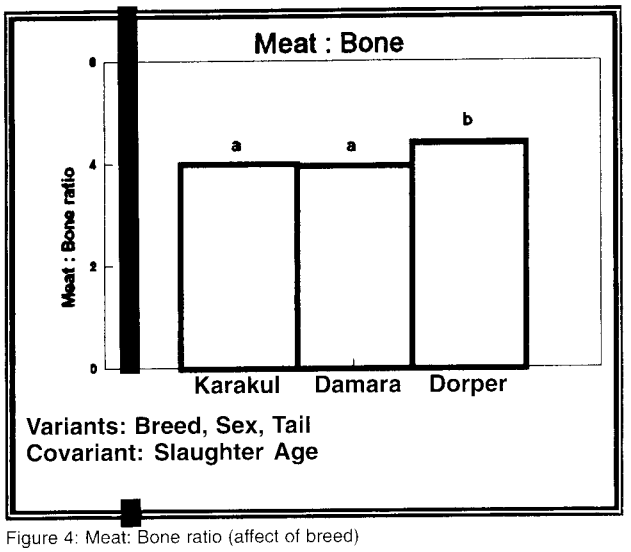

Figure 4: Meat: Bone ratio (affect of breed)

Figure 5 clearly shows, that sheep without tails have better carcasses than intact sheep. Docked sheep spread their fat more evenly over the carcass since the tail fat must be deposited somewhere else (Wohlt, Wright, Sirois, Kniffen and Lelkes, 1982). This did, however, not result in a significant difference of the average fat thickness (Figure 2, Table 2). The additional fat on the carcass thus improves the meat:bone ratio with approx. 15 g/kg.

Table 5: Meat:Bone ratio (affect of tail)

Karakul	148 a
Damara	150 a
Dorper	180 b

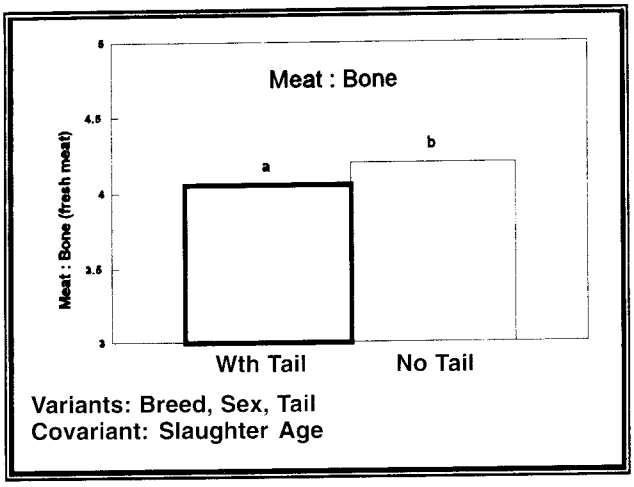

Figure 5: Meat: Bone ratio (affect of tail)

The affect of both breed and sex may, however, be misleading, because the Dorper is not a fat-tail breed like the Karakul and Damara (Terblanche, 1979).

Moisture

Three moisture measurements were taken, namely total moisture, expressible moisture and cooking loss.

Figure 6 shows the minute, but significant differences in percentage total moisture. Karakul sheep have the highest water content, the Dorper the lowest, and the Damara in between.

Table 6: Percentage moisture in the Rib-Eye

Karakul	76.1 a
Damara	76.0ab
Dorper	75.6b

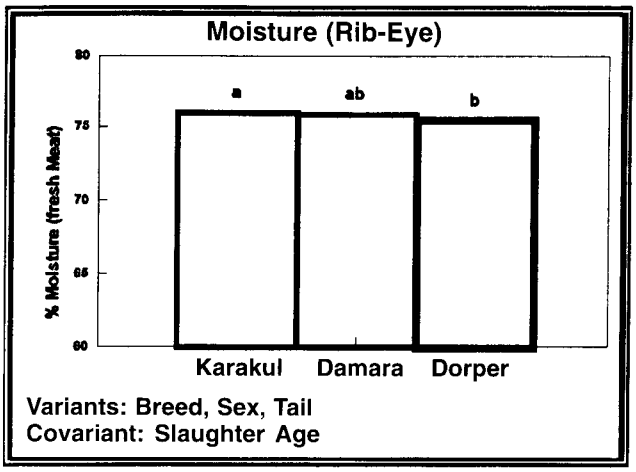

Figure 6: Percentage moisture in the rib-eye

Expressible moisture correlates well with "juiciness" and is determined after cooking the meat. The higher the expressible moisture percentage, the juicier the piece of meat. Juiciness is, however, only partly explained by expressible moisture, since intra-muscular fat and fibrosity also play important roles. The Damara had the driest meat and the Karakul the juiciest, with the Dorper intermediary. The breeds all differed significantly. Figure 7 displays this clearly.

Since the Dorper is a late-maturing type, one can expect the meat to be drier than that of the other two breeds

Table 7: % Expressible Moisture

Karakul	148 a
Damara	150 a
Dorper	180 b

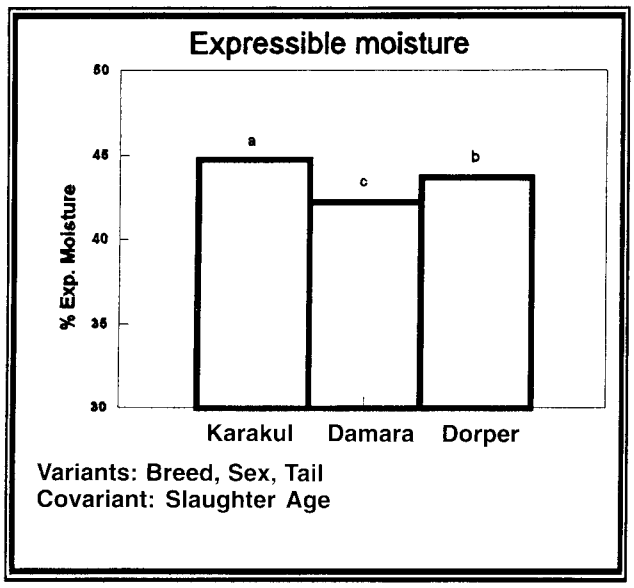

Figure 7: Percentage expressible moisture

because of the lower total fatness. A sensory evaluation panel is necessary to determine the best meat, since laboratory results are insufficient to describe the palatability of meat.

Cooking loss

In the study, no differences in cooking loss could be observed.

Shear Force

Shear force is very important as a meat quality characteristic, since this gives a direct indication of the tenderness of the meat. Karakul and Dorper have more tender meat than the Damara. The shear force was measured on a 12.5 mm sample in a Warner-Bratzler shear. The results are presented in Figure 8 and Table 8.

Table 8: Shear force (kg/12.5 mm)

Karakul	1.97 a
Damara	2.25 b
Dorper	1.94 a

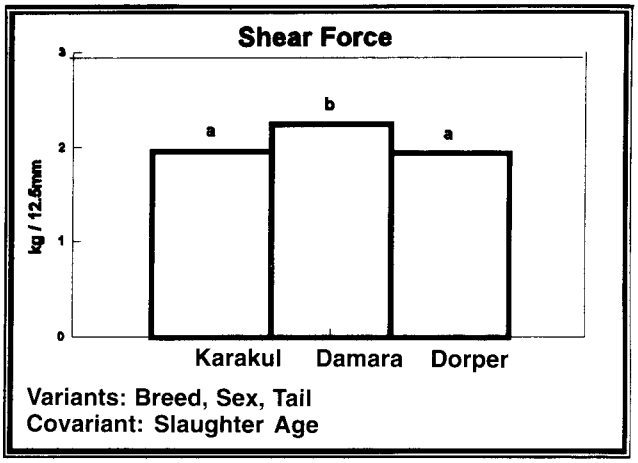

Figure 8: Shear force (kg/12.5mm)

Other

Other interesting results were, that docking had no influence on GDA and that neither breed nor tail had an influence on dressing percentage.

CONCLUSIONS

Without a sensory evaluation panel it is impossible to class the animals from best to worst regarding meat quality. Meat quality can only be assessed by combining laboratory results with the findings of an evaluation panel. However, based on the laboratory results, the following conclusions can be made: Karakul sheep have the juiciest meat and the Damara the driest and toughest meat. The carcass of the Dorper is larger and leaner than the other two breeds - this is ascribed to the maturity type of the Dorper. The Dorper produces more meat than the other two breeds. It has some advantages to dock the sheep with regard to fat distribution and carcass composition. Most differences between the breeds are very small and might not always be detectable, but they are significant because of the large numbers used. The variance within breed was in all instances, higher than between breeds.

ACKNOWLEDGEMENTS

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