Productive and Reproductive Performance of Afrino, Dorper and Merino Sheep in the False Upper Karoo

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INTRODUCTION

The difference in profitability of sheep breeds remains one of the most controversial discussion issues among farmers and is one of the aspects that receive little comment from researchers and scientists. The reason for this is that the full implication of such a comparison is seldom taken into account. Nonetheless, farmers are continuously changing from one breed to another. The decision to change from one breed to another is mostly due to short-term financial reasons and current market trends favoring either wool or meat. For example, when changing from wool sheep to mutton sheep, the first mutton income follows quickly on the last wool income, with favourable short-term cash flow implications. This is, however, a once-off situation, as the following mutton income will also be on a routine yearly basis.

The issue of less selective grazing behaviour of Dorper sheep is also frequently mentioned. This is based on the relative improved animal performance (reproduction and growth), which is frequently observed by farmers when changing from one breed to another. Research results in various areas in the Karoo have shown that there are very little differences in grazing behaviour and diet selection of different sheep breeds.

Another aspect of breed comparisons, which contribute to wrong conclusions, is the inaccurate large stock unit (LSU) values assigned to various small stock breeds by the Act on the Conservation of Agricultural Resources (Act 43 of 1983). If these LSU-values are used for the purpose of breed comparison, income per hectare of mutton sheep tends to be over-estimated relative to that of wool sheep, due to a lower body weight assigned to Dorper sheep than the actual weight of these ewes in practice. Furthermore, if ewe numbers are based on current legislation when changing from wool to mutton sheep, more Dorper ewes will be kept than what the natural resource can carry, with subsequent over-grazing and damaging of the veld.

Research done at the Carnarvon experimental station and the Tarka conservation area (near Hofmeyr), indicated that there were relatively small differences in income between Afrino, Dorper and Merino sheep over the long term. There were, however, relatively large differences between the two experimental localities.

A study was therefore conducted to investigate the relative performance of different sheep breeds in two different topographic and veld types, on the same farming enterprise in the Middelburg district of the Eastern Cape province. Apart from Merino (wool breed) and Dorper (meat breed) sheep, which were already run on Twistkraal and Grootvlei respectively, Afrino (dual purpose) sheep were also included for the purpose of this study.

MATERIAL AND METHODS

The study was conducted at Grootvlei and Twistkraal in the Middelburg district in the Eastern Cape province under natural conditions. The veld type is classified as False Upper Karoo. One part of the farming enterprise, namely Grootvlei, is characterized by typical "Vlakte" veld, which is normally regarded as a better veld type than the mountainous veld, which is the predominant veld type of Twistkraal, the other part of the farming enterprise.

From April 2001 to July 2003, Afrino, Dorper and Merino ewe flocks, consisting of ±100 ewes each, were kept at both Grootvlei and Twistkraal. Hundred Merino ewes, as well as 100 Dorper ewes, were bought from farmers in the Middelburg and adjacent areas. The rest of the Merino and Dorper ewes were obtained from the existing flocks at Twistkraal and Grootvlei. Afrino ewes were bought from different breeders. All ewes were tagged with an identity number after they were bought. Afrino rams were bought on the Afrino ram sales, while Merino and Dorper rams available at Twistkraal and Grootvlei respectively, were used in the Merino and Dorper flocks.

The ewes of all three breeds were managed as one flock at each location for the duration of the study, except during mating. Lambs were also run together and managed as one flock. Animals were kept under natural veld conditions and received no feed or mineral supplementation at any stage. The normal inoculation, drenching and tick control programmes were followed.

Ewes originating from the different farmers were divided equally between Grootvlei and Twistkraal in such a way that the two flocks had a similar age structure. A system of two breeding seasons per year was followed. At the start of the experiment, 50 ewes of each breed were mated at each locality to 4% rams for a seven-week period from April to June 2001. All rams were tested for fertility before mating started. The second breeding season stretched from 15 October to 25 November 2001. Ewes mated at each locality included all ewes that did not lamb during September 2001, as well as an additional 50 Afrino ewes bought from breeders and 50 Merino and 50 Dorper ewes from the existing flocks at Twistkraal and Grootvlei. This mating system was followed till the March 2003-lambing season.

Data recorded

Data collected on the ewe flock for four lambing seasons (from September 2001 to March 2003) included records on number of ewes mated, number of ewes that lambed, number of lambs born and number of lambs weaned. The following data were also recorded for each lambing season: dam ID, lamb ID, date of birth, sex and birth status of the lamb, as well as weaning weight at 120 days of age. Furthermore, monthly body weight of lambs was recorded from five to ten months of age. At six months of age, all ewe lambs were classed and those not suitable for replacement purposes were declared surplus. All lambs were weighed monthly and the surplus ewe lambs, together with all the ram lambs, were slaughtered at the local abattoir as soon as they have reached slaughter weight (± 40 kg for Dorper lambs; ± 42 kg for Afrino and Merino lambs). Upon reaching slaughter weight, lambs were fasted overnight and fasted body weight was recorded before slaughtering the next morning. Carcass weight, dressing percentage, V1- and V3-fat depth measurements and carcass grading were recorded.

Continue on next page ➢

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Body weight of ewes was recorded before each mating season. Afrino and Merino ewes were shorn at the end of January 2002 and 2003. Fleece weight was recorded after shearing and a midrib wool sample was taken from each ewe for determination of fibre diameter, clean yield percentage, staple length, crimp frequency, duerden, coefficient of variation and standard deviation of fibre diameter.

RESULTS AND DISCUSSION

Reproductive performance

The reproductive performance for the three breeds at Grootvlei and Twistkraal over the experimental period is summarised in Table 1. Reproductive performance recorded in this study falls within the ranges reported in literature for the specific breeds.

Body weight of ewes

Body weights of ewes recorded before each mating season are summarised in Table 2 for the three breeds at the two localities. Body weight of ewes before mating was higher at Grootvlei than at Twistkraal, while Dorper ewes were heavier than Afrino ewes, which in turn were heavier than Merino ewes. The ewes of all three breeds in this study weighed less than the body weights reported for the respective breeds in literature.

Wool production

Wool production is summarised in Table 3. Merino ewes produced on average 1.3 kg more clean wool that was 0.6 μm stronger than that produced by Afrino ewes. From Table 3 it is clear that both Afrino and Merino ewes at Grootvlei produced less wool with a lower fibre diameter than the ewes at Twistkraal. Wool production as well as fibre diameter of Afrino and Merino ewes at Grootvlei and Twistkraal were lower than those recorded in other studies under similar conditions.

Growth performance of lambs

Growth performance of the lambs is presented in Table 4. Body weights of lambs at Grootvlei were heavier than those at Twistkraal. Dorper lambs were the heaviest at weaning, followed by Afrino and then the Merino lambs at both localities. The same tendency was observed for 6- to 9-month body weights at Twistkraal. At Grootvlei, there were no differences in 6- to 10-month body weight between Dorper and Afrino lambs, both being heavier than the Merino lambs. Growth performance of the lambs accords well with those cited in literature for the three breeds.

Slaughter traits of lambs

Slaughter traits for the lambs are summarised in Table 5. From Table 5 it is evident that Dorper lambs reached slaughter age earlier than Afrino and Merino lambs. Dressing percentage was also higher in Dorper lambs. The lower V1- and V3-measurements of Dorper lambs could most probably be ascribed to their earlier slaughter age. Afrino and Dorper lambs in this study were slaughtered at a higher average age than the ranges recorded in literature. However, differences in slaughter age could most probably be ascribed to differences in slaughter weight. Other carcass traits fall within the ranges reported in the literature.

Economic analysis

The productive and reproductive data recorded for the three breeds in this study were used to calculate gross income for the three breeds at the two localities (Table 6), using the wool and meat prices at the time the study was completed. The SM2000-programme of Herselman (2002) was used for the analyses. Animals of all breeds had a higher income per hectare and per ewe at Twistkraal than at Grootvlei. The higher reproductive rate, higher wool production and lower body weight of ewes at Twistkraal contributed to this fact.

From Table 6 it is clear that, with the specific wool and mutton prices used, Afrino sheep had the highest gross income per ewe, followed by Merino and Dorper ewes respectively. However, Merino sheep had the highest gross income per hectare at both localities. Afrino sheep performed intermediate, while Dorper sheep had the lowest gross income per hectare. The combination of low ewe body weights, high wool production and a relatively high reproductive rate, resulted in Merino sheep generating the highest income per hectare, compared to Afrino and Dorper sheep. Cloete et al. (2004) reported a similar situation when comparing income of five Merino and Merino-type dam lines.

Continue on next page

Table 1. *Reproductive performance of Afrino, Dorper and Merino ewes at Grootvlei andTwistkraal over the experimental period*

Trait	GROOTVLEI			TWISTKRAAL		
	Afrino	Dorper	Merino	Afrino	Dorper	Merino
Lambs born per 100 ewes per year (%)	152	130	110	168	140	107
Lambs weaned per 100 ewes per year (%)	132	100	94	153	115	96
Lamb survival rate (%)	87	77	85	91	82	91
Average number of matings per ewe per year	1.6	1.6	1.3	1.6	1.6	1.4

Table 2. *Body weight of ewes before mating*

Breed	GROOTVLEI	TWISTKRAAL	Average / breed
Afrino	52.7 kg	52.0 kg	52.3 kg
Dorper	57.8 kg	55.4 kg	56.6 kg
Merino	44.6 kg	42.2 kg	43.4 kg

Table 3. *Wool production of Afrino and Merino ewes at Grootvlei and Twistkraal*

Trait	GROOTVLEI		TWISTKRAAL	
	Afrino	Merino	Afrino	Merino
Greasy fleece weight (kg)	1.7	3.4	1.9	3.7
Clean fleece weight (kg)	1.2	2.5	1.3	2.7
Clean yield (%)	65.6	72.9	65.6	74.0
Fibre diameter (μm)	20.1	20.7	20.6	21.2
CV (%)	20.2	19.9	19.8	19.8
Staple length (mm)	64.0	83.1	70.2	89.3

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As relative income from breeds could be influenced by the relative product prices of wool and meat, the gross income per hectare of the three breeds is illustrated in Figures 1 and 2 for various wool and meat price scenarios, using the actual body weights, fleece weights and reproductive data recorded at Twistkraal.

Even over the wide range of wool : meat price ratios used, Merino sheep still outperformed the other two breeds economically. This could be ascribed to the relatively high reproductive rate of the Merino ewes in this study, compared to the lower national average for Merino sheep, combined with the relatively lower body weight as well. At lower reproductive rates and higher body weights in Merino sheep, the other breeds could possibly outperform Merino sheep at the lower wool: meat price ratios.

CONCLUSIONS

It was evident from the results of this study, that when a specific Merino flock has a relatively high reproductive rate, they will outperform the other breeds at all wool: meat prices ratios. Furthermore, differences in productive and reproductive efficiency of Afrino, Merino and Dorper sheep occurred between the two localities studied. When changing from one breed to another, or one commodity to another, the reproductive rate, mature body weight and fibre production of the two breeds under the farming conditions in question should be considered, as these are the primary factors determining profitability of a specific enterprise.

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Table 4. *Body weight of Afrino, Dorper and Merino lambs at Grootvlei and Twistkraal*

Trait	GROOTVLEI			TWISTKRAAL		
	Afrino (n=147)*	Dorper (n=103)	Merino (n=135)	Afrino (n=145)	Dorper (n=113)	Merino (n=129)
Weaning weight (kg)	28.1	31.0	22.1	26.9	30.7	21.3
Average daily gain: birth to weaning (g/day)	251	280	193	240	284	183
6 mo weight (kg)	32.9	34.7	26.1	28.8	33.7	23.9
7 mo weight (kg)	37.6	39.6	31.2	34.3	37.5	29.8
8 mo weight (kg)	40.6	42.2	33.1	34.6	39.3	30.0
9 mo weight (kg)	43.4	43.7	34.8	37.2	41.3	33.1
10 mo weight (kg)	45.4	44.8	36.1	39.8	42.5	34.5

* Number of lambs weaned

Table 5. *Slaughter traits of Afrino, Dorper and Merino lambs at Grootvlei and Twistkraal*

Trait	GROOTVLEI			TWISTKRAAL		
	Afrino (n=93)*	Dorper (n=73)	Merino (n=44)	Afrino (n=74)	Dorper (n=60)	Merino (n=61)
Slaughter weight (kg)	42.9	40.9	42.0	42.1	39.2	42.3
Slaughter age (days)	268	239	337	291	238	346
Carcass weight (kg)	19.2	18.7	19.1	19.6	18.9	18.8
Dressing %	45.4	48.0	45.3	46.4	49.0	44.7
V1 (mm)	4.5	3.7	4.3	4.9	4.1	4.5
V3 (mm)	3.2	2.5	2.5	3.2	2.3	3.3

* Number of lambs slaughtered

Table 6. *Gross income for Afrino, Dorper and Merino sheep at Grootvlei and Twistkraal (Wool price = R31-00; Meat price = R18-00)*

	GROOTVLEI			TWISTKRAAL		
	Afrino	Dorper	Merino	Afrino	Dorper	Merino
Total income (R/ ewe)	R 553.47	R 382.05	R 460.94	R 654.07	R 441.97	R 480.53
Wool income (R/ ewe)	R 66.81		R 132.22	R 77.06		R 144.19
Meat income (R/ ewe)	R 486.66	R 382.05	R 328.72	R 577.01	R 441.97	R 336.34
Total income (R/ ha)	R 83.70	R 69.34	R 104.56	R 93.71	R 77.62	R 113.75

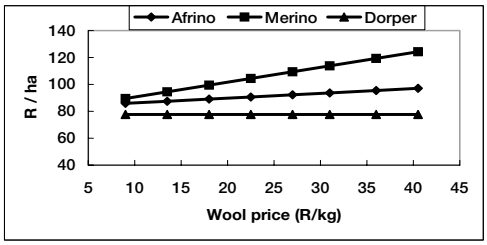

Figure 1.

Figure 1. Gross income for the different breeds at a constant meat price (R18-00 /kg) and variable wool prices

Figure 2. Gross income for the different breeds at a constant wool price (R31-00 /kg) and variable meat prices

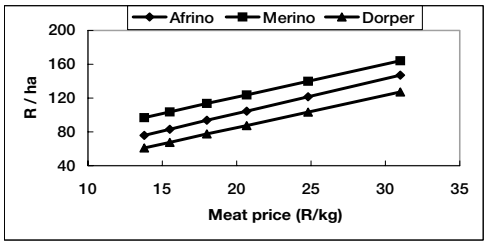

Figure 2.