# The effects of shade and shearing date on the production of Merino sheep in the Swartland region of South Africa

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## Abstract

A total of 497 Merino ewes were allocated to one of four experimental groups for the period 1996 to 1998. The treatments were designed to provide data on the effect of shade during an autumn lambing season and the effect of shearing prior to joining in September or prior to lambing in February. Dietary intake in shaded and control paddocks was similar, but animals in shaded paddocks consumed less water than those in control paddocks. Lambs born in shaded paddocks tended to be heavier at birth than those born in control paddocks. Survival of lambs was unaffected by the provision of shade, but lambs born in shaded paddocks were 3.8 % heavier at weaning than contemporaries born in control paddocks. Lambs born to ewes that were shorn prior to lambing tended to be lighter than those from ewes shorn prior to joining. Lamb survival prior to weaning tended to be higher in lambs born to ewes shorn prior to lambing than in those shorn prior to joining. Shearing of ewes prior to lambing had a beneficial effect on lamb survival during 1997, when the survival of progeny of ewes shorn prior to joining was low. Annual lamb survival data obtained in the present experiment were combined with that from two previous experiments conducted at the same site. The response in lamb survival of the progeny of ewes shorn prior to lambing depended on the average lamb survival observed in the control group. Multiple-born progeny of ewes shorn prior to lambing grew faster to lamb marking than contemporaries born to ewes shorn prior to joining. No difference was detected in single lambs. The clean fleece weight of ewes shorn prior to lambing was heavier than that of contemporaries shorn prior to joining. Similar benefits were found for staple strength and the frequency of mid-staple breaks. It was concluded that the shearing of ewes prior to lambing might be advantageous under certain conditions, particularly when lamb survival is likely to be low.

**Keywords:** heat stress, shearing, wool, Merino, sheep, lamb
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## Introduction

As sheep originate from a semi-desert environment, it is generally accepted that they would be well adapted to high ambient temperatures. Present-day strains and types may differ in respect of basal nutrient requirements, making them more susceptible to heat stress. Heat stress reduces feed-intake, growth and reproduction. Studies conducted in Queensland (Australia) indicated that birth weight and survival of neonatal lambs was improved when shade was provided during late pregnancy (Hopkins *et al*., 1980). This suggests that heat stress has an effect on the uterine environment, causing lambs to be smaller at birth and to have a lower viability. They would also be more susceptible to dehydration during the early stages of life. Individual sheep differ in their responses to heat stress, and not all sheep make equal use of shade; this has also been observed in dairy cows (Johnson, 1991). Sheep with long wool were reported to be less sensitive to solar heating than newly shorn animals (Parer, 1963; Monteith, 1973 as cited by Johnson, 1991).

The shearing of pregnant ewes housed under controlled conditions prior to lambing consistently enhances lamb birth weight (Rutter *et al*., 1972; Black & Chestnutt, 1990; De Boer & Everts, 1993; Morris *et al*., 2000) and survival (De Boer & Everts, 1993), as well as early lamb growth (Symonds *et al*., 1990) in the cold northern hemisphere countries. Results of studies conducted under free-ranging conditions in temperate areas are much less consistent. Birth weight responses are variable under these conditions (Dabiri *et al*., 1995; 1996; Husain *et al*., 1997). In a recent study, Kenyon *et al*. (1999) not only found that responses in birth weight varied under outdoor conditions, but also that the realized response in groups shorn prior to lambing could be related to the mean birth weight of the control group. It was concluded that the response in birth weight to pre-lambing shearing may be maximized under conditions where maternal constraints limit fetal growth in unshorn ewes. The practice of shearing prior to lambing is seen as a means of enhancing lamb survival (Kenyon *et al*., 1999), but variable results have been reported (Alexander *et al*., 1980; Irazogui & Giglioli, 1984; Husain *et al*., 1997).

The aim of this study was to assess the effect of providing shade for pregnant Merino ewes lambing during autumn in the Swartland area of South Africa. This area is an important wheat production area, and has high environmental temperatures during summer, with little or no shade provided for livestock. The effects of shearing prior to lambing or prior to joining were also investigated.

## Material and methods

Merino ewes, aged 2-7 years, at the Langgewens experimental farm (33°17'S; 18°42'E) formed the basis of the investigation. The climate at the experimental site is Mediterranean, 78 % of the total long-term annual precipitation of 395 mm being recorded during winter (April-September). The experimental site is characterized by dry, hot and windy summers. Long-term data indicate that average monthly temperatures exceeding 30° C are expected for the period December through to February. In total, 179, 184 and 134 ewes were available for mating during September of 1995, 1996 and 1997 respectively. The ewes were mated with Merino rams under flock-mating conditions at a ratio of approximately 33 ewes per ram.

The ewes lambed during March/April of 1996, 1997 and 1998. For ease of reference, year of lambing will be used in the presentation of the results. Lambing took place in eight paddocks of approximately one ha each. The ewes were adapted to the paddocks for two weeks prior to the expected commencement of lambing. They remained in the paddocks throughout lambing, and for an extra 14-21 days prior to lamb marking. The ewes received 250 g per head per day of a 33:67 mixture of lupin and oat grain. A 50:50 mixture of lucerne and oat hay was hammer-milled through an 18-mm screen, and provided *ad libitum*. Shade structures were erected in four of the paddocks, while the other four paddocks served as controls. Shade structures consisted of corrugated iron roofs, mounted on the top of six wooden posts. The roof area of the structures was 3 x 5 m, and the roofs were elevated to 2.0 meter above ground level. During 1997 and 1998, water meters were installed in the water supply line to all paddocks. This allowed the measurement of water consumption on a per paddock basis. Concentrate and roughage consumption was also recorded. Ewes were also subjected to one of two shearing treatments. Prior to the 1995 joining, the ewes were randomly allocated to one of two groups. One group was shorn in September, just prior to joining. The other group was shorn in February, within four weeks of the commencement of lambing. Ewes remained in the same treatment for the remainder of the experiment. The period from 15 February to 14 April coincided with late pregnancy and lactation in each of the years. Lambs were weighed and numbered within 24 h of birth. Survival to docking and weaning, as well as weaning weight (at 140 ± 10 days) were recorded individually. Wool samples were obtained from 123 ewes after weaning in 1998, and analyzed for clean yield, fibre diameter, coefficient of variation of fibre diameter, staple length and staple strength. Climatic information was obtained from a nearby weather station (less than 400 m from the experimental site)

Lamb survival rates were expressed as proportions and compared using $Chi^2$ procedures (Siegel, 1956). Fixed model, least squares analyses were used to assess the effects of birth year, dam age, sex, birth type, shading treatment and shearing treatment as well as the applicable two-factor interactions (Harvey, 1990). The fixed effects of dam age, sex and birth type were consistent with literature reports, and these results are not presented here except for a brief mention in the text. Two-factor interactions between the main effects were considered to be of little significance, and were thus also not tabulated.

## Results

Climatic conditions are summarized in Table 1. Average maximum temperatures were 1.3-2.1 degrees below 30° C. Minimum and average temperatures ranged from 15.1 to 16.5° C and from 21.6 to 22.6° C respectively. Between 7.0 and 23.5 mm of rain were recorded over the two month period. Sunshine hours ranged from 9.2 to 9.7 hours a day, and wind speed from 7.5 to 10.0 km per hour.

**Table 1** Means (± s.d.) for climate parameters during late pregnancy and early lactation for a 60 day period commencing 14 days prior to the start of lambing during the lambing seasons of 1996, 1997 and 1998

| | 1996 | 1997 | 1998 |
|---|---|---|---|
| Temperature (° C) | | | |
| Maximum | 28.1 ± 4.2 | 27.9 ± 3.6 | 28.7 ± 4.2 |
| Minimum | 15.7 ± 3.2 | 15.2 ± 2.7 | 16.5 ± 3.1 |
| Average | 21.9 ± 3.2 | 21.6 ± 2.9 | 22.6 ± 3.4 |
| Days > 30 ° C | 22 | 20 | 23 |
| Rainfall (mm) | 21.3 | 23.5 | 7.0 |
| Days with > 1 mm rain | 5 | 3 | 1 |
| Sunshine (h) | 9.7 ± 3.0 | 9.2 ± 3.0 | 9.4 ± 2.7 |
| Average wind speed (km/hr) | 10.0 ± 5.1 | 7.5 ± 3.9 | 8.7 ± 4.7 |

Average food consumption on a paddock basis was independent of shading treatment during the lambing seasons of 1997 and 1998 (1.505 ± 0.060 kg/ewe/day in control paddocks *vs.* 1.504 ± 0.060 in shaded paddocks). Ewes maintained in control paddocks consumed 26 % more ($P < 0.05$) water during the experimental period than

contemporaries in shaded paddocks (3.878 ± 0.222 *vs.* 3.076 ± 0.222 l/ewe/day respectively). Most ewes were in the shade from about 10:00 until late afternoon. They moved out of the shade for varying intervals, usually to feed or drink water.

Lamb birth and weaning weight were affected ($P < 0.01$) by birth year, dam age, sex and birth type. Lambs from mature (3-6 years of age) and old (7 years of age) dams were heavier ($P < 0.05$) than those from maiden dams. Ram lambs and singles were heavier ($P < 0.01$) than ewes and multiples. Lamb survival to weaning was independent ($P > 0.20$) of dam age and sex, while multiples were less likely ($P < 0.01$) to survive than singles. Lambs born in paddocks where shade was provided tended ($P = 0.12$) to be heavier at birth than those born in control paddocks (Table 2). Lambs born in shaded paddocks were 3.8 % heavier ($P < 0.05$) at weaning than those born in control paddocks. The survival of lambs was unaffected ($P > 0.20$) by the provision of shade. Shading treatment interacted ($P = 0.007$) with year as far as the daily gain of lambs prior to lamb marking was concerned. Lamb born in shaded paddocks during 1996 outperformed ($P = 0.05$) contemporaries born in control paddocks (172 ± 6 *vs.* 155 ± 6 g/day respectively). Body weight gain to lamb marking was independent ($P > 0.05$) of shading regime in the other two years.

**Table 2** Least squares means (± s.e.) of birth weight, weaning weight and pre-weaning survival (expressed as a proportion) of lambs born during 1996-1998

| Trait | Number of lambs | | Birth weight | Survival per lamb | Weaning weight |
|---|---|---|---|---|---|
| | Born | Weaned | (kg) | born | (kg) |
| Overall mean | 598 | 410 | 3.82 ± 0.05 | 0.686 | 21.5 ± 0.3 |
| Shade treatment | | | (P = 0.12) | (ns) | (P < 0.05) |
| Control | 311 | 213 | 3.77 ± 0.06 | 0.685 | 21.1 ± 0.4 |
| Shade provided | 287 | 197 | 3.87 ± 0.06 | 0.686 | 21.9 ± 0.4 |
| Shearing treatment | | | (P = 0.07) | (P = 0.12) | (ns) |
| Pre-joining | 314 | 206 | 3.88 ± 0.06 | 0.656 | 21.5 ± 0.4 |
| Pre-lambing | 284 | 204 | 3.76 ± 0.06 | 0.718 | 21.5 ± 0.4 |

ns: not significant ($P > 0.20$)

Lambs born to ewes that were subjected to pre-joining shearing tended ($P = 0.07$) to be heavier at birth than contemporaries with dams that were shorn prior to lambing (Table 2). Lamb weaning weight was independent of shearing treatment. Closer scrutiny of the data, however, revealed that shearing treatment interacted ($P = 0.017$) with birth type as far as the daily gain of lambs prior to lamb marking was considered. Gain was independent ($P > 0.50$) of shearing regime in singles (155 ± 5 and 149 ± 5 g/day in the progeny of ewes shorn prior to joining or prior to lambing respectively). Multiple-born progeny of ewes shorn prior to lambing outperformed ($P = 0.05$) contemporaries reared by ewes shorn prior to joining (114 ± 6 *vs.* 98 ± 6 g/day respectively).

Lambs from dams that were shorn prior to lambing tended ($P = 0.12$) to have a better survival rate than the progeny of ewes that were shorn prior to joining. When the influence of shearing prior to joining or prior to lambing was analyzed within birth year, no effect could be discerned during 1996 (93/121 = 0.769 *vs.* 80/106 = 0.755 respectively; $Chi^2 = 0.08$; $P > 0.80$). During 1997, the progeny of ewes shorn prior to joining were less likely to survive to weaning than lambs born to ewes shorn prior to lambing (68/126 = 0.540 *vs.* 78/116 = 0.672; $Chi^2 = 3.91$; $P = 0.05$). No difference was recorded during 1998 (45/76 = 0.672 *vs.* 46/62 = 0.749; $Chi^2 = 0.47$; $P > 0.40$).

The quantity of clean wool produced by ewes that reared at least one lamb was equivalent to 87.5% of that produced by ewes that failed to rear a lamb ($P < 0.01$; Table 3). Ewes that reared at least one lamb produced finer ($P < 0.01$) wool than barren ewes. The staple strength of wool produced by ewes that reared at least one lamb was lower ($P < 0.01$) than that produced by ewes that failed to rear a lamb. Wool parameters were largely independent of the effect of shade, although wool produced by shaded ewes tended ($P < 0.10$) to be of lower clean yield and staple strength than that produced by control ewes. The position of the break was also unaffected by shading treatment. Half the ewes had mid-staple breaks, irrespective of the provision of shade. Ewes that were shorn prior to lambing yielded slightly more ($P < 0.05$) clean wool at a lower ($P < 0.01$) clean yield than contemporaries shorn prior to joining. The staple strength of wool produced by ewes shorn prior to lambing was 31.1% sounder ($P < 0.01$) than that of ewes shorn prior to joining. A higher proportion of the latter group produced wool with a break in mid-staple than the former group (40/66 = 0.606 *vs.* 20/57 = 0.351; $Chi^2 = 6.98$; $P < 0.01$).

**Table 3** Least squares means (± s.e.) for wool traits in ewes subjected to different shading and shearing treatments

| Trait | Number of observations | Wool traits | | | |
|---|---|---|---|---|---|
| | | Clean fleece weight (kg) | Clean yield (%) | Fibre diameter (μm) | Staple strength (N/ktex) |
| Overall mean | 123 | 3.8 ± 0.1 | 72.0 ± 0.5 | 23.2 ± 0.2 | 30.8 ± 1.2 |
| Shade treatment | | ns | P = 0.09 | ns | P = 0.09 |
| Control | 72 | 3.9 ± 0.1 | 72.9 ± 0.6 | 23.1 ± 0.2 | 33.0 ± 1.5 |
| Shade provided | 51 | 3.7 ± 0.1 | 71.1 ± 0.8 | 23.4 ± 0.3 | 28.7 ± 2.0 |
| Shearing treatment | | * | ** | 0.14 | ** |
| Pre-joining | 66 | 3.7 ± 0.1 | 75.3 ± 0.7 | 23.0 ± 0.2 | 26.7 ± 1.6 |
| Pre-lambing | 57 | 3.9 ± 0.1 | 68.6 ± 0.8 | 23.5 ± 0.3 | 35.0 ± 1.9 |
| Reproduction status | | ** | ns | ** | ** |
| Barren | 27 | 4.0 ± 0.1 | 71.8 ± 1.1 | 24.0 ± 0.4 | 36.6 ± 0.6 |
| Lambed and lost | 22 | 4.0 ± 0.1 | 72.8 ± 1.1 | 23.0 ± 0.4 | 31.6 ± 0.6 |
| Reared ≥ 1 lamb | 74 | 3.5 ± 0.1 | 71.4 ± 0.6 | 22.7 ± 0.2 | 24.5 ± 1.4 |

ns: not significant (P > 0.20); * P < 0.05; ** P < 0.01

**Discussion**

The lack of response in feed intake between the shaded and unshaded groups could possibly be ascribed to cooler environmental conditions during the night when animals were able to maintain a normal feed intake. In studies conducted in temperature controlled rooms (elevated *vs.* winter temperatures), Hopkins *et al*. (1980) found that induced heat stress had no detrimental effect on the mean daily feed intake and live weight of sheep. In their experiment, elevated temperatures were maintained for 16–17 h each day. Adrianakis *et al.* (1990) also found no difference in voluntary food intake between heat-stressed ewes inside a climate chamber with an air temperature of 42–46° C in comparison to non-stressed ewes. The daily water intake of Suffolk sheep with access to tree shade in a Mediterranean climate was 33% (7.5 *vs.* 11.3 l/head) lower (P < 0.05) than in sheep with no shade (Olivares & Caro, 1998). Padua & da Silva (1997) found a 7% decline in average daily gain of Suffolk lambs for a 10% increase in maximum ambient temperature (overall mean of 36.2 ± 2.2° C). Food intake of lambs also differed (P < 0.05) between an open shelter and a climatic chamber (sheltered against solar radiation).

There was a tendency (P = 0.12) for lambs born in shaded paddocks to be heavier at birth than lambs born in unshaded paddocks. It has to be conceded that the pregnant ewes were subjected to the respective treatments for a short period of approximately 2 weeks before lambing started. The animals were run in the same flock prior to this period, utilizing small grain stubble paddocks with limited access to tree shade. The positive effect of shade on lamb birth weight would possibly have been enhanced if the animals had been subjected to the experimental conditions over a longer period, particularly during January and the earlier part of February. The latter months are regarded as being the months with the highest maximum temperatures at the experimental location. In this regard, Stephenson *et al.* (1984) found that the birth weight of lambs born to ewes with access to shade was higher than that of lambs born to ewes with no access to shade. In the tropical conditions of Queensland (Australia) Hopkins *et al.* (1980) found that chronic heat stress during pregnancy was associated with foetal growth retardation, resulting in a decline in lamb birth weight. The physiological mechanisms responsible for negatively affecting lamb birth weights following maternal heat stress are obscure (Alexander, 1974). According to Bell *et al*. (1989), the reduction in foetal growth is mediated by a primary inhibition of placental growth. It could also be ascribed to restricted nutrition of the foetus *per se* because of abnormalities in placental uptake or a reduction in uterine blood flow (Hopkins *et al.*, 1980). It seems likely that protein and/or fat tissue could have been catabolised in the foetus during heat stress periods. Mellado *et al*. (2000) found that high air temperatures during late gestation had a limited influence on the birth weight of goat kids in Mexico. The effect of temperature on foetal growth restriction of kids in this experiment may be related to the cumulative effect of several months of high air temperatures, i.e. the mean temperature during the entire gestation period.

According to Hopkins *et al.* (1980), elevated ambient temperatures resulted in a high respiration rate (panting) in lambs from 09:00 until late afternoon. They noted that lambs fell asleep in the cool of the evening, apparently exhausted from their thermoregulatory efforts. The lower weaning weight of lambs with no access to shade in the present study could possibly be related to their failure to suckle during this period of heat stress, as well as to increased birth weight.

At high ambient temperatures, sheep commonly seek shade under trees, behind fence posts or with their heads under other animals (Arnold & Dudzinski, 1978). Under practical farming conditions, a shade structure should be erected relatively close to the feed and water troughs to ensure easy access for animals, since the animals in this study mostly left the shade to feed or to drink water. It is important to note that Johnson (1991) reported that Merino wethers differed in their use of shade. Some sheep used shade for an average of 39% of the time (3 h of an 8-h observation period) while other sheep only made use of shade for 6% of the observation period. Other researchers (Johnson, 1987; Sherwin & Johnson, 1987; 1990) also found that some animals prefer to lie in the sun at the edge of the group despite available space with the shade. Johnson (1991) reported that core body temperature of sheep in the sun did not differ from that of those in the shade.

No consistent effect of the shearing of pregnant ewes shortly before their expected lambing date was found in this study. There was a trend ($P = 0.07$) for birth weight to be higher in the progeny of ewes shorn prior to joining. This result is in contrast to the main body of references (Rutter *et al*., 1972; Black & Chestnutt, 1990; De Boer & Everts, 1993; Kenyon *et al*., 1999; Morris *et al*., 2000). It has to be conceded that the ewes in the present study were shorn closer to lambing than in the most other studies, possibly contributing to the discrepancy. With regard to the other traits considered, there were indications that shearing enhanced ($P < 0.05$) the early growth of multiples as well as lamb survival in at least one year.

Two studies have reported responses in the survival of multiple lambs following shearing of ewes prior to lambing (Alexander *et al*., 1980; Irazoqui & Giglioli, 1984). Two previous studies at this site did not find any conclusive advantages as far as lamb survival was concerned, although significant ($P < 0.10$) responses were found in some years (Cloete *et al*., 1994; Cloete & Durand, 1996). In the recent study of Kenyon *et al*. (1999), results obtained from different trials were combined to demonstrate that the response in birth weight to pre-lambing shearing depended on the birth weight of the control group. In the light of this, it was decided to combine the results of this trial with that of two other experiments conducted at this institute (Cloete *et al*., 1994; Cloete & Durand, 1996). The annual responses in lamb survival in the pre-lambing shorn groups of all these trials were regressed on the mean lamb survival of the respective control groups (Figure 1). It is evident that the responses in lamb survival were related to the mean performance of the control group. The response was linear for the range studied. A reduction of approximately 0.06 in the response of pre-lambing shorn groups was expected for an increase of 0.10 in the survival of control group lambs. The regression line crossed the x-axis at approximately 0.80, suggesting that pre-lambing shearing was unlikely to benefit lamb survival under conditions where lamb survival would be expected to be greater than 0.80. The obtained response was fairly robust, if it is considered that different breeds (Cloete *et al*., 1994 used SA Mutton Merinos) and lambing seasons (winter lambing was practiced in previous trials) were involved.

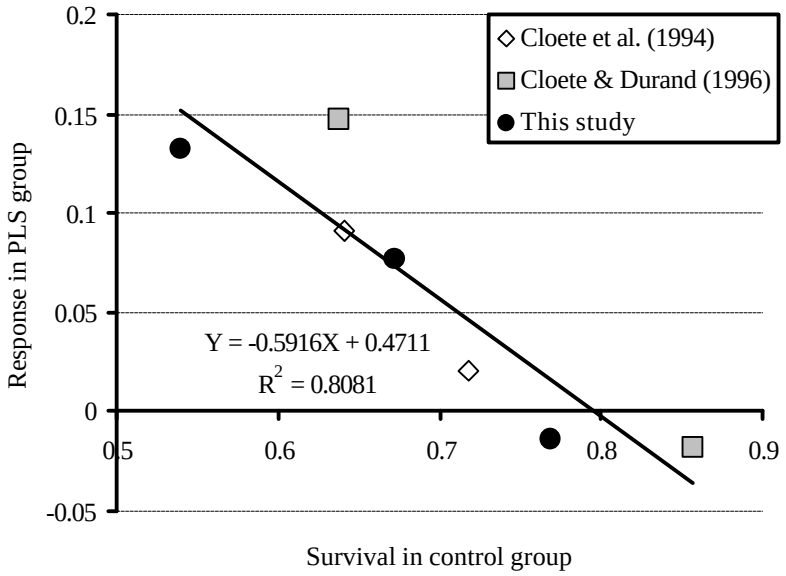


**Figure 1** Response in lamb survival in pre-lambing shorn (PLS) ewes in relation to the mean survival of control group animals. The figure contains seven-year means obtained from three separate studies conducted at this institution, including the present study.

The influence of shearing prior to lambing on lamb growth was limited to the growth of multiple lambs prior to lamb marking. Responses of up to 20% in growth rate of the progeny of pre-lambing shorn ewes have been reported for housed animals in the colder northern hemisphere countries (Symonds *et al*., 1990). Although smaller responses have been observed under pasture conditions in a temperate climate (i.e. Cloete *et al*., 1994), the majority of literature sources found no improvements in growth or weaning weight under pastoral conditions (Dabiri *et al*., 1994; 1995; 1996; Cloete & Durand, 1996; Husain *et al*., 1997). From these references it appears as if growth responses in the progeny of ewes shorn prior to lambing are transient and unpredictable, although they may occasionally be present.

Reproduction was found to impact negatively on the wool yield and staple strength of the ewes included in the study. The adverse influence of the stress of reproduction on fibre traits is well-documented (Turner *et al*., 1968; Corbett, 1979; Oddy, 1985; Charlick & Arnold, 1990). The clean wool production of ewes shorn prior to lambing was increased ($P < 0.05$) compared to contemporaries shorn prior to joining. The fact that the wool growth periods differed (the former group was shorn in February, while the latter group was shorn in September) for the two groups complicated this comparison. It is worth mentioning that the finding of improved fleece weights in pre-lambing shorn ewes is supported by results of others. Dabiri *et al*. (1994) reported an improved fleece weight in pre-lambing shorn ewes in one out of two years. Dabiri *et al*. (1996) also found an increased clean wool production rate in ewes shorn prior to lambing in May, but this effect was absent in ewes shorn prior to lambing in August. Ewes shorn prior to lambing also had higher staple strength and fewer fleeces with mid-staple breaks. Although literature supporting this finding could not be found, improved wool colour and staple strength are listed among the major advantages of pre-lambing shearing (Daribi *et al*., 1996). It seems reasonable to assume that stress associated with pregnancy and lactation could result in a reduced staple strength and a higher frequency of mid-staple breaks in ewes shorn prior to joining. Pre-lambing shorn ewes would be shorn nearer to the period of peak stress associated with reproduction, with fewer mid-staple breaks. An increase in food consumption after shearing prior to lambing could also benefit wool soundness, although this increase was confined to late pregnancy in the study of Dabiri *et al*. (1996).

## Conclusions

The provision of shade to autumn lambing ewes in the Swartland resulted in a significant, although small improvement in lamb weaning weight and an improvement in lamb growth to marking in one year. The effect of shading treatment on birth weight could possibly have been enhanced if the ewes had been subjected to it over a greater portion of gestation. Further field studies need to be conducted to verify this contention. The effects of natural shade (trees and/or shrubs) in stubble lands also need further investigation. It has to be conceded that the animals in the present study were not subjected to severe heat stress, and also had the opportunity to lose some of the accumulated heat load of the day during the cooler nights.

The shearing of ewes prior to lambing resulted in improved lamb survival in one year, and in an improved growth rate of multiple lambs up to marking. Evidence was presented that indicated that the beneficial effect of pre-lambing shearing would be maximized under conditions where a poor lamb survival (less than 0.80) is expected. The lamb survival of progeny from ewes shorn pre-lambing showed a markedly reduced variation between years compared to the control treatment. Pre-lambing shearing may thus have a role to play when adverse conditions are expected to occur during lambing.

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