Short Communications

The effect of shearing pregnant ewes prior to a winter-lambing season on ewe and lamb performance in the southern Cape

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Received 21 April 1993; revised 19 November 1993; accepted 19 July 1994

About half of the 505 winter-lambing SA Mutton Merino ewes were shorn at four or fewer weeks prior to lambing at the Outeniqua Experimental farm near George in July-August 1991 and 1992. The remaining ewes, with a 6 – 7-month fleece, were only crutched. The reproduction of all these ewes was monitored, while data from 666 progeny were used to investigate the effects of shearing on early lamb growth and lamb survival to weaning. During 1991, shearing prior to lambing improved ($P \leq 0.05$) lamb birth mass by 4.9% relative to progeny of the unshorn control group. There was also a tendency ($P \approx 0.08$) for shearing to improve lamb survival (0.73 vs. 0.64). During 1992, birth mass and lamb survival of progeny of shorn ewes did not differ from that of progeny of unshorn ewes. Shearing ewes prior to lambing improved ($P \leq 0.01$) their lamb daily gain (to eight weeks) by 8%. The productivity of ewes (expressed as mass of lamb weaned/ewe joined) also improved ($P \leq 0.05$) by 19% in shorn ewes. The latter result suggests that biological gains may be derived from the shearing of winter-lambing ewes prior to lambing, although effects on lamb birth mass and survival were inconclusive. Since shearing prior to lambing appears to be a cost-effective method of improving the efficiency of winter-lambing ewe flocks, further studies are envisaged.

Ongeveer die helfte van 505 SA Vleismerino-ooie is vier of minder weke voor lam geskeer, tydens die Julie-Augustus winterlamseisoene van 1991 en 1992 op die Outeniqua-proefplaas by George. Die ander helfte is slegs gemikskeer om met vagte met 'n 6 – 7-maande groeiperiode te lam. Die reproduksie van hierdie ooie is aangeteken, terwyl data van 666 nageslag gebruik is om die invloed van skeer van ooie voor lam op vroeë lamgroei en -oorlewing te ondersoek. Gedurende 1991 het skeer van ooie voor lam geboortemassa met 4.9% relatief tot nageslag van ongeskeerde kontrole-ooie verhoog ($P \leq 0.05$). Daar was ook 'n neiging ($P \approx 0.08$) vir skeer voor lam om lamoorlewing te verbeter (0.73 vs. 0.64). Geboortemassa en lamoorlewing van die nageslag van geskeerde ooie het in 1992 nie verskil van ongeskeerde tydgenote nie. Die skeer van ooie voor lam het die daaglikse groeitoename tot agt weke van hulle lammers met 8% verbeter ($P \leq 0.01$). Die produktiwiteit van ooie (uitgedruk as massa lam gespeen/ooi gepaar) was ook 19% hoër ($P \leq 0.05$) by ooie wat voor lam geskeer is, relatief tot ongeskeerde tydgenote. Die laasgenoemde resultate dui daarop dat die skeer van ooie binne vier weke voor lam tot biologiese voordele mag lei, alhoewel effekte op geboortemassa en lamoorlewing nie konstant was nie. Aangesien skeer van ooie voor lam 'n koste-doeltreffende metode vir die verhoging van doeltreffendheid in kuddes wat in die winter lam blyk te wees, word verdere ondersoeke in die vooruitsig gestel.

Keywords: Ewe reproduction, lamb growth, lamb survival, shearing prior to lambing.

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The birth mass of lambs born to housed ewes under cold conditions increased when ewes were sheared during the last two months of pregnancy (Rutter *et al.*, 1972; Vipond *et al.*, 1987; Black & Chestnutt, 1990). Chronic cold stress was found to change the partitioning of nutrients in the ewe in favour of the foetus (Thompson *et al.*, 1982). Furthermore, Symonds *et al.* (1990) reported that shearing of housed ewes prior to lambing enhanced the growth rate of their lambs by as much as 20% during the first 30 days after birth. They postulated that metabolic adaptations in recently shorn ewes in a cold environment result in endocrine changes likely to increase the partitioning of nutrients towards milk production.

The effect on lambs of shearing ewes prior to lambing in paddocks has not been researched to the same extent. It has, however, been shown that recently shorn ewes were more likely to use shelter during lambing (Lynch & Alexander, 1980). In theory, this behaviour should increase lamb survival, although no consistent improvements have been found (Alexander *et al.*, 1980; Irazoqui & Giglioli, 1984). Results with regard to birth mass and early growth were also inconclusive in ewes lambing in paddocks (Orleans-Pobee & Beatson, 1989; Parker *et al.*, 1991). Shearing prior to lambing may provide a low-cost method of improving the performance of winter-lambing sheep flocks. This experiment was undertaken to investigate the possible benefits thereof under South African conditions.

The experiment was conducted at the Outeniqua Experimental Farm of the Department of Agriculture near George in the southern Cape (33°55′ S and 22°25′ E). The animals used in the study, 250 ewes of mixed age (2 – 6 years), were from a commercial SA Mutton Merino flock. After mating during February-March 1991, these ewes were stratified according to age and randomly allocated to two shearing treatments (shorn prior to lambing and unshorn). Ewes allocated to the shorn group were shorn two weeks before lambing commenced in July-August 1991 and four weeks before lambing commenced in July-August 1992. The unshorn ewes were crutched, and left to lamb with 6 – 7 months of wool growth on them. The ewe flock grazed mainly dry-land lucerne and subterranean clover-ryegrass mixtures, but an oat fodder crop and kikuyu-ryegrass were used occasionally.

During 1991, a system of drift-lambing was followed on an oat fodder crop and in three kikuyu-ryegrass paddocks. Ewes that had lambed were left in their lambing paddock with their progeny for about one day before being transferred to dry-land lucerne paddocks. During 1992, the breeding flock was set-stocked in five subterranean clover-ryegrass paddocks. After lambing, the whole flock was transferred to graze dry-land lucerne and subterranean clover-ryegrass mixtures until weaning. The stocking rate during lambing was similar at the onset of

lambing for the two years (15 ewes/ha). Shelter in the form of tree belts along the edge of the lambing paddocks was available.

Prior to lambing, all ewes were side-branded with stock-marker paint to facilitate the identification of lambs and their mothers and to minimize disturbance to the lambing flock. Recordings included the live mass at joining and reproduction data, as well as the mass of lambs weaned per ewe for 505 ewes for both lambing seasons. In 666 of these lambs, live mass at birth, eight weeks (actual age ± *SD* = 55 ± 9 days) and weaning, as well as pre-weaning survival, were recorded. Live mass at eight weeks was used to calculate early daily live mass gain. Details regarding sex (male or female), birth type (singles or pooled multiples) and dam age (maiden or adult) were known for individual lambs.

Chi^2-procedures were used to compare ewe reproduction traits, expressed as proportions (Snedecor & Cochran, 1967). Triplet and twin births were pooled as multiples. Lamb birth mass and live mass gain to eight weeks were analysed by least-squares procedures (Harvey, 1990). The fixed model employed included the effects of year, shearing treatment, sex, dam age and birth type as well as the year × shearing treatment interaction. Lamb survival was assessed by Chi^2-procedures. Mass of lamb weaned per ewe was analysed by least squares procedures (Harvey, 1990). The fixed model included the effects of year, shearing treatment and ewe age, as well as the year × shearing treatment interaction. Mass of lamb weaned had an underlying binomial distribution, and tests of significance must be seen as approximations (Harvey, 1982). The interaction between lambing year and shearing treatment was not significant ($P > 0.18$) in most cases. Means for the two shearing treatment years are thus presented in Table 1. Results are discussed in the text for traits where the response to shearing prior to lambing appeared to vary between years.

Mean maximum temperatures for the respective lambing seasons were 18.5°C in 1991 and 19.0°C in 1992. Mean minimum temperatures were 7.2 and 7.4°C, respectively. Maximum temperatures generally exceeded 13°C, while minimum temperatures rarely descended below 4°C. A total precipitation of 77.1 mm over a period of 13 days was recorded in July-August 1991, while 140.6 mm over a period of 12 days was measured in July-August 1992. Wind-speed averaged 7.1 km/h in 1991 and 6.3 km/h in 1992. Climatic data were in accordance with long-term averages, but the rain recorded during the 1992 lambing season were higher than expected.

Table 1 The effect of shearing treatment on ewe reproduction, lamb birth mass, lamb daily gain to eight weeks and lamb survival to weaning when pooled across years for 1991 and 1992

Trait	Shearing treatment	
	Pre-lamb shorn	Unshorn
Number of ewes joined	254	251
Ewes lambed/ewe joined	0.835	0.809
Ewes lambed multiples/ewe lambed	0.528	0.527
Number of lambs born	340	326
Birth mass (kg)	4.26 ± 0.05	4.21 ± 0.05
Daily gain to 8 weeks (g/day)	197[1] ± 4	182[2] ± 4
Lambs weaned/lamb born	0.735	0.675

[1,2] Denote significance ($P \leq 0.01$)

Lambing rate (ewes lambed/ewe joined) and multiple birth-rate (ewes lambed multiples/ewe lambed) were independent of shearing treatment (Table 1). Lamb survival (lambs weaned/lamb born) of progeny of shorn ewes tended to be higher than that of contemporaries born to unshorn controls, but the difference failed to reach significance ($Chi^2 = 1.88$; $df = 1$; $P = 0.17$). There was evidence of a difference in response between years. Progeny of shorn ewes tended to have a higher survival rate than contemporaries reared by unshorn ewes in 1991 (0.732 vs. 0.641, $Chi^2 = 3.11$; $P = 0.08$). No difference was found in 1992 (0.739 vs. 0.718, $Chi^2 = 0.07$; $P > 0.50$). The fact that ewes were shorn two weeks earlier relative to the commencement of lambing in 1992 may have influenced the sheltering behaviour of ewes. The percentage of Merino ewes within 6 m of shelter decreased from 90% in the first week after shearing to 46% by the fourth week and 28% by the eighth week after shearing (Lynch & Alexander, 1980). Time of shearing before lambing thus appears to be important. In another study, lambing sites were closely associated with the preference of the flock for shelter, and no evidence was found that ewes deliberately sought shelter in which to lamb (Stevens *et al.*, 1981). Sheltering behaviour should none the less increase lamb survival provided that shelter is available. Two studies reported improvements in the survival of multiple-born progeny of shorn ewes relative to contemporaries born to unshorn controls, while no difference was found for singles (Alexander *et al.*, 1980; Irazoqui & Giglioli, 1984). The improvement in lamb survival of progeny of shorn ewes in 1991 was supported by these results.

The interaction between shearing treatment and year approached significance ($P = 0.07$) for birth mass. Progeny of shorn ewes were 3.9% heavier ($P \leq 0.05$) than control progeny in 1991 (4.23 ± 0.06 vs. 4.07 ± 0.06 kg). No significant difference in the birth mass of lambs from the two treatments was obtained in 1992 (4.28 ± 0.07 vs. 4.34 ± 0.07 kg, respectively). Shearing prior to lambing consistently improved birth mass in housed, winter-lambing ewes (Rutter *et al.*, 1972; Vipond *et al.*, 1987; Black & Chestnutt, 1990). Results obtained under paddock conditions are more variable. Irazoqui & Giglioli (1984) obtained an improvement of roughly 10% in the birth mass of progeny of shorn ewes. No clear improvements were reported in other studies (Orleans-Pobee & Beatson, 1989; Parker *et al.*, 1991). Our results suggested that the shearing of paddock-lambing ewes prior to lambing could improve the birth mass of lambs, but the effect was not consistent for the two years. Data regarding pasture availability and quality were not recorded for the two years, but the ewes grazed subterranean clover-ryegrass pastures in late pregnancy in 1992, and this is generally regarded as more palatable than the kikuyu-ryegrass pasture utilized in 1991. Albeit speculative, the lack of a difference between the groups in 1992 may thus be associated with the generally higher intake levels on a more palatable sward.

Pooled for all the years (P for shearing treatment × year interaction > 0.18), progeny of shorn ewes grew 8% faster ($P \leq 0.01$) up to eight weeks than their control group contemporaries (Table 1). Shearing of ewes was found to increase lamb growth up to 30 days by as much as 20% in housed ewes maintained at mean minimum and maximum temperatures of 3.2 and 8.6°C, respectively (Symonds *et al.*, 1990). In our study, temperatures

were higher and growth was measured over a longer period. On the other hand, Thompson (1983) found that lamb growth was retarded when lambs were subjected to acute cold exposure, which commenced at parturition and continued for a four-day period, when compared with animals reared at 20°C. In another study, the lamb growth of progeny of shorn, housed ewes was enhanced relative to contemporaries born to unshorn ewes, when put to pasture after housing (Austin, 1977). The growth performance of paddock-reared progeny tended to improve with shearing prior to lambing in the studies of Parker *et al.* (1991) and Fernandez Abella *et al.* (1991), but no significant differences were reported. A tendency ($P \leq 0.10$) to this effect was, however, reported by Parker *et al.* (1991). This study, and the results obtained by Symonds *et al.* (1990) support the contention that early lamb growth benefits from shearing pregnant ewes. Overall, ewe productivity (mass of lamb weaned/ewe joined) was improved ($P \leq 0.05$) by 19% in shorn ewes relative to unshorn contemporaries (23.7 ± 1.3 kg vs. 19.9 ± 1.3 kg in the respective treatments). This effect was consistent over the years (P for shearing treatment × lambing year interaction > 0.30).

The improved growth of lambs reared by shorn ewes may simply be a reflection of higher intake levels by these ewes, as reported by Black & Chestnutt (1990) and Parker *et al.* (1991). Growth responses of lambs were also found under conditions of similar ME intake of shorn and unshorn ewes in the study of Symonds *et al.* (1990). It was speculated that a change in the partitioning of nutrients to the mammary gland may have been involved, since live mass and body condition scores did not suggest marked differences in the rate of body tissue mobilization between shorn and unshorn ewes. Hart *et al.* (1978) found that high plasma growth hormone and low plasma insulin concentrations with normal plasma glucose concentrations are associated with a metabolic environment favouring nutrient partitioning for lactation. The ratio of insulin to growth hormone was lower in shorn than in unshorn ewes in early lactation, suggesting that nutrient partitioning for milk production could be favoured (Symonds *et al.*, 1990). This was mainly due to a decreased plasma insulin concentration in shorn ewes. Plasma 3-hydroxybuterate concentrations also increased on day 12 of lactation, suggesting the stimulation of hepatic ketogenesis, which is caused by the release of non-esterified fatty acids from adipose tissue, to meet the higher energy requirements of shorn ewes (Symonds *et al.*, 1989). Symonds *et al.* (1990) thus concluded that metabolic adaptations to winter shearing of pregnant ewes results in improved lamb growth rates, which can be accounted for by the endocrine changes during lactation which are likely to increase the partitioning of nutrients towards milk synthesis.

Shearing prior to lambing led to variable responses in birth mass and lamb survival in the two years that it was practised. Seen in relation to the variable results obtained under outdoor conditions (Alexander *et al.*, 1980; Irazoqui & Giglioli, 1984; Orleans-Pobee & Beatson, 1989; Parker *et al.*, 1991; Fernandez Abella *et al.*, 1991), these results are understandable. The nature of this investigation did not allow us to assess specific causes of the variation in response between years with any certainty, and it can only be speculated on. The lack of control over environmental conditions, differences in pasture palatability, and factors such as sheltering of ewes, possibly contributed to this variation.

The early lamb growth of progeny of shorn ewes and the overall productivity of these ewes were generally better when compared with their unshorn contemporaries and their offspring. These results and those reported in the literature strongly suggest that biological gains may be derived from the shearing of winter-lambing ewes prior to lambing. It therefore appears to be a cost-effective method of improving efficiency in such flocks. Further studies are required to investigate the effects of shearing on lamb birth mass and survival, for which no consistent benefits could be demonstrated in this study.

Acknowledgements

We wish to express our sincerest gratitude to Miss Dalene Young and her helpers, who were responsible for the care and maintenance of the experimental flock as well as the recording of the data.

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