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## Effects of pre-lamb and conventional full-wool shearing on the productivity of ewes

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### ABSTRACT

The effects of pre-lamb and conventional (post-weaning) annual shearing of ewes on their productivity and that of their lambs were studied over a three year period. Ewes ( $n=500$ ) were selected from a flock of 5000 mixed-age Border Leicester x Romney ewes at Massey University's Riverside property in the Wairarapa in April 1989 and randomly allocated to two equal sized groups. Both groups were managed under the same conditions until December 1991. Throughout the trial, one group was shorn after weaning in November/December and the second group was shorn prior to lambing in August. Ewe liveweights and lambing performance were measured over three years, and individual ewe fleeceweights were recorded over two full years. Pre-lambing ewe liveweights were similar for both policies in all years, while post-weaning liveweights were greater in pre-lamb shorn ewes in 1989 only. Annual fleeceweights were significantly ( $P<0.05$ ) greater for the pre-lamb shorn ewes in 1990 ( $4.07\pm 0.05$  vs  $3.64\pm 0.06$  kg) but not in 1991 ( $3.61\pm 0.08$  vs  $3.75\pm 0.09$  kg). Lamb birthweights and weaning weights did not differ between shearing treatments. The small difference in ewe and lamb performance between the shearing treatments suggests that management factors, such as the provision of feed and shelter post-shearing, the spread of seasonal work, net income per ewe and cashflow, should determine whether a pre-lamb shearing policy is adopted.

**Keywords:** Shearing policies; pre-lamb; full wool; wool production; lamb birthweight.

### INTRODUCTION

Even in times of low wool prices, wool commonly contributes more than 30% of the annual income of New Zealand sheep farmers (NZMWBES, 1993). The management of wool harvesting is therefore an important determinant of sheep farming profit because of its effects on wool quality, sheep performance, labour requirements and cashflow (Parker and Gray, 1989).

Pre-lamb shearing offers several potential advantages over the conventional post-weaning (main) shear policy. The wool of pre-lamb shorn ewes is likely to provide high net returns because of better colour and greater staple strength, due to wool harvesting occurring at the optimum time in relation to the pattern of fibre growth (Sumner, 1985). Also, several trials in the United Kingdom have shown that the lambs of housed pre-lamb shorn ewes are heavier at birth and grow more rapidly than lambs produced by unshorn ewes (Symonds *et al.*, 1986; Vipond *et al.*, 1987; Black and Chestnutt, 1990). Greater lamb birthweights may improve lamb survival, particularly in multiple-born lambs, due to a greater capacity of heavier lambs for maintaining heat production relative to heat loss in cold conditions (Alexander, 1974). This could be an important advantage of pre-lamb shearing under New Zealand farming conditions since lamb losses are typically between 15 and 25% of all lambs born and one-third of these losses are due to the starvation/exposure syndrome (McCutcheon *et al.*, 1981).

The merits of pre-lamb shearing have been discussed by several authors (Wodzicka, 1963; Frengley, 1964; Henderson, 1965; Livingston and Parker, 1984), but few pre-lamb shearing

experiments have been conducted under New Zealand conditions (Everitt, 1961; Sumner and Scott, 1990; Parker *et al.*, 1991). The potential advantages of pre-lamb shearing (at the end of winter or early spring in August-October) described previously are offset by the risk of increased ewe losses post-shearing from cold stress (Everitt, 1961) and a shortage of pasture relative to the increased feed demand of ewes post-shearing (Coop and Drew, 1963; Joyce, 1968). With respect to the latter, ewe feed intake may increase by up to 78% depending on weather conditions and this increase in intake may persist for 4 to 6 weeks (Elvidge and Coop, 1974), although at a progressively diminishing level as the wool regrows.

The limited published evidence describing the effects of a pre-lamb shearing policy under New Zealand farming conditions prompted the experiment described in this paper, in which the effects of once-yearly shearing of ewes in August (prior to lambing) and in November/December (conventional full-wool policy) were compared. The experiment was conducted under commercial farming conditions in the Wairarapa region of New Zealand over a three year period.

### MATERIALS AND METHODS

The 500 experimental ewes were selected from a flock of 5000 mixed-age Border Leicester x Romney ewes at Massey University's Riverside property in the Wairarapa (latitude 39°S) in April 1989. The 500 ewes, which had been marked by crayons fitted to rams during the first 10 days of 1989 mating, were randomly allocated into two equal sized groups. Ewes were individually eartagged to identify "conventional" and "pre-lamb" shearing groups. Throughout the trial, "con-

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ventional" ewes were shorn after weaning in November/December and "pre-lamb" ewes were shorn 3 to 4 weeks prior to the commencement of lambing in August. Only the conventionally shorn ewes were crutched prior to lambing.

The trial was run under the usual sheep management system for Riverside (Parker, 1987) and measurements coincided with the normal sheep farm operations at shearing, docking, weaning and mating. Both groups of ewes were grazed together for the duration of the experiment except for the period beginning at set-stocking for lambing (late August) and ending at docking (mid-October, when the lambs were 5 weeks of age). During this period each shearing group was continuously stocked in paired paddocks to minimize environmental effects. All of the experimental animals were rotationally grazed with the full commercial flock from weaning until the following lambing (August). Farm pasture cover information was collected at 4-6 week intervals throughout the experiment as part of the management recording system for Riverside farm (Parker, 1987).

The liveweight of ewes was recorded each year at pre-lamb shearing (August) and at weaning (November/December). Ewe liveweight, for the respective shearing treatment, was adjusted for greasy fleeceweight at the time of weighing by adding the estimated weight of residual wool (derived from total annual wool production for the year concerned). Liveweights were not adjusted for the products of conception because, based on lambing performance data, these should have been similar for both shearing treatments.

Fleeceweights of all trial ewes were recorded individually over two full years (1989-1990 and 1990-1991). The weights of crutchings (August) and fleece (November/December) were combined to provide the average fleeceweight of ewes shorn conventionally.

During the 1989 and 1990 lambings a sample of lambs from 80 and 100 ewes respectively in each shearing treatment were weighed and ear tagged. The sex, date of birth and birthrank of lambs were recorded within 24 hours of birth. In the 1991 season lambs from all of the treatment ewes were recorded. Tagged lambs were weighed again at weaning in each year. The growth rate of lambs was calculated from birth to weaning.

### Statistical analysis

Because most ewes (other than those which died during the trial) appeared in each year of the study, analyses were

conducted within year. Ewe liveweight and fleeceweight data were fitted to a model comprising shearing treatment (pre-lamb vs conventional). The models for lamb birthweight, weaning weight and growth rate included dam's shearing treatment, litter size (single vs multiple) and sex (male vs female). Lamb birthweight was fitted as a covariate in the weaning weight model. Birthweight and weaning weight were adjusted for the interval from shearing to the date of lambing and from the date of birth to weaning respectively.

## RESULTS AND DISCUSSION

### Ewe lambing performance

The lambing performance (lambs docked/ewe lambing) of the pre-lamb and conventionally shorn ewes was similar over the three years, being 126 vs 123 % in 1989, 129 vs 140 % in 1990 and 138 vs 133 % in 1991.

Although the data were not subjected to statistical analysis (because of limited numbers of ewes in each year), shearing treatment did not markedly affect the lambing performance of ewes in any year of the experiment. This is consistent with the results of Sumner and Scott (1990) who found no difference in the percentage of dry ewes, ewe deaths or ewes cast, or in lamb survival, between ewes shorn pre-lamb in July or at weaning (January). Everitt (1961) also reported no significant difference in lambing percentage, incidence of dry ewes or the mortality of ewes (or their lambs) that had been either pre-lamb shorn in June/July or shorn at the conventional time in December.

### Ewe liveweight and fleeceweight

Liveweights of ewes prior to lambing were not affected by shearing treatment in any year while post-weaning liveweights were greater ( $P<0.05$ ) in pre-lamb shorn ewes only in 1989 (Table 1).

Annual fleeceweights were significantly ( $P<0.001$ ) greater for pre-lamb shorn ewes than for conventionally shorn ewes in 1990 but not in 1991 (Table 1).

The small and inconsistent effect of shearing policy on ewe liveweight pre-lambing and at weaning is similar to the findings of Salman and Owen (1986), Black and Chestnutt (1990) and Parker *et al.* (1991), all of whom found that shearing treatment during pregnancy had no significant influence on ewe liveweight during late pregnancy and lactation.

**TABLE 1:** Effect of shearing treatment on ewe liveweight (kg) prior to lambing and at weaning, and on annual fleeceweight (kg) 1989-1991 (mean $\pm$ SEM). Number of animals per group is in brackets.

Year	Pre-lambing liveweight		Post-weaning liveweight		Annual fleeceweight	
	Pre <sup>1</sup>	Conv <sup>2</sup>	Pre	Conv	Pre	Conv
1989	54.5 $\pm$ 0.5 (248)	53.0 $\pm$ 0.5 (248)	60.1 $\pm$ 0.5 <sup>b</sup> (209)	57.3 $\pm$ 0.4 <sup>a</sup> (217)	-	-
1990	55.7 $\pm$ 0.5 (161)	55.7 $\pm$ 0.5 (154)	54.1 $\pm$ 0.6 (144)	52.8 $\pm$ 0.6 (136)	4.07 $\pm$ 0.05 <sup>b</sup> (161)	3.64 $\pm$ 0.06 <sup>a</sup> (132)
1991	56.5 $\pm$ 0.7 (65)	56.8 $\pm$ 0.8 (58)	53.6 $\pm$ 0.9 (56)	53.8 $\pm$ 0.9 (51)	3.61 $\pm$ 0.08 (66)	3.75 $\pm$ 0.09 (49)

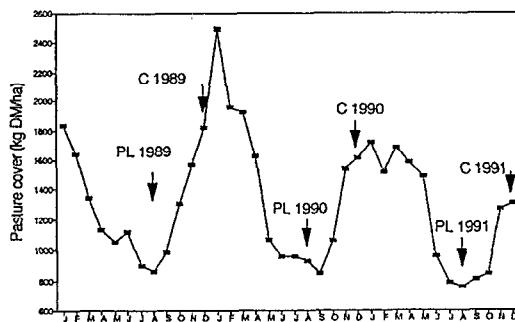
<sup>1</sup>Pre-lamb shearing treatment.

<sup>2</sup>Conventional (post-weaning) shearing treatment.

<sup>a,b</sup>Means within rows and main effects having superscripts with letters in common are not significantly different ( $P>0.05$ ).

The annual fleeceweight of ewes pre-lamb shorn in August was greater than that of ewes left unshorn until weaning (November) in 1990 but not in 1991. This inconsistency probably reflected the availability of pasture in each season (Figure 1). Although there have been no formal studies of relationships between pasture allowance and intakes of pre-lamb shorn ewes, studies by Dabiri (1994) suggest that, as allowance increases, so too does the ability of shorn ewes to express their drive to consume more pasture. Pasture cover was greater during spring/summer 1989/1990 than during the corresponding period in 1990/1991. Thus ewes shorn in spring 1989 would have had a greater opportunity to increase voluntary intakes, leading to their greater post-weaning liveweights (than conventionally shorn ewes) in 1989 and greater fleeceweights at the next (1990) shearing (although this would have required an increase in feed intake beyond that needed simply to compensate for increased maintenance requirements consequent upon removal of the fleece). Annual fleeceweights of ewes pre-lamb shorn in July and ewes left unshorn until January were similar in the experiment reported by Sumner and Scott (1990), but a greater fleeceweight was recorded for pre-lamb shorn ewes than their December shorn counterparts by Everitt (1961). These inconsistencies may have reflected differences between trials in the pasture conditions to which ewes were exposed post-shearing but this cannot be determined with certainty because pasture conditions were not described in those studies.

**FIGURE 1:** Average monthly pasture cover (kg DM/ha) for Riverside farm from January 1989 to December 1991. PL = date of pre-lamb shearing, C = date of conventional shearing.



**TABLE 2:** Effect of shearing treatment on lamb birthweight, weaning weight, and lamb growth rates from birth to weaning 1989-1991 (Mean $\pm$ SE). Number of animals per group is in brackets.

Year	Birthweight (kg)		Weaning weight (kg)		Growth rate (g/d)	
	Pre <sup>1</sup>	Conv <sup>2</sup>	Pre	Conv	Pre	Conv
1989	4.72 $\pm$ 0.09 (88)	4.61 $\pm$ 0.09 (90)	22.8 $\pm$ 0.5 (80)	22.5 $\pm$ 0.6 (80)	255 $\pm$ 5 (80)	254 $\pm$ 5 (80)
1990	4.38 $\pm$ 0.11 (55)	4.68 $\pm$ 0.11 (55)	20.6 $\pm$ 0.5 (50)	20.2 $\pm$ 0.5 (48)	223 $\pm$ 6 (50)	213 $\pm$ 6 (48)
1991	5.07 $\pm$ 0.09 (79)	5.00 $\pm$ 0.09 (72)	21.5 $\pm$ 0.7 (68)	21.2 $\pm$ 0.6 (64)	213 $\pm$ 5 (68)	211 $\pm$ 5 (64)

<sup>1</sup>Pre-lamb shearing treatment.

<sup>2</sup>Conventional (post-weaning) shearing treatment.

## Lamb weight and growth

The birthweights, weaning weights and growth rates of lambs are presented in Table 2. None of these variables was affected by shearing treatment.

Lamb birthweight, weaning weight and growth rate were not affected by the dam's shearing treatment. This is consistent with the results of Russel *et al.* (1985), Orleans-Pobee and Beatson (1989) and Parker *et al.* (1991), but not with the results of several other studies which reported greater birthweights in lambs of pre-lamb shorn ewes compared with those of unshorn ewes (Maund, 1980; Salman and Owen, 1986; Symonds *et al.*, 1986; Vipond *et al.*, 1987; Black and Chestnutt, 1990). This inconsistency may be related to the fact that shorn animals managed under grazing conditions in a temperate to cold climate (similar to the current study) are less able to increase feed intake in response to shearing than those managed under intensive conditions. When food allowance was restricted for both pre-lamb shorn and unshorn housed ewes, the birthweights and growth rates to 14 weeks of age of single or twin lambs were not affected by shearing treatment (Russel *et al.*, 1985). Differences in maternal heat stress may also have contributed to the greater birthweights of lambs born to pre-lamb shorn ewes run under Northern Hemisphere indoor conditions (Murray and Crosby, 1986; Vipond *et al.*, 1987; Black and Chestnutt, 1990). Heat stress of pregnant ewes can reduce ewe feed intake and reduce gestation length by 2-3 days (Shelton and Huston, 1968; Alexander and Williams, 1971), and thereby reduce lamb birthweight in unshorn ewes compared with lambs of their pre-lamb shorn peers. The fact that ewes in the present study were shorn four weeks prior to lambing, rather than the six or more weeks in other studies (Maund, 1980; Symonds *et al.*, 1986; Vipond *et al.*, 1987; Salman and Owen, 1989; Black and Chestnutt, 1990), could also account for the lack of a shearing treatment effect on lamb birthweights. This is supported by the study of Black and Chestnutt (1990) who examined the effect of time interval from shearing to lambing in housed pregnant ewes (shearing 12, 9, 6 and 4 weeks before lambing) and recorded considerable increases in lamb birthweight from those ewes shorn at least 6 weeks prior to lambing.

## CONCLUSIONS

These data suggest that pre-lamb shearing does not affect lamb growth but may influence ewe liveweight at

weaning and ewe fleeceweight. Although differences in ewe liveweight and fleeceweight were inconsistent between years, our data suggest that pre-lamb shorn ewes are likely to have slightly greater post-weaning liveweights and increased fleeceweights (at the subsequent shearing) relative to ewes shorn post-weaning when feed allowances are high after shearing.

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