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Another look at shearing lambs

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Abstract

Some farmers believe shearing lambs improves weight gain. On four separate farms, lambs were randomly drafted into two groups in summer, one was shorn while the other was crutched but left unshorn. They were subsequently run as one mob until all were shorn as yearlings in spring. Corriedale lambs (n = 100 x 2 years and 50 per treatment in a third year) were used on one farm, Halfbred lambs (n = 100 per treatment x 1 year) on another farm and two farms used Merino lambs (n = 50 per treatment on each farm x 1 year). Averaged across three consecutive years, the Corriedales shorn as lambs were 2.8 kg heavier as yearlings ($P < 0.001$) and grew 629g more wool ($P < 0.001$), which could be profitable. Halfbred yearlings shorn as lambs were 0.85 kg heavier ($P = 0.041$) and although not significant, grew more wool (120 g). Shorn Merino lambs produced 140 g more wool on one farm ($P = 0.019$) only, with no significant live weight differences between shearing treatments on either farm. International literature suggests the decision to shear lambs should be based on availability of feed, cost of shearing, time of year, temperature and the risk of flystrike, grass seed damage or adverse weather.

Keywords: woolly lambs; lamb shearing

Introduction

Many commercial sheep farmers in New Zealand believe that shearing lambs will improve growth rate. The earliest scientific reports from New Zealand did indeed show a greater live weight gain of shorn lambs compared to the unshorn control (Wallace 1960a,b). During a nine week period following shearing in December, shorn lambs gained 1.5 and 1.9 kg more in two consecutive years. It is possible that this outcome was widely reported and that farmer beliefs have stemmed from that initial work.

Sumner (1984) compared lambs shorn in December and again in April, or January and again in April with a control group that remained unshorn until April and found no difference in carcass weight when all groups were slaughtered in May. The protocol was implemented across 11 private farms in the North Island, and on nine of those farms there was no difference between the groups. On one farm the shorn lambs were 1 kg heavier and on another they were 1 kg lighter. These results should convince farmers that there may be no live weight gain.

Pownall et al. (1984) observed a significant interaction between shorn and unshorn treatment groups which was dependent on their feed allowance. Shorn lambs grew faster when ample feed was offered, but when feed was restricted, shorn lambs produced carcasses that were 0.8 kg lighter. Furthermore, Bray et al. (1985) were able to reduce carcass fatness by shearing lambs and manipulating nutrition.

A range of coarse wool breeds and some crosses with terminal sire breeds were used in the experiments outlined above. The experiments reported here were designed to test the hypothesis that shearing lambs with finer wool would affect live weight gain and weight of wool harvested.

Materials and methods

Experiment 1

Two hundred Corriedale ewe lambs were tagged, their live weight recorded and they were randomly allocated to two groups on the 25 January 1993. The following day, half the lambs were shorn and their greasy fleece weight recorded. Control lambs were yarded and crutched but not shorn. The lambs were returned to pasture and maintained as one flock until 30 August 1993 when all animals were shorn and their greasy fleece weight and live weight were recorded. The experiment was repeated in 1994, again using 200 lambs, with lamb shearing on the 27 January and yearling shearing on the 12 September. In 1995 a hundred lambs were used, with lamb shearing on the 25 January and yearling shearing on the 8 September. These lambs were farmed in the Ure Valley on the coast near Ward in the South Island (41°53' S and 174°04' E). Average annual rainfall for this site is 720 mm. A total of 114 mm of rain was recorded in November and December 1992 and January 1993, then good rains of 146 mm followed shearing in February 1993. In the second year of the experiment, 110 mm rainfall in November and 121 mm in December 1993 was quite high, but only 28 mm fell in January 1994 before shearing and February was much drier than the previous year with only 51 mm of rain. In the final year, rainfall was very high during the period between the two shearing events with 953 mm recorded, yet in only 49 mm fell in November and 12 mm in December 1994 with above average rain of 115 mm in January 1995 leading up to shearing and followed by 87 mm of rain in February. Rainfall data were obtained from the nearest available weather station records (http://cliflo.niwa.co.nz)

Table 1 Mean live weight ± standard error of the mean of Corriedale lambs in January and as yearlings in September, and fleece weight of those shorn as lambs (Shorn), and when both shorn and unshorn (Woolly) groups were shorn as yearlings. Live weight gain and fleece weight were adjusted for live weight in January (Adjusted), because heavy lambs gained less weight but grew more wool. Bold text indicates significance at P<0.05.

Parameter	Year	Sheep age	Shearing treatment		P-value
			Woolly	Shorn	
Live weight	1993	Lamb	34.3 ± 0.3	33.9 ± 0.3	
		Yearling	36.9 ± 0.4	39.8 ± 0.4	
	1994	Lamb	36.2 ± 0.3	36.0 ± 0.3	
		Yearling	36.0 ± 0.4	38.5 ± 0.4	
	1995	Lamb	30.2 ± 0.5	29.8 ± 0.5	
		Yearling	40.7 ± 0.5	43.5 ± 0.6	
Adjusted live weight gain			4.06	6.91	**<0.001**
Fleece weight	1993	Lamb		1.91 ± 0.03	
		Yearling	5.62 ± 0.06	4.02 ± 0.05	
		Total	5.62 ± 0.06	5.93 ± 0.07	
	1994	Lamb		2.02 ± 0.03	
		Yearling	4.52 ± 0.05	3.62 ± 0.05	
		Total	4.52 ± 0.05	5.64 ± 0.07	
	1995	Lamb		1.59 ± 0.04	
		Yearling	5.21 ± 0.09	3.99 ± 0.08	
		Total	5.21 ± 0.09	5.58 ± 0.11	
Adjusted fleece weight			5.14	5.77	**<0.001**

Table 2 Mean live weight ± standard error of the mean of Halfbred lambs in January and as yearlings in November, and fleece weight of those shorn as lambs in January (Shorn) or left unshorn (Woolly) until both groups were shorn as yearlings. Live weight gain and fleece weight were adjusted for live weight in January (Adjusted), because heavy lambs gained less weight but grew more wool. Bold text indicates significance at P<0.05.

Parameter	Year	Sheep age	Shearing treatment		P-value
			Woolly	Shorn	
Live weight	1994	Lamb	29.0 ± 0.4	28.4 ± 0.5	
		Yearling	35.2 ± 0.4	35.8 ± 0.4	
Adjusted live weight gain			6.51	7.36	**<0.04**
Fleece weight	1994	Lamb		1.28 ± 0.03	
		Yearling	4.12 ± 0.06	2.92 ± 0.06	
		Total	4.12 ± 0.06	4.20 ± 0.08	
Adjusted fleece weight			4.10	4.22	0.19

Experiment 2

Two hundred New Zealand Halfbred (Lincoln X Merino) ewe lambs were tagged and weighed on 31 January 1994. Half were shorn and the greasy fleece weights recorded. The lambs were returned to pasture and maintained as one flock until they were all shorn on the 14 November when their greasy fleece weight and live weight were recorded. These lambs were farmed in the Scargill Valley, North Canterbury (42°54' S and 172°55'E) where the average rainfall was 750 mm. Total annual rainfall was only 528 mm in the 1995 calendar year, although leading up to shearing there were higher than average rains in November 1994 of 77 mm and very good rains in December of 189 mm, with average rains of 47 mm in January 1995 and 54 mm in February.

Experiment 3

One hundred Merino ewe lambs on each of two farms were tagged and weighed. Fifty on each farm were shorn and the greasy fleece weights were recorded. The lambs were returned to pasture and maintained as a flock on each farm until they were shorn as yearlings when their greasy fleece weight and live weight were recorded. One flock was farmed in the Awatere Valley in Marlborough (41°39' S and 174°00' E) and were shorn on the 22 January 1996. The second flock was farmed in the neighbouring Medway Valley (41°46' S and 173°51' E) and were shorn the following day. All animals from the flock in the Awatere Valley were shorn on the 12 September 1996 and over a month later, on the 17 October in the Medway Valley. Average rainfall was 787 mm for both sites, with 104 mm falling in November and 70 mm in December 1995. These falls were average amounts. January and February were dry with only 22 mm and 36 mm respectively. While 1996 was a year of above average annual rainfall in this area with 828 mm, 139 mm fell in July when soil temperatures would have restricted the response of pasture and 158 mm fell in November 1996 after this experiment was completed.

Statistical analysis

Individual liveweight gain of an animal was calculated by subtracting live weight as an unshorn lamb from live weight as a yearling after shearing. Liveweight gain values were then analysed with analysis of covariance (ANCOVA) using their lamb live weight as a covariate. This ANCOVA allowed the mean weight gain values of shorn (Shorn) and unshorn (Woolly) groups to be adjusted for mean live weight difference of the groups as lambs, so the groups could be compared on the treatment difference of shorn or unshorn, without the influence of their initial live weight difference.

Fleece weight of each individual animal in the Shorn group was calculated by adding fleece weight as a yearling to fleece weight as a lamb since they were shorn twice. Yearling fleece weight was used for the Woolly group since they were shorn only once. Fleece weight values were compared between the groups with the same ANCOVA described above. Regression equations presented in figures were calculated from raw data using Microsoft Excel.

Results

Experiment 1

The live weight and fleece weight of the Corriedales at lamb and yearling shearing are shown in Table 1. Figure 1 shows lambs that were smaller at shearing gained more weight than larger lambs, irrespective of treatment group or year ($P < 0.001$). Mean live weight gain to yearling age, adjusted using the initial live weight at lamb shearing is also shown in Table 1. Shorn lambs gained an average of 2.84 kg more across the three years of this experiment. In the second year of the experiment, unshorn lambs lost 0.2 kg between January and yearling shearing, yet the shorn group gained 2.5 kg between shearings. Lamb and yearling fleece weights are also shown in Table 1. The relationship between live weight of the animal at shearing and fleece weight at the time of shearing is shown in Figure 2. More wool was harvested from heavier lambs ($P < 0.001$) and heavier yearlings also had heavier fleece weights ($P < 0.001$), whether they were shorn as lambs or not. Live weight of the yearling was therefore used as a covariate in the analysis, and a total of 629 g more wool was harvested from the yearlings shorn as lambs ($P < 0.001$).

Experiment 2

Halfbred lamb and yearling live weight, and fleece weight at shearing are shown in Table 2. A similar relationship to that observed in Experiment 1 was noted, where lambs that were lighter at the commencement of the experiment gained more weight than those which were heavier ($P < 0.001$). Mean live weight gain adjusted for initial weight of the lamb at shearing was 0.85 kg greater for the shorn lambs ($P = 0.041$). Heavier lambs at shearing had heavier fleeces

Figure 1 Relationship between live weight as a lamb and live weight as a yearling in September, of Corriedales either shorn as lambs in January (Shorn – open circles) or left unshorn (Woolly – closed circles). Pooled results from 1993, 1994 and 1995 with regression equation near the relevant line.

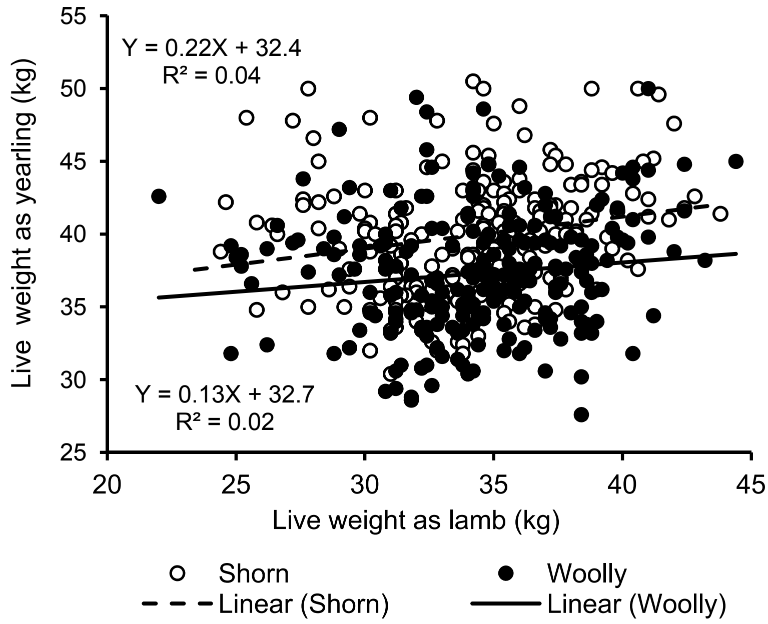

Figure 2 The relationship between live weight at shearing and fleece weight of Corriedales from lambs shorn in January (Lamb – closed squares) and yearlings shorn in September that were either shorn as lambs (Shorn - open circles) or left unshorn (Woolly - closed circles). Pooled results from 1993, 1994 and 1995 with regression equation near the relevant line.

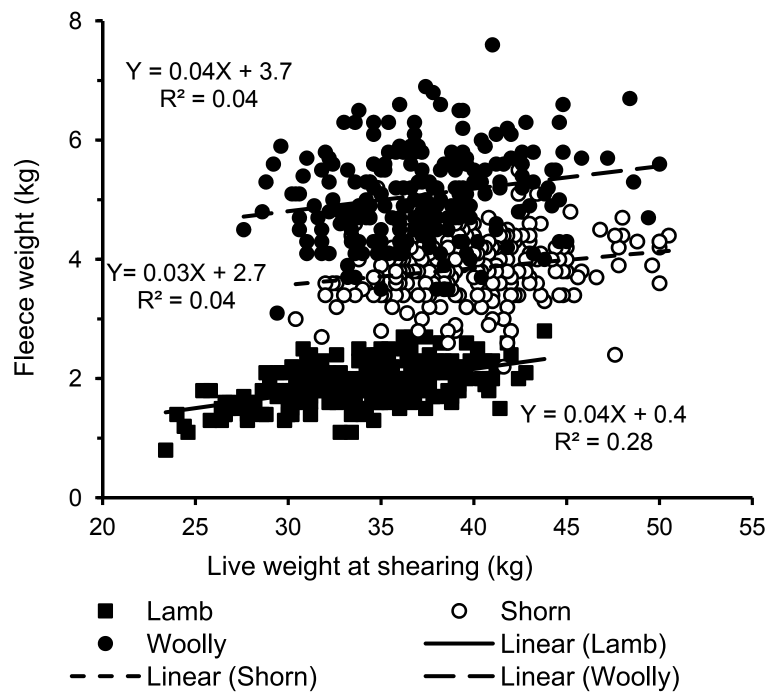

Table 3 Mean live weight ± standard error of the mean of Merino lambs from two farms in January and as yearlings in September (Awatere Valley) or October (Medway Valley), and fleece weight of those shorn as lambs in January (Shorn) or left unshorn (Woolly) until both groups were shorn as yearlings. Live weight gain and fleece weight were adjusted for live weight in January (Adjusted), because heavy lambs gained less weight but grew more wool. Bold text indicates significance at P<0.05. italic text indicaes significance between P = 0.05 and P = 0.10.

Parameter	Location	Sheep age	Shearing treatment		P-value
			Woolly	Shorn	
Live weight	Awatere Valley	Lamb	26.4 ± 0.4	25.5 ± 0.4	
		Yearling	30.6 ± 0.5	30.4 ± 0.5	
Adjusted live weight gain			4.33	4.73	0.51
	Medway Valley	Lamb	22.9 ± 0.4	23.2 ± 0.3	
		Yearling	36.9 ± 0.6	36.8 ± 0.5	
Adjusted live weight gain			14.02	13.63	0.58
Fleece weight	Awatere Valley	Lamb		0.83 ± 0.02	
		Yearling	4.00 ± 0.08	3.42 ± 0.07	
		Total	4.00 ± 0.08	4.25 ± 0.08	
Adjusted fleece weight			4.00	4.24	**0.02**
	Medway Valley	Lamb		0.99 ± 0.03	
		Yearling	4.40 ± 0.07	3.66 ± 0.05	
		Total	4.49 ± 0.07	4.65 ± 0.06	
Adjusted fleece weight			4.50	4.64	*0.09*

(P <0.001) and more wool was harvested from heavier yearlings irrespective of whether they were shorn as lambs. Although more total wool was harvested from the yearlings shorn as lambs, when adjusted using live weight as a covariate, there was only 120 g more wool than the Control group. This difference was not significant.

Experiment 3

Production information from Merino lambs on the two Marlborough farms is presented in Table 3. On the Awatere Valley farm, those that were shorn as lambs gained 0.39 kg more weight than those left woolly, while shorn lambs on the Medway Valley farm gained 0.39 kg less weight than the Woolly group. The difference in liveweight change was not significant on either farm. As with the previous experiments, the heavier lambs from the Awatere Valley farm gained less weight than lighter lambs (P = 0.005), though there was no significant association between liveweight gain and weight of the lamb at shearing on the Medway Valley farm. More fleece was harvested from heavier lambs at lamb shearing on both properties (P <0.001 in the Awatere Valley and P =0.006 in the Medway Valley), and heavier yearlings produced heavier fleeces on both farms (P <0.001 and P = 0.004 respectively) whether shorn as lambs or not. More wool was harvested from shorn lambs in the Awatere Valley (P = 0.019), though there was no significant difference on the Medway Valley farm.

Discussion

Weight of wool harvested was always greater in the group shorn as lambs, though the difference was not always significant. Live weight gain of shorn lambs was not significantly greater on all farms. Heavier lambs or yearlings consistently produced heavier fleeces at shearing, irrespective of their treatment group. Live weight gain of lighter lambs was greater between shearing times. Lighter lambs may have been younger and at a different stage of their growth trajectory, or they may have been born as twins or multiples and fared better during growth to their yearling live weight, compared with singles that had achieved more growth pre-weaning. Bray et al. (1990) found smaller lambs grew at the same rate as larger lambs post-weaning, while twin lambs gained weight faster than singles post-weaning. Rearing rank records would assist understanding of the current results.

Corriedale yearlings that had been shorn as lambs consistently outperformed their flock mates that had been left woolly in each of the three years of the trial, and absolute live weight and fleece weight have real commercial value which cannot be discounted by covariate analysis. At around current values of $4 to $5 per kilogram for lamb meat, and around $10 per kilogram for wool from these finer genotypes (M Hargadon, Personal communication), the shorn Corriedale yearlings would be worth $12 more than the unshorn controls because of 2.8 kg more live weight, or approximately 1.4 kg of carcass and 600 g more wool. Shearing lambs would then remain profitable after paying $5 cost for shearing the lambs, and ignoring the cost of the extra feed. Notwithstanding the dramatic fluctuations in product prices since the early 1990s, there is some financial incentive to shear lambs in this particular environment, with this breed of sheep. It would be economically rewarding if this could be repeated across other farms, breeds and environments.

Halfbred lambs that were shorn also gained more weight up to yearling shearing than unshorn Controls, but the smaller differences observed on this farm would not cover the cost of shearing. There was no significant effect of shearing on the Merino lambs, with a small retardation in live weight gain on one property that was coincidentally the same magnitude as the increased gain on the other. The evidence from these three farms is thus similar to many other reports, where live weight gains or losses, or commonly no significant differences were observed after shearing

(Sumner 1984). These farms are in environments that face other challenges such as grass seed and flystrike which may justify the cost of shearing.

In finer wool sheep such as those used here, the value of the wool is also a consideration and though the value of the wool clip was determined during the experiments reported here, measurements were not made on individual fleeces. Given a range of potential birth dates, Rogan et al. (1995) found that shearing Merino ram lambs could be worthwhile for stud breeders to obtain greater repeatability of yearling fleece weight measurements, but repeatability was not improved for fibre diameter. For commercial sheep breeders however, Rogan et al. (1995) calculated that shearing would not deliver an economic return despite a 700 g increase in live weight and 100 g of extra wool per shorn lamb. Newman et al. (1996) conducted a very similar experiment, with Merino lambs, to the experiments reported here, and found no difference in live weight gain, but an extra 350 g of wool was harvested from the group shorn as lambs. There were very few significant differences in measured fibre characteristics, though not surprisingly the fleeces from the group shorn as lambs came as two short staples of 36 mm and 68 mm in length whereas the unshorn group produced one staple of 102 mm long. Then, and now, the longer wool was more valuable, with lambs wool with a staple length of less than 50 mm worth $6 per kg compared to $8 per kg for equivalent wool longer than 50 mm (M Hargadon, Personal communication).

Why then might some researchers observe an increase in live weight gain, while others note no significant effect or even a retardation of growth? We propose that the time of year and the weather conditions following shearing in the specific location, and the feed available post shearing provide the answers. Lambs grew faster under 16 hours of light than 8 hours of light in a controlled environment room maintained at 19°C, and unshorn lambs produced heavier carcasses under these conditions (Forbes et al. 1979). Live weight gain is therefore more likely in summer than in winter. The initial experiment described by Wallace (1960a,b) used terminal sire cross lambs that were shorn in the very early summer in the Waikato which is warm and humid, such that the shorn lambs were perhaps better able to dissipate body heat. Pownall et al. (1984) showed that shorn lambs could gain more weight at higher pasture allowances. Both Pownall et al. (1984) and Bray et al. (1985) observed lower live weight gain when shearing Coopworth or terminal sire cross lambs in autumn in Canterbury. The breeds which have been used in experiments are also diverse, and there is no suggestion that the current experiments compare the three breeds used here in four different years. However, terminal sired lambs may be expected to grow faster than Merino lambs and a significant difference may be more readily detected. Under hot conditions of >30°C in a feedlot in the United States, shearing had no effect on live weight gain but did affect feed intake, though in this case the shorn lambs ate more to achieve the same weight gain (Lane & Kemp 1990). In the experiments on private farms reported here and in those reported by Sumner (1984) we have no information on pasture availability or quality, but the lambs were run together and had equal opportunities.

Sumner et al. (2010) linked rainfall to wool production and live weight gain. Rainfall data has been provided here, though readers should note that all four farms were in summer dry environments where production is largely based around annual pasture species which may not respond to summer rain. Rainfall around shearing was above average in 1993 and 1995 but below average in 1994 on the farm in the Ure Valley, which may have affected live weight gain in both groups as overall performance was lower in 1994, but this does not explain the consistent advantage in live weight gain of the shorn group on this farm. The experiment in the Scargill Valley in 1995, was associated with low rainfall around shearing, and a poor year overall. Very low rainfall in January and February 1996 may have affected the lambs in the Medway and Awatere Valley. Future research should measure the quantity and quality of forage post-shearing.

Other New Zealand research has shown that shearing lambs can reduce microbial contamination of carcasses during slaughter (Biss & Hathaway 1996). However, shearing within seven days of slaughter had no significant effect on microbial contamination in Norwegian plants (Hauge et al. 2011). The difference could be due to sheep breed, processing methods, or the longer period between shearing and slaughter in the New Zealand report. Shearing can cause skin cuts, which can heal and leave scars that are revealed when the wool is removed and the pelt is tanned to nappa leather (Scobie et al. 1998; Holst 1996). Pelts which carry scars are less valuable, although price signals for pelts are often unseen by the sheep farmer or may be outweighed by price incentives from lamb processors to achieve lower microbial contamination by shearing. Although Holst et al. (1997) found timing of shearing could affect the value of skins tanned with the wool on, this is not a common processing route for New Zealand lamb pelts (Scobie et al. 1997).

Without doubt, shearing is a very effective strategy for reducing flystrike risk of lambs in New Zealand (Cole & Heath 1999). Evidence to the contrary has been reported in Australia where shorn lambs became more susceptible to flystrike than woolly controls (Hemsley et al. 1984; Rogan et al. 1995). Strategic shearing is an effective way of reducing the contamination of the fleece with seeds of grasses (*Hordeum* spp., *Austropstipa* spp., *Vulpia* spp. and *Bromus diandra*) or *Erodium* spp. (Campbell et al. 1972; Warr & Thompson 1976; Shugg & Vivian 1973; Holst et al. 1996; Tozer et al. 2008). Similarly, lice populations can be reduced by shearing and this can reduce the incidence of the pelt fault 'cockle' (Heath et al. 1995). However, lambs should be shorn in the early summer to avoid grass seeds, in the mid summer to reduce flystrike and in winter to control louse infestations. Farmers need to assess the biggest risk to the greatest number of lambs and time shearing to reduce that risk and perhaps capitalise on live weight or wool production gains that may be made given the time of year and available pasture.

Interesting questions therefore remain about the effect of shearing lambs. The authors consider that shearing options should be considered separately for lambs kept as replacements, lambs that are small and need longer to finish and lambs that are closer to slaughter weight. Furthermore, there are now demanding live weight targets for breeders who wish to mate lambs to give birth as yearlings. Judicious use of shearing with appropriate feeding might help achieve extra weight gain.

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