Effect of shearing on lamb growth and carcase performance

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Abstract

A study was undertaken on three properties throughout New Zealand to determine the impact of shearing on lamb performance and whether this offered any economic benefit to farmers as a farm-management tool. A total of 1,183 lambs were randomly allocated to one of four treatments, shorn fasted, bellied fasted, woolly fasted and woolly not fasted. Shorn fasted lambs grew 12 g/d faster than woolly fasted lambs ($P<0.05$), but at similar rates to bellied lambs and woolly not fasted lambs. There were no differences among treatments for carcase weight, meat yield or proportion of lambs killed at slaughter. The difference observed in average daily gain between the shorn fasted and the woolly fasted lambs, and the lack of difference observed between shorn fasted and woolly not fasted lambs, indicated that while shearing improved lamb growth rates, the weight loss due to fasting overnight was not overcome by the increased growth rate associated with shearing. While there was no economic benefit associated with lamb carcase weight or time to slaughter, at a wool price of $5.40 per kg clean, shorn lambs were still of a greater value to farmers compared to lambs from all other treatments.

Keywords: lamb; growth rates; shearing; wool; fleece

Introduction

Farmers have traditionally used shearing as a tool to improve lamb growth rates and overall performance. This belief stems mainly from farmer's personal experience and the reported research outcomes of a number of early studies (Wallace et al. 1960a; Wallace et al. 1960b).

The fleece is important for the maintenance of efficient temperature regulation (MacFarlane et al. 1968; Whittow et al. 1971). Removing the fleece not only evokes a metabolic response to partition body resources to maintain a constant body temperature (Piccione et al. 2008), it also evokes an increase in feed intake to meet the energy requirements associated with the additional heat production (Russel et al. 1985; Symonds et al. 1988; Vipond et al. 1987). While this increase in feed intake should have a positive effect on lamb growth rates, research studies looking at the effect of shearing on lamb performance have produced highly variable results. The positive and negative effects seen are likely to be due to a range of environmental factors, including the amount and quality of feed available post-shearing, the weather experienced, and the time of year (Baile & Forbes 1974; Weston et al. 1989; Forbes et al 2007).

Research on the effect of shearing, in relation to improved lamb performance, in current finishing systems is minimal. It is therefore timely to re-visit the effect that shearing may have on lamb performance and assess the economic return to the farmer.

Materials and methods

A randomized experimental design was used to assign lambs to one of four treatments, shorn fasted, bellied fasted, woolly fasted or woolly not fasted. Shorn fasted and bellied fasted treatments were chosen as they are current common shearing techniques used by farmers, where woolly fasted and woolly not fasted were chosen as controls.

The trial was carried out on three different properties, property one was located in the Wairarapa (southern region of the North Island, New Zealand) and properties two and three were located in Southland (southern region of the South Island, New Zealand). Trial commencement dates ranged from 12th Feb to 5th of March (Table 1). Across the three properties, a total of 1,183 lambs were EID tagged, with an anthelmintic administered and a starting live weight collected. Lambs were randomly-allocated to one of four different treatments. Lambs allocated to the shorn fasted, bellied fasted and woolly fasted treatments were held in the yards overnight after weighing and fasted in preparation for shearing. Lambs in the woolly not fasted group were returned to the paddock directly after weighing. After treatments were applied all lambs were reweighed and sent back for grazing with the woolly not fasted mob.

Table 1 Number of lambs, date of treatment, after-treatment weigh events and slaughter dates for each property involved in the study.

Property	Number lambs	Treatment start date	After-treatment weight 1 date	After-treatment weight 2 date	Slaughter date
1	409	12th Feb	2nd May	21st May	23rd May
2	391	5th Mar	31st Mar	30th Apr	2nd May
3	381	5th Mar	2nd Apr	7th May	9th May

From post treatment to slaughter, lambs were offered unrestricted grazing on pasture covers between 1700 and 2200 kg/DM per hectare. During this time lambs were re-weighed twice, with lambs reaching a desired live weight, being sent for slaughter at an Alliance Group Ltd processing plants. Weather data was also collected from post treatment to slaughter from an on-farm weather station on property one (Wairarapa), with Environment Southland supplying regional data for property two (Southland). Temperature data were unavailable for property three (Southland).

Data analysis

To understand and compare true growth rate differences among treatment groups, it was important that the weight loss due to fasting overnight and weight loss due to removal of fleece or belly was taken into consideration. Therefore, final lamb live weights after treatment for the shorn fasted and bellied fasted treatments were adjusted for fleece and belly weight loss. For each property, the average weight loss due to fasting overnight was calculated by weighing the lambs in the woolly fasted group before and after treatment. The fleece and belly adjustments were then calculated by taking the average live weight of the shorn fasted or bellied fasted lambs after treatment, subtracting the average start weight, and then adding back the average fleece weight. Average daily gain (ADG) was then calculated by subtracting the after treatment live weight from the final live weight collected prior to slaughter and dividing by the number of days between weigh events.

Differences among treatments for ADG, carcase weight and meat yield were analysed using mixed linear model (PROC MIXED; SAS). Fixed effects included site and treatment and an interaction term between treatment and site was also fitted. Start weight was fitted as a covariate in all models and pre-slaughter live weight was fitted as a covariate for carcase weight and meat yield models. Proportion of lambs killed was also investigated using a logistic regression model using the statistical software R 3.1.0. Treatment and site was fitted as a fixed effect and start weight as a covariate.

Financial Analysis

A fixed carcase weight and price of $5.20/kg was applied to all treatment groups based on an average carcase weight of 18 kilograms and a grade of YX. All treatments received the shorn/bellied premium of $1.60 at slaughter. It was assumed that if lambs were woolly the farmer would belly crutch pre-slaughter. Average fleece weight was calculated as 1.85 kilograms, which included oddments of 0.4 kilograms. Bellied lambs also achieved 0.4 kilograms of oddments. Fleece value was calculated at $5.40 per kilogram clean based on a clean fleece yield of 82%. Oddments received $4.00 per kilogram clean with a yield of 82%.

Wool payments were calculated as a woolly lamb producing 1.5 kilograms of clean fleece ($7.80 per lamb). The shorn lambs also achieved a wool premium of 0.40 kilograms of clean fleece ($5.75 per lamb). The wool premium payment also included a pelt allowance of $1.50.

Shearing and crutching expenses were obtained from the Lincoln Farm Technical Manual (2013). Handling costs were estimated on manager and shepherd labour for bringing in, sorting and returning lambs.

Results

There were no significant differences detected among treatment groups for hot carcase weight (HCW), meat yield or proportion slaughtered. Shorn lambs had a 7% greater ADG compared to the woolly fasted lambs ($P<0.05$, Table 2). There were no significant differences for ADG among any of the other treatment groups (Table 2).

Site had a highly significant effect on all variables (Table 2). This shows variation between sites and was corrected within the model. The interaction between site and treatment was not significant.

Table 2 The effect of treatment (Bellied fasted, shorn fasted, woolly not fasted and woolly fasted) (least square means ± SEM) on start weight (kg), average daily gain (ADG), carcase weight (HCW), weight of meat per carcase (Meat Yield) and percentage slaughtered (Slaughtered).

Treatment	n	Start Weight (kg)	ADG (kg/day)	HCW (kg)	Meat Yield (kg)	Slaughtered (%)
Bellied fasted	294	32.1 ± 0.15	0.159 ± 0.002 [ab]	18.5 ± 0.07	7.84 ± 0.04	89.1 ± 0.19
Shorn fasted	295	32.0 ± 0.15	0.166 ± 0.002[a]	18.5 ± 0.07	7.84 ± 0.04	88.7 ± 0.26
Woolly not fasted	294	32.0 ± 0.15	0.159 ± 0.002 [ab]	18.6 ± 0.07	7.81 ± 0.04	88.3 ± 0.26
Woolly fasted	298	32.1 ± 0.14	0.154 ± 0.002[b]	18.6 ± 0.07	7.89 ± 0.04	89.9 ± 0.26
Significance						
Treatment	P	n.s	<0.05	n.s	n.s	n.s
Site	P	<0.001	<0.001	<0.001	<0.001	<0.001
Treatment*Site	P	n.s	n.s	n.s	n.s	n.s

[ab] Values within rows with different superscripts are significantly different ($P<0.05$). n.s, non-significant

Due to no significant differences found for carcase weight or proportion of lambs killed, a constant carcase value was assumed for all treatment groups. After adjusting for the value of shorn fleece, oddments and wool pull, less

costs associated with each treatment, shorn fasted lambs achieved a higher value of $1.07 – $2.07 per lamb relative to all other treatment groups.

Feed availability and quality of feed were not directly measured as part of this trial. This may have explained the lack of difference observed between treatments. It

Table 3 Financial performance analysis of woolly fasted, shorn fasted, bellied fasted and woolly not fasted groups. Outlining value by treatment and associated costs

	Woolly fasted	Shorn fasted	Bellied fasted	Woolly not fasted
Carcase value	$93.60	$93.60	$93.60	$93.60
Premium paid on shorn lamb	-	$1.60	-	-
Premium paid on bellied lamb	$1.60	-	$1.60	$1.60
Wool pull payment (incl pelt allowance)	$8.20	$5.75	$8.20	$8.20
Average shorn fleece or belly value	$1.31	$7.73	$1.31	$1.31
Total average value per lamb	$104.71	$108.68	$104.71	$104.71
Less costs				
Cost of shearing	-	$3.30	-	-
Cost of belly crutching	$1.60	-	$1.60	$1.60
Sorting and handling related to shearing		$1.00	$1.00	
Total average cost per lamb	$1.60	$4.30	$2.60	$1.60
Net Value	$103.11	$104.18	$102.11	$103.11

The average maximum temperature between mid-Feb and the end of May for the North Island site was 17.3°C and a total of 61 mm of rain was recorded The Southland sites recorded an average maximum temperature of 17°C and a total average rainfall of 62 mm.

Discussion

The overall aim of this study was to determine the effect of different shearing treatments (shorn or bellied) on lamb finishing performance and economic return to the farmer. Trial results showed that shorn lambs grew 12 g/d faster than woolly fasted lambs but had similar growth rates to bellied lambs and woolly not fasted lambs. There were also no differences among treatments for carcase weight or meat yield. The lack of effect on carcass weight and meat yield indicates that the small difference in ADG was not sufficient to generate a performance benefit. However, at a wool price of $5.40 per kg clean, shorn lambs were of a greater value to farmers compared to lambs from all other treatments.

The difference observed in average daily gain between the shorn and the woolly fasted lambs, and the lack of difference observed between shorn and woolly not fasted lambs, indicates that while the shearing improved lamb growth rates, the weight loss due to fasting overnight was not overcome by the increased growth rate associated with shearing. While it is widely accepted that an increase in heat transfer between a shorn lamb and its environment will result in an increased appetite and intake of feed (Wodzicka-Tomaszewska 1963; Keady et al. 2012) to meet the heightened energy requirements (Russel et al. 1985; Symonds et al. 1988; Vipond et al. 1987), the size of the effect on lamb growth rates will be dependent on the amount and quality of feed available and the weather experienced post shearing (Baile & Forbes 1974; Weston et al. 1989; Forbes et al. 2007).

was suggested by Sumner et al. (1982) and Scobie et al. (2013) that variable effects due to shearing could be partly due to differences in the quality and quantity of feed. At low pasture allowances, shorn lambs would not be able to satisfy their increased feed requirements, while at high pasture allowances, their increased appetite would be met. In addition to feed availability, it is also important that the feed available is of sufficient quality. Minson & Ternouth (1971) found that, while shearing increased energy requirements of sheep, it also increased the voluntary intake of poor-quality and low-digestibility feed. The availability of high-quality feed post shearing is therefore crucial to capture any benefit of an increased appetite from shearing (Pownall et al. 1984).

In addition to feed availability and quality of feed, the weather and time of year are also likely to have an impact on the size of liveweight gain responses from shearing. Weather data for the current trial suggest that air temperatures experienced across all properties were relatively mild, with no treatment groups being exposed to extreme weather events. While temperatures were relatively mild, differences in lamb growth rates were still observed between shorn lambs and woolly fasted lambs. This is supported by other research, which has shown that despite ambient temperatures, lamb shearing can still have an effect on body heat loss (Elvidge & Coop 1974).

Despite a small positive effect being observed in average liveweight gains for lambs that were shorn compared to woolly fasted lambs, overall the difference was not large enough to compensate for the weight loss experienced during fasting. This meant that overall there were no financial benefit due to carcase weight or time to slaughter. The financial analysis did show however, at a wool price of $5.40 per kg clean, shorn lambs were worth between $1.07 and $2.07 more than lambs from the other three treatment groups. While a positive result,

one important factor to note is that the wool price in the 2013/14 season was well above the 10-year average. It would be of further interest to investigate the variation in wool price and the impact this has on the break-even point for lamb shearing.

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