THE EFFECT OF FEEDING EXPELLER EXTRACTED CANOLA MEAL ON THE QUANTITY AND QUALITY OF WOOL PRODUCED BY COMMERCIAL FLOCKS OF REPRODUCING EWES

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SUMMARY

Expeller extracted canola meal (150 g/head/day) was added to the diet of five commercial flocks of Merino ewes around their time of lambing in autumn with the expectation that it would increase the rate of growth of their wool at this time and hence increase their staple strength relative to that of flockmates hand-fed a normal commercial ration of oats or lupins. In two flocks on the same farm, intake of canola meal increased staple strength by around 5 N/ktex; in a further two flocks there was no effect of canola meal and in the last flock there was a decrease in staple strength of 4 N/ktex. Associated changes in the position of break, yield, clean fleece weight and mean fibre diameter were variable and inconsistent. In the two flocks where staple strength was increased the response was similar for ewes that conceived in either the first or second cycle of joining; ewes that received canola meal for either four weeks before and four weeks after lambing or six weeks before and two weeks after lambing.

Keywords: staple strength, reproducing ewes, supplementary feeding, canola meal, commercial flocks

INTRODUCTION

The growth rate of wool of ewes decreases dramatically during the month before and after parturition (Masters and Mata 1996). For ewes lambing in autumn and shorn in spring, this often results in a staple with an 'hour glass' profile, low staple strength (SS) and with a high proportion of mid staple breaks. However, Masters and Mata (1996) found that addition of a highly protected source of good quality protein to the diet (fishmeal or expeller extracted canola meal) increased the rate of wool growth by about 50% compared to control ewes fed white lupins during the three weeks before or the three weeks after parturition. This should increase SS and move the position of break closer to the tip of the staple. However, the timing of feeding relative to parturition may be critical as the treatments did not affect the rate of wool growth of ewes fed during the period from six to three weeks before parturition (D. G. Masters pers. comm.). Another positive response in the wool of ewes fed good quality protein around parturition was that their yield of clean wool for the year tended to increase, but these positive responses were to some extent balanced by a tendency for the mean fibre diameter to increase.

To test the robustness of this approach to manage the SS of lambing ewes under field conditions, five commercial flocks of autumn-lambing/spring-shorn Merino ewes on four farms were offered a pelleted ration rich in expeller extracted canola meal (CM) as a dietary supplement around lambing. The characteristics of their wool was compared to that of flockmates fed an approximately isocaloric supplement of either oats or white lupins.

MATERIALS AND METHODS

Supplements

In mediterranean south-western Australia it is normal practice for farmers to hand-feed Merino ewes lambing in autumn; ewes lamb on dry pasture residues at about the time of the opening rains of the new annual-pasture growing season. At lambing, flocks are typically offered around 500 g of oats and/or white lupins per head per day in a trail, two to three times per week (typical of the control flocks). In the experimental treatment (CM flocks), 260 g of the ewe's standard grain ration was replaced by 230 g of a pelleted feed containing 65% CM (Davidson Industries, Pinjarra), 24% white lupins, 10% oats, and 1% hydrated lime. These pellets were offered for 30 days before and 30 days after the first ewes were expected to start lambing.

Animals and experimental design

Approximately 60 days before the start of lambing, the ewes were scanned using real-time ultrasound to estimate the number and age of the foetuses (Johns 1993). Ewes that had conceived a single lamb on either the first or second cycle of joining (cycle 1, foetuses ^{3} 70 days of age; cycle 2, foetuses 70 to 50 days of age) were allocated at random to either the control or CM flock after stratification for cycle of conception.

Thirty days before lambing commenced the ewes were weighed then drafted into either the control or CM flock. Two paddocks with similar dry pasture residues and judged by the farmer to have a similar pasture composition and potential for growth in the green phase, were grazed by the two flocks during the 60 days of differential feeding. Feeding of CM stopped 30 days after lambing commenced and the flocks were mustered 10 to 14 days later, to mark the lambs. At lamb marking the ewes were weighed and from the appearance of their udders (± milk, ± clean teats, and ± teat plugs) were classified as lambed and reared, lambed and lost or did not lamb. After marking, the two flocks were recombined until shearing (Table 1). On the day of shearing the ewes that reared a lamb had a midside wool sample taken for measurement of washing yield, mean fibre diameter, staple length, SS and position of break (Gardner *et al.* 1993).. The weight of the greasy fleece of each of these ewes was also recorded at shearing.

The results were analysed using analysis of variance with the computer package SuperANOVA.

Table 1. The farm location, control grain fed, size, age, date of lambing and shearing for five commercial flocks of Merino ewes with opening rains around 15 May

Farm	Flock	Location	Control diet plus pasture	No. of ewes	Age (years)	Lambing (start date)	Shearing (month)
A	1	Bakers Hill	Lupins	160	3 to 6	27 April	September
B	2	York	Lupins	120	3	15 April	October
C	3	Wagin	Oats	225	3	21 May	July
D	4	Kendenup	Oats	183	3 to 8	1 May	September
D	5	Kendenup	Oats	322	3 to 8	1 May	September

Table 2. The number of ewes that conceived in either cycle 1 or cycle 2 of joining, that reared a lamb to weaning

Feeding treatment	Cycle of conception	Flock 1	Flock 2	Flock 3	Flock 4	Flock 5
Control	1	38	29	27	27	68
	2			22	12	22
Canola meal	1	39	30	30	29	72
	2			16	16	28

RESULTS

Staple strength and position of break

Feeding of CM increased the SS of the ewes in Flock 4 by 4.2 N/ktex and Flock 5 by 5.0 N/ktex (Table 3). By contrast, there was no difference in SS for Flocks 1 and 2 and the SS in Flock 3 decreased by 4 N/ktex. In Flocks 4 and 5, the increase in SS applied equally to the ewes that conceived in either the first or second cycles of joining, that is those ewes offered CM for four weeks before and four weeks after or six weeks before and two weeks after their mean date of lambing. In Flock 3, the negative effect on SS was confined to the ewes that conceived in the first cycle of joining.

There was a shift in the position of the break in the staple towards the tip in three of the flocks fed CM (range 3 to 7% units; flocks 1, 3 and 4, Table 4). In Flock 1 the shift in the position of break was not associated with a difference in SS. However, in Flock 3 the shift in the position of break was against the direction in the shift in SS and of similar magnitude for the ewes in both cycles of conception.

Other wool characteristics and effects associated with liveweight

In three of the flocks offered CM, a significant increase in yield translated into an increase in clean fleece weight (Table 5). In Flock 3, as for position of break, the increase in clean fleece weight was against the

Table 3. The staple strength (Newtons/kilotex) of ewes that conceived in either cycle 1 or cycle 2 of joining, that reared a lamb to weaning

Feeding treatment (S)	Cycle of conception (C)	Flock 1 mean	Flock 1 s.e.	Flock 2 mean	Flock 2 s.e.	Flock 3 mean	Flock 3 s.e.	Flock 4 mean	Flock 4 s.e.	Flock 5 mean	Flock 5 s.e.
Control	1	15.3	0.75	24.8	0.91	41.4	1.67	25.4	2.34	21.0	1.28
	2					40.5	1.73	30.8	3.76	24.2	2.71
Canola meal	1	16.8	1.12	24.3	1.79	35.1	1.42	29.5	2.33	26.0	1.28
	2					40.5	1.61	34.7‘	2.16	29.1	2.54
Significance						S - P=0.02		C - P=0.05 S - P=0.003		S - P=0.1 C - P=0.1	

Table 4. The position of break (% from the tip) of ewes that conceived in either cycle 1 or cycle 2 of joining, that reared a lamb to weaning

Feeding treatment (S)	Cycle of conception (C)	Flock 1 mean	Flock 1 s.e.	Flock 2 mean	Flock 2 s.e.	Flock 3 mean	Flock 3 s.e.	Flock 4 mean	Flock 4 s.e.	Flock 5 mean	Flock 5 s.e.
Control	1	68	1.0	50	0.8	76	1.0	77	0.8	80	0.6
	2					77	1.3	78	1.3	82	0.9
Canola meal	1	65	0.9	51	0.9	74	1.8	70	0.9	81	0.6
	2					73	2.0	72	1.8	82	1.0
Significance		S - P=0.02				S - P=0.05		S - P=0.001			

Table 5. The clean fleece weight (kg) of ewes that conceived in either cycle 1 or cycle 2 of joining, that reared a lamb to weaning

Feeding treatment (S)	Cycle of conception (C)	Flock 1 mean	Flock 1 s.e.	Flock 2 mean	Flock 2 s.e.	Flock 3 mean	Flock 3 s.e.	Flock 4 mean	Flock 4 s.e.	Flock 5 mean	Flock 5 s.e.
Control	1	2.8	0.08	3.4	0.09	4.2	1.13	3.3	0.08	3.8	0.08
	2					4.3	0.97	3.5	0.11	3.7	0.15
Canola meal	1	2.7	0.07	3.4	0.19	4.4	1.09	3.6	0.11	4.0	0.07
	2					4.6	2.03	3.6	0.13	4.1	0.13
Significance						**S** - P=0.08		**S** - P=0.02		**S** - P=0.07	

direction of the shift in SS. Only in Flock 5 was there an affect on mean fibre diameter. In this case there was a 0.6 micron difference between the two feed treatments (Control = 21.6 micron vs Canola = 22.2 micron; P = 0.03) and a 0.7 micron increase between the ewes conceiving in cycle 2 compared with cycle 1 of joining (cycle 1 = 21.7 micron vs cycle 2 = 22.5 micron; P = 0.03). Staple length ranged from 94 to 110 mm but was not affected by either feed treatment or cycle of conception.

Within Flocks 1, 2, 3 and 5, the liveweight of the ewes in the two feed treatments and cycles of conception were similar both before and after feeding. However, in Flock 4, the ewes in the CM flock were 4.8 kg heavier (P = 0.001) before differential feeding started and were still 2 kg heavier (P = 0.05) ten weeks later. In this flock, the diffence in liveweight at the beginning of CM feeding was the most significant influence on SS, but liveweight was not associated with significant differences in other wool characteristics.

DISCUSSION

The finding that feeding reproducing ewes 150 g/head/day of expeller extracted canola meal around lambing can incease the SS by about 5 N/ktex under commercial paddock conditions complements the finding of Masters and Mata (1998). In their case, the SS of ewes fed the same canola meal pellets for six weeks before and two weeks after lambing was increased by 7 N/ktex. However, in our experiment and that of Masters and Mata (1998), neither the increase in SS nor the other wool responses expected as corollaries to a marked increase in the rate of growth of wool around lambing appear to be consistently repeatable.

In Flock 4 the SS of ewes increased from the first cycle of lambing to the second cycle. This same trend was evident among the ewes of Flock 5. It is tempting to link this increase in SS to the rapid availability of green feed as the opening rains coincided very closely with the start of lambing in these flocks. However, it should be noted that the effect of CM was additional to this effect of cycle of conception. Further, Masters and Mata also reported a progressive increase in SS in successive cycles (approximately two week intervals) of lambing. However, in their case there would have been some green feed throughout the period of canola feeding.

In Flock 1, 15 ewes from each feed treatment were milked 24 days after lambing (Milton *et al.* 1996). That the milk yield of the ewes offered CM was 20% higher than those offered lupins along with increases in all milk components indicates, that feeding CM increased the the nutritional status of the ewes even though it had no apparent affect on wool characteristics other than position of break.

In Flocks 1 and 2, the position of break appeared to be further towards the tip than in the other flocks.

However, without dye-bands to indicate the start and finish of CM feeding it is not possible to make comparisons between flocks on different farms.

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