GROWTH OF WOOL IN LACTATING MERINO EWES

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SUMMARY

Growth rate of wool (g/d greasy) was measured before and after lambing in Merino ewes of three genotypes: fine wool (FW), strong wool (SW), and medium fine wool(MW) .

Reductions in wool growth rate during a 12-week lactation (% decrease from growth rate before lambing) were 24 and 31% respectively in the FW and SW which suckled single lambs. There was an increase of 5% in the equivalent period in ewes which had not been mated. In the MW ewes reductions in wool growth rate during lactation were 44, 37, 29 and 9% respectively in ewes which reared twins, reared one of twin-born lambs, reared a single, or lost a single lamb at birth.

Milk yield was inversely related to the reduction in wool growth during lactation; variation in milk yield accounted for 45 to 63% of the variation in reduction of wool growth rate in each of three genotypes. Variation in the growth rate of lambs gave a similar relationship in the MW ewes. Milk yield was closely related to change in body condition score, so that the use of change in body condition score as an additional variable in a multiple regression did not increase the proportion explained by the variation in reduction of wool growth rate due to milk yield.
(Keywords: ewes, lactation, wool growth).

INTRODUCTION

Wool growth is depressed when nutrient requirements for pregnancy and lactation exceed the ability of the ewe to increase feed intake sufficiently to meet these requirements (Annison et al. 1984). These authors managed to eliminate the depression of wool growth normally associated with pregnancy and lactation by feeding a ration rich in energy and protein to single- and twin-bearing Merino ewes. However most grazing ewes experience some degree of undernutrition during pregnancy and lactation. In ten experiments with Merino ewes summarised by Corbett (1979) the full cycle of reproduction over the whole year reduced greasy fleece weight by 9 to 18% in ewes rearing single lambs compared with non-breeding ewes, and by over 20% in one experiment with ewes rearing twins. The greatest adverse effect was measured in ewes in poor nutritional environments. The extent to which lactation contributed to the total reduction was variable (35 to 67%) and was probably dependent on the relative degrees of undernutrition in pregnancy and lactation.

In the course of experiments on the partitioning of energy in lactating Merino ewes of three genotypes we have measured rate of growth of wool before and after lambing in housed and grazing sheep. Different feeding regimes have been imposed, and milk yield and body condition score have been recorded regularly. This enabled us to examine the relationships between milk output and changing body condition and wool growth in these ewes.

MATERIALS AND METHODS

Animals

(i) Experiment 1 Ewes of two genotypes were housed during the last two weeks of pregnancy and the first six weeks of lactation, in two consecutive years. In the first year they were two years old and lambing for the first time. The genotypes

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were: small frame/fine wool (fibre diameter c. 19μ) (FW) and large frame/strong wool (c. 24μ) (SW) Merinos. Measurements were made on 19 animals in the first year and 15 in the second, plus four unmated control ewes of each genotype in the second year only.

(ii) Experiment 2 This was carried out in one lambing season with medium frame/ medium fine wool (c. 21μ) (MW) Merinos grazing a predominantly perennial ryegrass/ subterranean clover pasture. Measurements were made on 45 ewes all of which lambed and reared zero to two lambs.

Treatments

All ewes lambed in August/September and were shorn annually in December.

Housed ewes in the first year were offered rations of lupin and oat grain, and hay sufficient to cover the calculated requirements for 0.75 or 1.5 1 milk/d (ARC 1980). In the second year they had an allowance of 0.75 or 1.0 kg lupin grain and hay ad libitum. Intakes were recorded.

Grazing ewes in experiment 2 were drawn from treatment and control flocks. The former were offered supplement when required to maintain body condition scores above 2.3 until lambing. During lactation all ewes were under the same nutritional regime which was assessed as poor due to waterlogging of pasture.

Measurements

Dyebands were applied O-2 days post partum (Chapman and Wheeler 1963) and wool samples were removed at shearing which coincided with the end of lactation. Growth rates of greasy wool (g/d) were calculated for the period before lambing and during the lactation period of approximately 12 weeks.

Milk output was measured weekly during the first six weeks of lactation using oxytocin (McCance 1956). Condition scores (CS) (Russel et al. 1969)of ewes were recorded at lambing and weaning, and changes calculated. Rate of growth to weaning was recorded in lambs from the MW ewes. Fibre length (mm), minimum fibre strength (Newtons/Ktex) and position on the fibre of the point of minimum strength were measured in wool samples from MW ewes.

Calculations

The reduction in rate of growth of wool during lactation (% decrease from that measured before lambing) was related by regression analysis to mean milk yield during the first six weeks of lactation and to changes in body CS.

RESULTS AND DISCUSSION

Milk yields, changes in CS, rate of growth of greasy wool and per cent reduction in wool growth rate during lactation are shown in Tables 1 and 2 for experiments 1 and 2 respectively. Nutritional treatments have been combined in both these tables as no overall significant differences between nutritional levels were observed. Ewes in experiment 1 were in slightly better body condition (CS 3) at lambing than those in experiment 2 (CS 2.5).

The overall effect of reproduction on rate of wool growth during lactation can be measured in experiment 1 where there were unmated control ewes. This amounted to a decrease of 20 and 30% in wool growth in the FW and SW ewes respectively when compared with growth rates in unmated ewes.

Table 1 Milk yield, change in body condition score, rate of growth of wool and reduction in rate of growth of wool during lactation (percentage from previousrate of growth) in housed ewes of two genotypes (Experiment 1)

Genotype of ewe	Fine wool		Strong wool		Fine wool & Strong wool	
Physiological state	Lactating-suckling 1 lamb				Barren	
Group size (n)	17		17		8	
	mean ±	SD	mean ±	SD	mean ±	SD
Milk yield (l/d)†	1.6	0.27	1.6	0.26	-	-
Measurements in lactation‡						
Change in CS	-0.4	0.25	-0.4	0.56	+0.2	0.18
Rate of wool growth (g/d)	9.5	2.47	10.5	2.10	14.7	3.06
Red'n in wool growth rate (%)	24	12.5	31	11.8	+5	17.9

† Mean for first six weeks; ‡ Average length of lactation 12 weeks.

The cost of lactation in terms of wool growth in MW ewes amounted to decreases of 22, 30 and 32% in wool growth during lactation in ewes rearing a single lamb, one lamb from twins, and twins, respectively, compared with growth rates in ewes whose lambs died at birth.

Table 2 Milk yield, change in body condition score, rate of growth of wool and reduction in rate of growth of wool during lactation (percentage from previous rate of growth) and other fleece characteristics in medium-frame Merinos grazing at pasture (Experiment 2)

No. of lambs born/suckled	2/2		2/1		1/1		1/0	
Group size (n)	6		5		23		11	
	mean ±	SD	mean ±	SD	mean ±	SD	mean ±	SD
Milk yield (l/d)†	1.9	0.31	1.6	0.43	1.3	0.22		
Measurements in lactation‡								
Total lamb growth (g/d)	220	27	140	22	150	24		
Change in CS	-0.4	0.49	-0.3	0.41	-0.1	0.35	+0.6	0.31
Wool growth rate (g/d)	7.2	1.20	7.4	0.97	8.3	1.19	10.6	1.84
Red'n in wool growth (%)	44	7.1	37	5.3	29	7.9	9.0	11.3
Additional wool measurements								
Min. fibre strength (N/Ktex)	35	13.2	37	11.0	38	13.2	36	11.7
Frequency < 30 N/Ktex	1/6		2/5		8/23		3/11	
Min. fibre strength occur:								
at or after lambing (%)	50		80		35		45	
around autumn break (%)	17		20		48		45	
Fibre length (mm)	86	6.8	78	7.2	88	7.1	86	12.0
Greasy fleece wt. (kg)	4.1	0.46	3.8	0.40	3.9	0.53	4.1	0.5

† Mean for first six weeks; ‡ Average length of lactation 12 weeks.

In sheep with fibre strength of less than 30 N/Ktex (AWTA definition of sound) a disproportionate number had this point of minimum strength occur around lambing or in early lactation (Table 2). In MW ewes suckling single lambs at pasture, 6/11 of the control ewes had a minimum fibre strength less than 30 N/Ktex while only 2/13 of the treatment ewes were in this category. Fibre length and annual wool production appeared to be little affected by lactation (Table 2).

The equation for all ewes in Table 3 indicates a decline of 16.5% in rate of wool growth during lactation for each litre of mean daily milk yield, with 49% of the variation related to variation in milk yield. Any variation in wool growth related to changes in CS could be accounted for by variation in milk yield, as the correlation of milk yield with change in body CS was -0.62.

Table 3 Effects of milk yield and change of body condition-of lactating ewes on the reduction (%) in rate of growth of wool after lambing compared with the rate prior to lambing (y)

Independent variables		Genotype of ewe	Regression parameters				
			($y = b X + a$)				
X			a	b		r^2	RSD
Milk yield (l/d)		FW	1.8	15.4		0.45**	12.1
		SW	-5.4	21.6		0.53**	14.4
		MW	8.9	16.4		0.63**	9.1
		All	4.8	16.5		0.49**	11.9
Change in CS		FW	14.4	-20.8		0.25*	14.1
		SW	12.2	-25.0		0.32**	17.3
		MW	25.8	-18.4		0.41**	11.5
		All	21.5	-15.1		0.22**	14.7
X1	X2		($y = bX1 + cX2 + a$)				
Milk yield (l/d)	Change in CS		a	b	c	r^2	
		FW	1.9	15.2	-0.6	0.45**	12.4
		SW	-5.0	17.1	-11.3	0.58**	14.0
		MW	9.3	16.0	-0.7	0.63**	9.2
		All	5.4	15.7	-1.7	0.49**	12.0

FW = fine wool; SW = strong wool; MW = medium fine wool. * P<0.05; **P<0.01

It is apparent that the increased demands due to lactation produce a reduction in wool growth in these experiments that come within the general range reported by Corbett (1979). However the economic penalty as a result of these reductions may not be so severe if it is not associated with sudden decreases in the diameter of wool fibres and consequently tensile strength.

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REFERENCES

ANNISON, E.F., GOODEN, J.M., HOUGH, G.M. and McDOWELL (1984). In "Reproduction in Sheep" editors D.R. Lindsay and D.T. Pearce. (Aust. Acad. Sci.: Canberra).

A.R.C. (1980). In "The nutrient requirement of ruminant livestock". (Comm. Agric. Bur.: Slough, U.K.).

CHAPMAN, R.E. and WHEELER, J.L. (1963). Aust. J. Sci. 26: 53.

CORBETT, J.L. (1979). In "Physiological and Environmental Limitations to Wool Growth" editors J.L. Black and P.J. Reis. (Univ. New England Publ. Unit: Armidale).

McCANCE, J. (1956). Aust. J. Agric. Res. 10: 839.

RUSSEL, A.J.F., DONEY, J.M. and GUNN, R.G.(1969). J. Agric. Sci. 72: 451.