

SEASONAL VARIATION IN FIBRE DIAMETER AND LENGTH GROWTH RATE IN HIGH AND LOW STAPLE STRENGTH MERINO WETHERS

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Merino sheep grazing Mediterranean pastures show significant fluctuations in fibre diameter (FD) and wool production. Purser (1981) suggested that the ratio of fibre length growth/day (FL) to FD also varied in this environment although direct measurements of FL were not made in his study. The aim of this study was to determine whether selection of phenotypes for staple strength (SS) influenced FL and FD between the groups and seasons.

The experiment consisted of 40 adult Merino wethers of 2 phenotypes selected for low (24.6 ± 2.3 N/ktex) and high (37.8 ± 2.8 N/ktex) SS based on the 2 previous spring shearings of the sheep in the base flock of Agriculture WA, Katanning. The sheep were run at a conservative stocking rate on annual pasture at the CSIRO Yalanbee Research Station (Latitude $31^{\circ} 45' S$, Longitude $116^{\circ} 27' E$) and shorn annually in September. The sheep were weighed and injected intra-dermally with ^{35}S -cysteine to measure FD and FL at fortnightly intervals for 12 months. Fortnightly FD and FL measurements were averaged within season (Table 1). Mid-side samples were taken at shearing to determine clean fleece weight (CFW), SS, FD at the point of break (FD_{POB}) and fibre shedding at the POB.

Table 1. Mean fibre diameter (FD, μm), fibre length (FL, $\mu m/day$), FL/FD and FL/FD² for grazing Merino wethers selected for low or high staple strength (SS) for Spring (Sp), Summer (Sum), Autumn (Aut) and Winter (Wint)

	Low SS				High SS				Sign. effect ^A	
	Sp	Sum	Aut	Wint	Sp	Sum	Aut	Wint	L	S
FD	28.5	22.6	20.6	27.1	27.4	21.4	20.8	26.0	**	***
FL	464	409	404	454	399	345	347	399	***	***
FL/FD	16.5	18.3	19.9	17.2	14.7	16.3	16.9	15.5	***	***
FL/FD ²	0.59	0.83	0.99	0.66	0.54	0.78	0.83	0.61	***	***

^ASignificant at **P<0.01, ***P<0.001 and L (SS phenotype) x S (season) interactions were not significant.

Non significant differences between the 2 groups of sheep were 4.9 and 4.5 kg, 25.6 and 32.8 N/ktex, 15.1 and 16.0 μm , and 3.0 and 3.3% for CFW, SS, FD_{POB} and fibre shedding for the low and high SS phenotypes respectively. The average FD and FL for the low SS phenotype was significantly higher than that for the high SS phenotype sheep. The low SS phenotype sheep had a higher calculated volume of fibre production per day than the high SS group, which was greater than the percentage difference in CFW between the groups, suggesting a lower wool follicle population in the low SS sheep.

The low SS phenotype had a significantly higher FL/FD and FL/FD² ratio than the high SS sheep and both groups had significant seasonal variations in FL/FD ratios with the maximum and minimum values in autumn and spring respectively, the inverse of feed available. The seasonal fluctuation in FL/FD ratio was similar to that for Romney sheep (Woods and Orwin 1988), but with maximum and minimum FL/FD ratios occurring in summer and winter respectively, the inverse of the photoperiod cycle. Thus Merino sheep grazing in Mediterranean environments cannot be assumed to have a constant FL/FD ratio.

This work was partially funded by the International Wool Secretariat.

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