

## Consequences of the Phenotypic Classification of Merino Sheep on Visual Fleece Traits for the Wool Follicle Population and Fibre Growth

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The increased demand for finer fleeces without compromising fleece weights or staple strength is an important challenge for the Merino sheep breeder. These characteristics are found in sheep (referred to as SRS® Merinos) with high densities and lengths of fibres of uniform size that also have a distinctive fleece structure and skin type (Watts, unpublished data). This specific arrangement and dimensions of fleece fibres is thought to be regulated genetically by the distribution pattern of pre-papilla cells in the foetal lamb skin (Moore et al, 1998).

In a study to investigate these possible relationships, Merino ewes 3.5 years of age were selected from a larger flock of 600 animals of a medium woolled Merino blood line which were the spring lamb drop from October 1998 maintained at pasture at Boyanga stud, Mungindi, NSW. These were visually selected in March 2002 as follows. 'Towards SRS® (R)' sheep were plain bodied with a thin and loose skin growing long and thin staples of soft and lustrous wool with high crimp amplitude and low crimp frequency and were expected to have high levels of fibre density and length. 'Tight' sheep had wrinkly skins with thick and stiff staples giving the impression of high 'fleece density' but were expected to not measure as such (c/w 'towards SRS®' sheep). 'Flat' skin sheep were plain bodied with long staples of low crimp amplitude and low lustre and were expected to have low levels of fibre density.

(Peter, didn't we take paired skin samples and deicate one to horizontal sectioning and one to vertical sectioning ?\_

Samples were fixed (Serras fixative) halved then embedded in paraffin: one half from each animal was orientated for cutting longitudinal sections (at the level of the dermal papilla) while the other half was used for transverse sections (10µm; 30 sections per orientation per animal). Sections were stained with haematoxylin, eosin and picric acid.

The diameters of primary (P) (n=50 fibres per animal) and secondary (S) follicles (n=100 fibres per animal), S:P ratio, follicle density (follicles/mm<sup>2</sup>) and dermal papilla (DP) cell number and size were assessed from these sections and fibre lengths (n = 100 fibres per animal) were measured on the mid-side wool samples for each animal at the time of sampling. The number of animals used for each treatment group was dependent on the quality of the histological sections. If the sections were not oriented correctly for accurate cell counts, the sheep was not used in the analysis. Data were analysed using a REML procedure in GenStat.

**Table 1. The effect of selection for the SRS® skin phenotype on the wool follicle population, dermal papilla cell population and fibre growth in Merino sheep (Mean±SEM)**

(Peter, shouldn't we express the diameters and SEMs to the first decimal place ?)

Phenotype	n	'Towards SRS®	n	Tight	n	Flat
P Follicle diameter (µm)	7	17.17±0.53 <sup>a</sup>	8	20.25±0.59 <sup>b</sup>	7	21.20±0.66 <sup>b</sup>
S Follicle diameter (µm)	7	16.48±0.51 <sup>a</sup>	8	17.43±0.51 <sup>a</sup>	7	17.06±0.53 <sup>a</sup>
S:P ratio	7	31.98±1.50 <sup>a</sup>	8	22.35±0.98 <sup>b</sup>	7	19.24±0.90 <sup>c</sup>
Foll density (no/mm <sup>2</sup> )	7	88.77±5.86 <sup>a</sup>	8	75.41±4.68 <sup>a</sup>	7	68.72±4.54 <sup>b</sup>
Fibre length (mm)	7	148.2±4.3 <sup>a</sup>	8	126.6±4.1 <sup>b</sup>	7	130.8±4.3 <sup>b</sup>
DP cell number	14	12.70±0.53 <sup>a</sup>	9	14.42±0.75 <sup>b</sup>	8	15.13±0.73 <sup>b</sup>
DP cell diameter (µm)	14	6.47±0.07 <sup>a</sup>	9	6.31±0.10 <sup>a</sup>	8	6.22±0.09 <sup>b</sup>

Values with different superscripts are significantly different (p<0.05)