



CRC

for

Premium

Quality

Wool

Associations Between Follicles and Wool Growth

Produced for the CRC for Premium Quality Wool undergraduate program by;
Dr. Janelle Hocking Edwards, The University of Western Australia.



Effect of follicle population and kinetics on fleece characteristics

Fleece characters



- Follicle population

- number
- density
- types of follicles
- % shutdown
- S/P ratio

- Follicle kinetics

- cell turnover
- bulb size
- dermal papilla size
- efficiency
- cortical cell types
- cell size

CRC

for

Premium

Quality

Wool



Differences in skin and follicle characteristics between finewool and strongwool Merinos

	<i>Finewool</i>	<i>Strongwool</i>
Follicle density	52.3	37.2*
Bulb volume	8.6	19.2*
Bulb cell volume	535	830 [#]
Germinative volume	44	70 ^{*#}
Cell division rate	18.3	24.0 ^{*#}

* Significantly different

Correlated with wool production

Janelle Hocking Edwards
Source: Hocking Edwards & Hynd (1992)

CRC

for

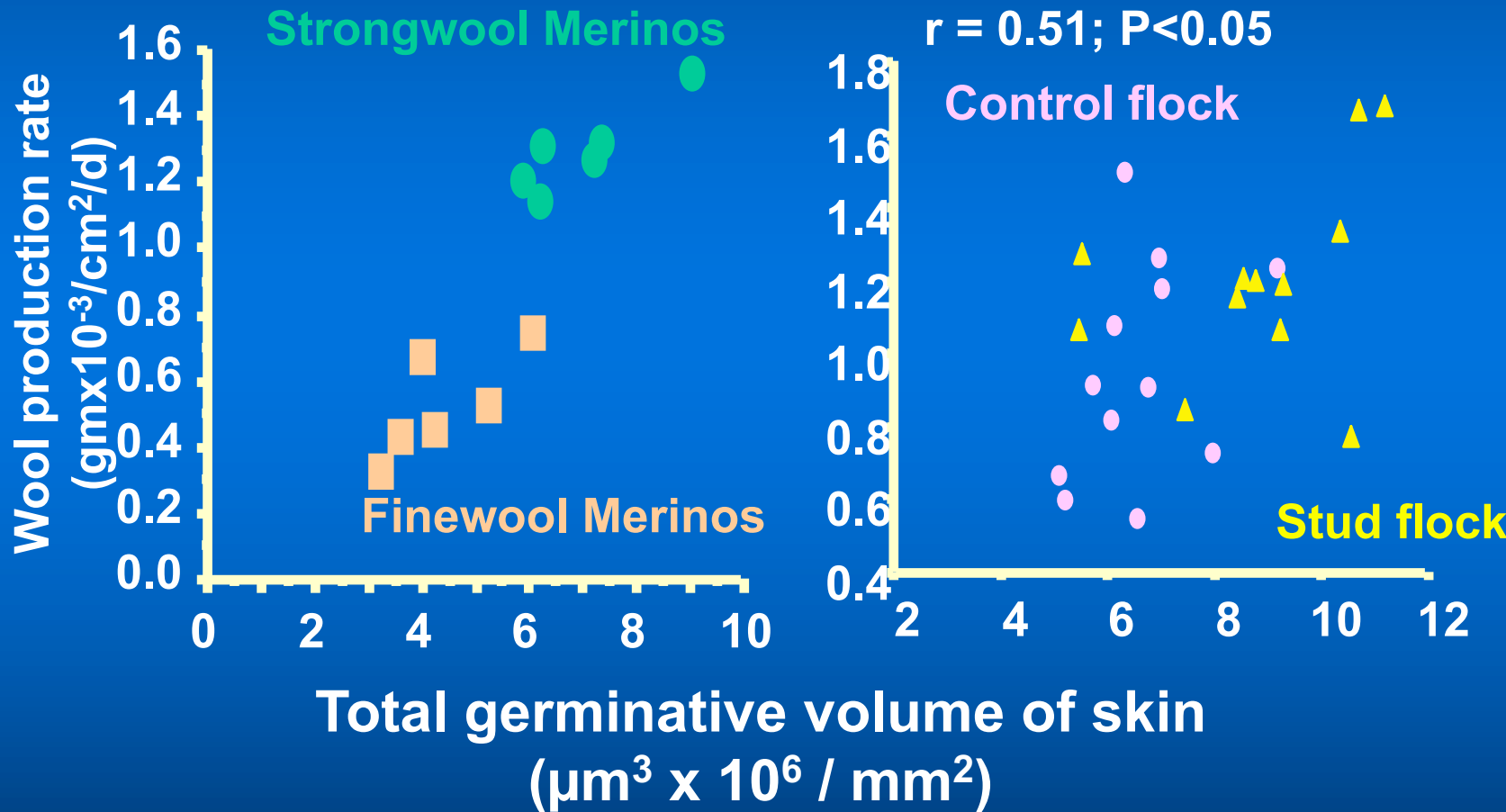
Premium

Quality

Wool



Relationship between wool production and the total volume of germinative tissue in the skin

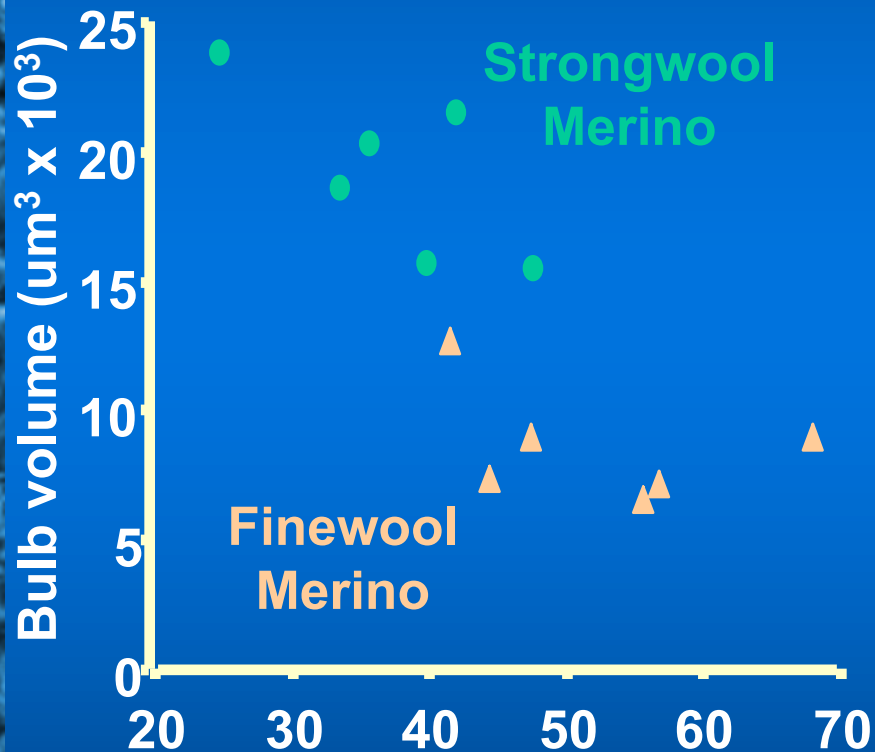


Source: Hocking Edwards, J.E. (1993)

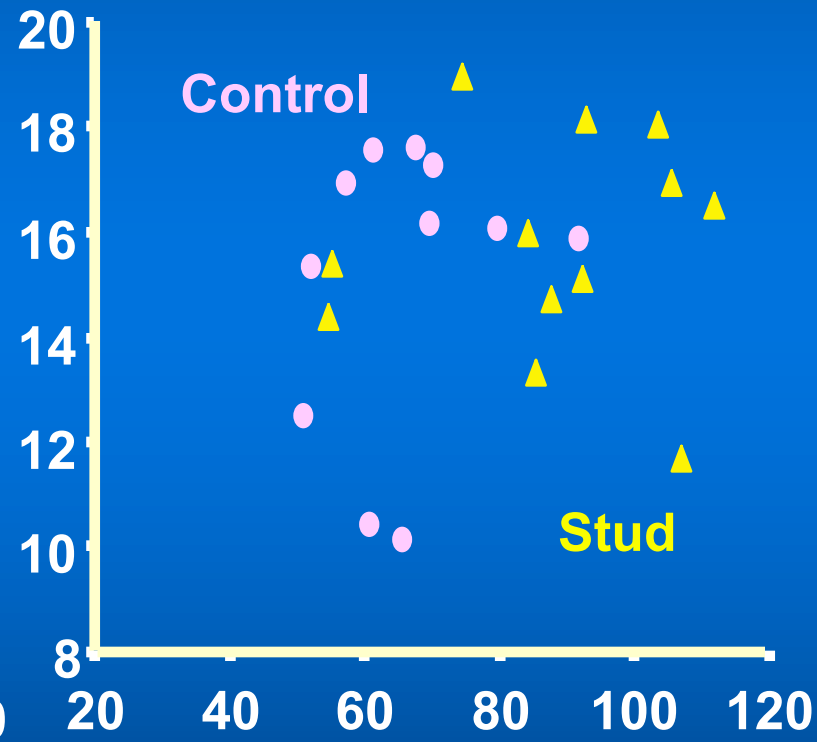


Relationship between bulb volume and density

$r = -0.79; P < 0.01$



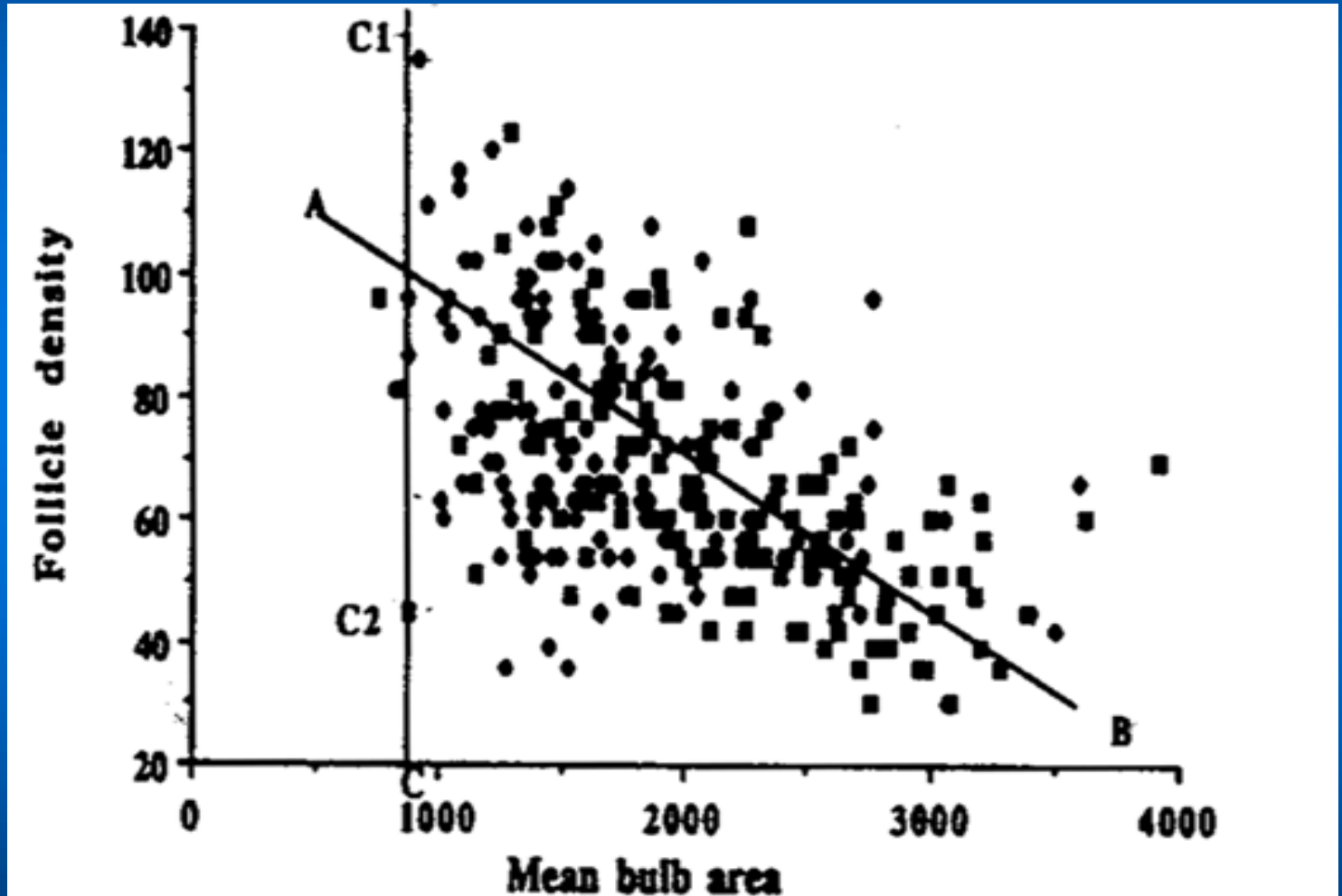
$r = -0.46; P < 0.05$



CRC
for
Premium
Quality
Wool



The relationship between bulb volume and follicle density varies widely between sheep.



CRC

for

Premium

Quality

Wool



Difference in cortical cell characteristics between finewool and strongwool merinos

	<i>Finewool</i>	<i>Strongwool</i>
Cortical cell volume (μm)	896	1061 ^{*#}
width (μm)	5.8	6.5 [*]
length (μm)	88	93 [#]
Cortical cell production (h^{-1})	3.4	10.2 [*]
Efficiency (%)	20	35

* Significantly different

Correlated with wool production

Janelle Hocking Edwards
Source: Hocking Edwards & Hynd (1992)

CRC

for

Premium

Quality

Wool



Fleece characteristics of finewool sheep with high CFW or low CFW

	<i>High CFW</i>	<i>Low CFW</i>	<i>P-value</i>
Mean fibre diameter (μm)	16.7	16.9	$P > 0.05$
Clean fleece weight (kg)	2.9	2.2	$P < 0.00001$
Staple length (mm)	91.6	82.9	$P < 0.05$

- MFD not different
- high CFW EBV group 32% greater CFW
- high CFW EBV group 10% longer staples
- no bloodline effects



Effects of follicle populations of finewool sheep on CFW

Skin biopsy results

	<i>High CFW</i>	<i>Low CFW</i>	<i>P-value</i>
Follicle density (mm⁻²)	91.9	74.6	P<0.01
S/P ratio	35.0	27.6	P<0.01
Dp:Ds	1.13	0.95	P<0.05
Production ratio	0.31	0.32	P>0.05

Skin impression results

	<i>High CFW</i>	<i>Low CFW</i>	<i>P-value</i>
Density of fibres (mm⁻²)	111.4	87.1	P<0.05
Epidermal follicles (mm⁻²)	38.0	38.6	P>0.05
Branched follicles (%)	56.4	45.9	P<0.01
Follicles/bundle	4.29	3.84	P>0.05
Follicles/epidermal follicle	2.89	2.33	P<0.05
Fraction of bare skin	0.52	0.56	P>0.06

CRC

for

Premium

Quality

Wool

Janelle Hocking Edwards

Source: Nancarrow et al. (1998)



Effect of skin and follicle characters on CFW of finewool sheep

- Many skin and follicle characters have small effects on CFW

CRC

for

Premium

Quality

Wool