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for
Premium
Quality
Wool

An Introduction to the Genetics of Merino Production Traits

Produced for the CRC for Premium Quality Wool undergraduate program by;
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Heritabilities: wool-related traits

	h^2	range
Body weight	0.52	0.09 - 0.65
Fibre diameter	0.48	0.25 - 0.75
Staple length	0.48	0.37 - 0.65
Yield	0.47	0.23 - 0.75
Greasy fleece weight	0.41	0.30 - 0.54
Fold score	0.39	0.28 - 0.50
Clean fleece weight	0.38	0.30 - 0.54
Follicle density	0.31	0.20 - 0.62
S/P ratio	0.30	0.25 - 0.45

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Genetic correlations with clean fleece weight

	r_A	<i>range</i>
Greasy fleece weight	0.83	0.77 - 0.88
Staple length	0.53	0.37 - 0.89
Yield	0.52	0.41 - 0.69
Body weight	0.27	0.13 - 0.37
S/P ratio	0.25	0.06 - 0.37
Fibre diameter	0.15	0.05 - 0.31
Follicle density	0.14	-0.02 - 0.30
Fold score	-0.05	-0.38 - 0.14

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Source: Davis and McGuirk (1987)



Response to selection: Clean Fleece Weight (CFW)

Expt	Selection criteria	% gain in CFW per year
1	High CFW	1.18
2	High CFW	1.58
3	High CFW, with checks on crimp frequency, skin wrinkle and face cover	1.02
4	High CFW, with checks on fibre diameter and skin wrinkle	1.05
5	High CFW, with checks on skin wrinkle and crimp frequency (or fibre diameter)	0.85

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Source: Davis and McGuirk (1987)



Correlated responses to selection

- greater response in component traits of follicle density and staple length
- negligible change in “restricted” traits, including fibre diameter
- improved feed conversion efficiency
- increased GFW and yield
- reduced wax % and suint %
- increased follicle depth, S/P and reduced follicle curvature

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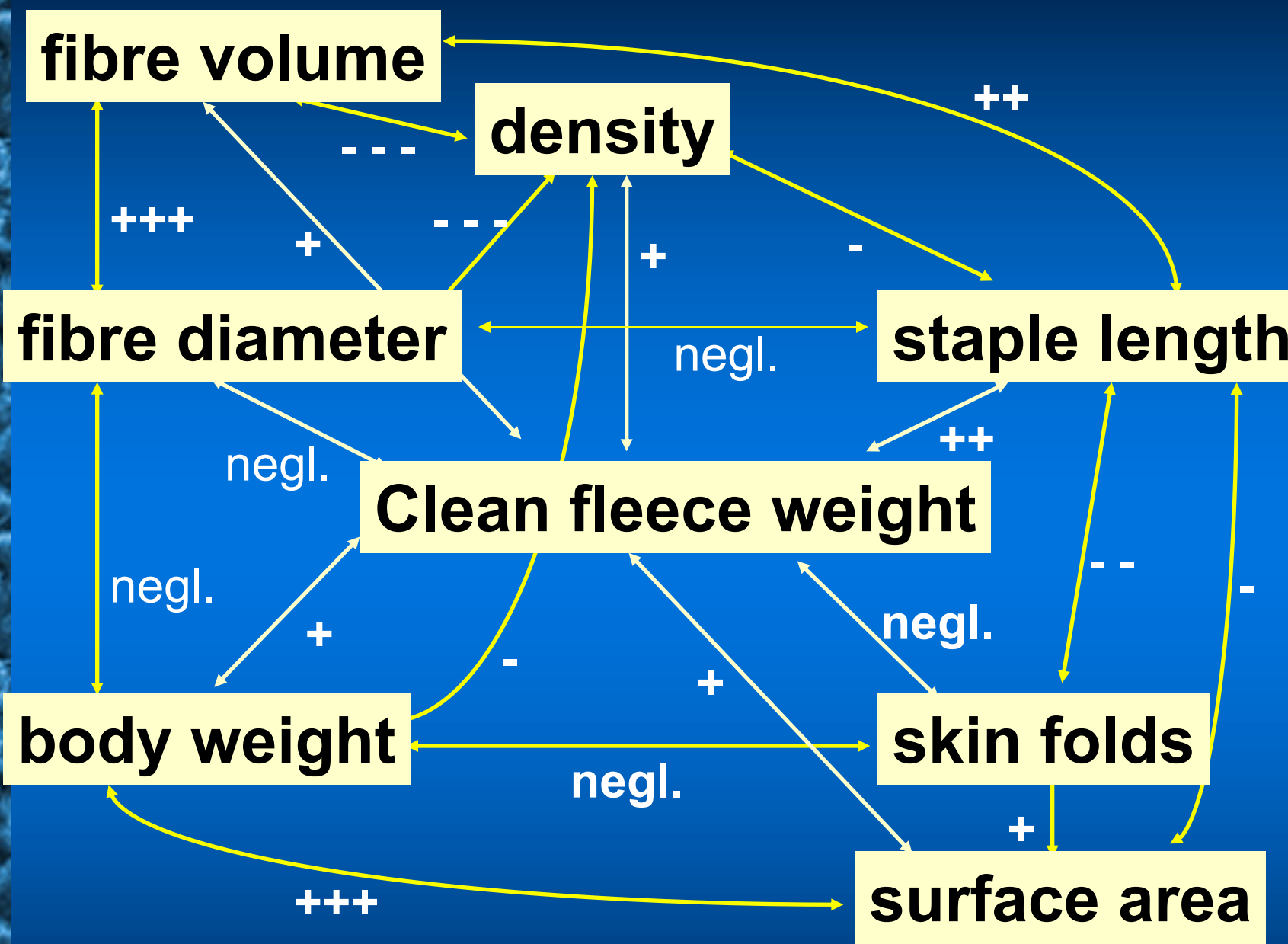
Response to single-trait selection for component traits:

	<i>% gain per year</i>	
<i>Selection for increasing:</i>	<i>Direct</i>	<i>CFW</i>
Yield	1.11	0.38
Fibre Density	3.19	- 0.59
Staple Length	0.75	0.04
Diameter	1.04	- 0.99
CW per area	2.37	- 0.46
Hogget Weight	1.47	- 0.37
Skin Folds	2.04	- 0.21

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Reproductive Traits

	Lambs born per ewe joined	Lambs weaned per ewe joined
Heritability	0 – 0.4	0 – 0.2
Genetic correlation with:		
Fleece weight	0.1	0.1
Body weight	0.2	0.2
Face cover	-0.1	-0.3
Skin folds	-0.2	-0.3

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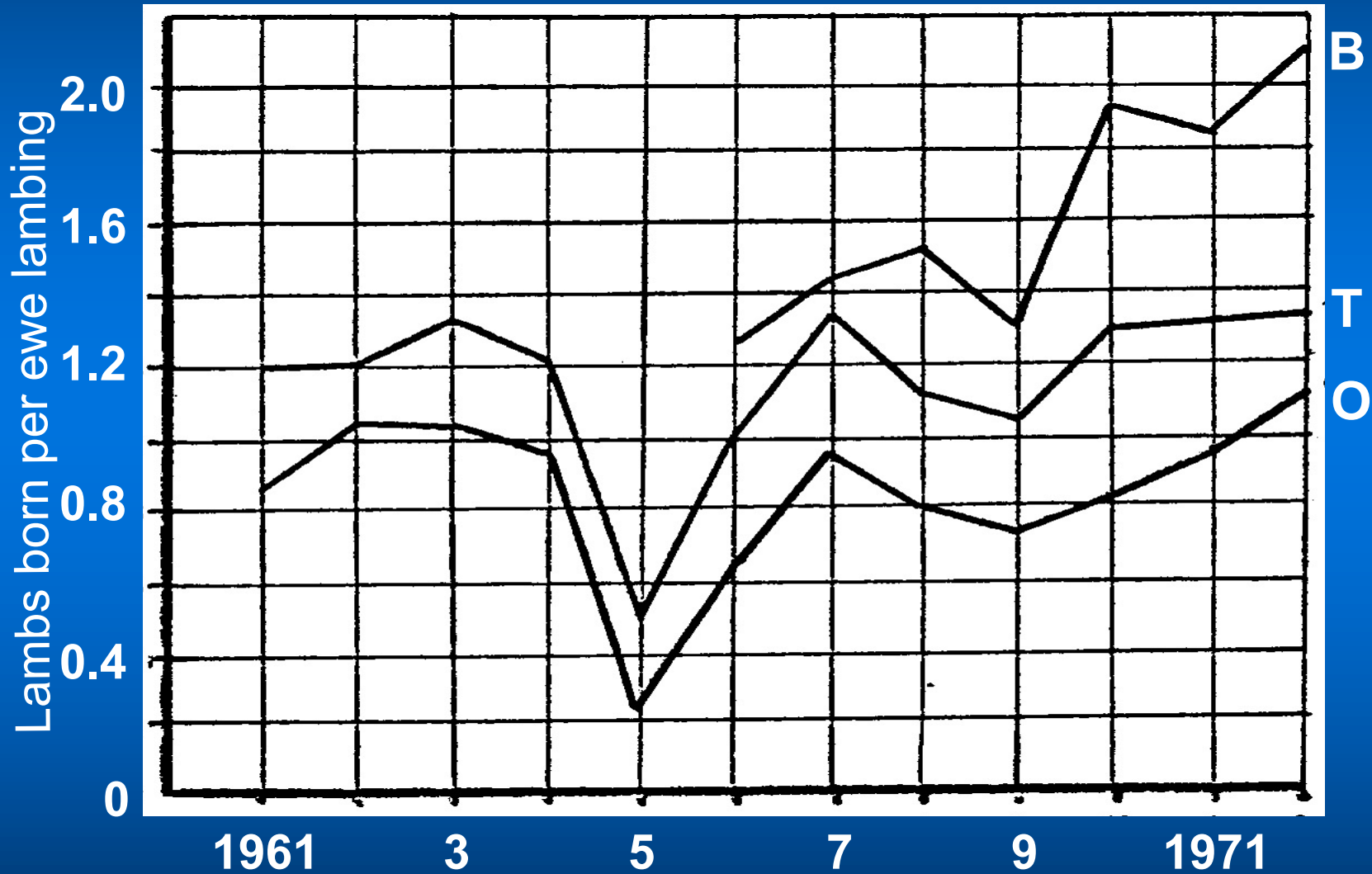
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Source: Turner (1977)



Response to selection for incidence of multiple births



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Source: Turner (1977)



Skin wrinkles



Highly wrinkled Merinos:

- higher greasy fleece weights but lower yields
- shorter staples
- more susceptible to flystrike
- longer to shear
- reduced fertility

compared to plainer sheep

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