RELATIVE IMPORTANCE OF COMPONENTS IN SELECTION FOR LAMB PRODUCTION

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Lamb production, defined as total weight of lamb weaned per ewe joined is dependent on various components, namely fertility, litter size, neonatal and postnatal lamb survival and lamb growth. Selection recommendations for increasing reproduction and lamb production have emphasised specific component traits, such as litter size, in preference to composite traits or an index. This is because heritability estimates have tended to be higher for component traits and because of simplicity. This paper examines the relative importance of the various components.

Data were analysed for 4219 ewes which were the progeny of 412 known sires, with 10,959 joining records over four years at Clay Center, U.S.A. The ewes were Finnsheep (F), Rambouillet (R), Dorset (D), Suffolk (S), Targhee (T) and two composite lines (½F¼R¼D and ½F¼S¼T), with most joined 8-monthly to lamb in January, May and September. The mean adjusted performance for individual ewes for each trait over all records was used to estimate phenotypic and genetic correlations and heritability. The independent contribution of each component trait to phenotypic and genetic variance of weight and number of lambs weaned per ewe joined was determined from the standard partial regressions for the composite trait (weight or number of lambs per ewe joined) on each of the components. Weight and number of lambs weaned may be regarded as natural phenotypic indices. Relative weightings of the components in these indices are given by the standard partial regressions of net genetic merit for index on the phenotype for each component.

TABLE 1: Standard Partial Regressions and Heritability Estimates (h^2)

Component Traits	Composite on Component		h^2	Index Weightings	
	Wt. Weaned	No. Weaned	(± s.e.)	Wt. Weaned	No. Weaned
Fertility	.61	.61	.09(.05)	.049	.049
Litter size	.38	.29	.16(.06)	.047	.029
Neonatal survival	.33	.33	.10(.06)	.041	.041
Postnatal survival	.60	.62	.15(.06)	.132	.137
Lamb growth	.27	-	.13(.07)	.049	-

Fertility and postnatal survival had a greater contribution to phenotypic variance in both weight and number of lambs weaned per ewe joined than the other component traits (Table 1). Standard partial regressions were generally larger and more variable using genetic than phenotypic correlations, however, the relative contributions of the components were similar. The index weightings (Table 1) show the importance of all components and in particular, postnatal lamb survival.

Most ewes were joined under an accelerated lambing regimen at suboptimal breeding seasons and lamb survival throughout the study was low. Under these environmental conditions, variance for fertility and lamb survival can be expressed. These results emphasise the need to take into account all components of lamb production and the importance of monitoring environmental changes that may affect the relative importance of components.