INSULIN - REGULATION OF GROWTH POTENTIAL?

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One of the major challenges in animal science is *to* identify physiological parameters that correlate highly with mature live weight at an early age. The use of these parameters as selection criteria is likely to increase the accuracy of modern breeding technology such as BLUP and thus increase the efficiency of genetic improvement in livestock industries. At Trangie, N.S.W., Merino flocks have been selected for 10 generations for (W+) and against (W-) weaning weight and as a result differ in mature live weight by 30%.

The aim of the present study was to identify differences in metabolic hormone status between the two genotypes at different ages with a view to establishing endocrine criteria for possible use as selection markers for growth.

Groups of W+ and W- wethers (n=10) *were* weaned at 16 weeks and offered a lucerne:oats (60:40) pelletted ration *ad libitum.* At 6 months of age each group was split into 5 groups of 2, which were offered calculated energy intakes of either 0.4, 0.8, 1.2, 1.6 or 2.0 times maintenance of the same ration. After a 10 day equilibration period, serial blood samples were collected at 20 min. intervals for 5 h via jugular catheters. The animals were reallocated to another dietary energy level and the protocol repeated 10 days later. All animals were returned to *ad libitum* intakes and the same procedure repeated at 12 months of age. Plasma hormone levels were measured by RIA.

Plasma IGF1 and GH levels did not differ with change in energy intake in either genotype at either age, but there were significant differences between genotypes in mean plasma IGF1 levels. Plasma insulin levels also differed significantly ($P<0.05$) between genotypes at both ages. In addition a significant interaction ($P<0.01$) existed between plasma insulin and intake in each genotype by age treatment group. The slope of the relationship between insulin and level of intake differed significantly ($P<0.05$) between genotypes at 12 months but not at 6 months of age.

Table 1 Live weight and hormone concentrations

Age	6 months		12 months	
Genotype	W+	W-	W+	W-
Live weight (kg)	26.0 ± 1.5	17.7 ± 1.3 *	40.2 ± 1.6	28.4 ± 1.9*
GH(ug/l)	3.4 ± 1.8	3.6 ± 1.8	1.6 ± 1.2	1.5 ± 1.2
IGF1(ug/l)	143 ± 9	117 ± 8**	205 ± 9	173 ± 6 **
Insulin (ug/l)				
Intake 0.4	0.4 ± 0.1	0.4 ± 0.1	1.1 ± 0.2	0.6 ± 0.1
(x maint.) 0.8	2.2 ± 0.6	0.7 ± 0.1	1.7 ± 0.1	2.5 ± 0.8
1.2	2.1 ± 0.2	1.8 ± 0.6	4.9 ± 1.7	1.6 ± 0.1
1.6	3.0 ± 1.0	2.1 ± 0.2	3.2 ± 0.7	3.2 ± 0.9
2.0	2.8 ± 0.7	2.0 ± 0.4	7.7 ± 4.1	2.2 ± 0.4

(means ± s.e.m., * $P<0.05$, ** $P<0.01$)

Speck *et al.* (1989) showed a positive relationship between protein gain and insulin but not IGF1 in W+ but not W- sheep. The results suggest that insulin plays an important role in the regulation of the growth process and thus appears to be a useful metabolic hormone for the identification of genetically superior lambs. The role of IGF1 warrants further investigation.

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