

SELECTION FOR YEARLING WEIGHT IN CATTLE - THE ROLE OF METABOLIC HORMONES

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Despite considerable effort, little progress has been made in the identification of physiological parameters which predict accurately the growth potential of bovine genotypes. The establishment at Trangie of herds of Angus cattle which have been selected for high (W+) or low (W-) yearling weight since 1974 has resulted in a 35% difference in mature live weight. These animals provide a useful resource by which to identify such factors. In the present study we have sought to establish if circulating concentrations of growth hormone (GH), insulin (Ins) and insulin like growth factor 1 (IGF1) are likely to be predictors of growth potential irrespective of nutrition status.

Groups of W+ and W- steers were offered a standard pelleted feed lot ration and straw for roughage, providing 9.9 MJ metabolizable energy (ME) per kg dry matter, *ad libitum* for 3 months prior to the commencement of the experiment. Two steers of each genotype were offered either 0.4, 0.8, 1.2, 1.6 or 2.0 times a calculated maintenance energy intake. The animals were allowed 14 days to equilibrate to the dietary levels before the insertion of indwelling jugular catheters. The following day, serial blood samples were collected at 20 min intervals for 4 h. The animals were then reallocated to another dietary energy level to increase the number of observations (n=4) at each energy level. Following a further 14 day equilibration period, the steers were subjected to the same bleeding regime. Plasma GH, Ins and IGF1 were measured by a double antibody radioimmunoassay, were analysed statistically by analysis of variance and their relationship with energy intake by regression analysis.

Table 1 Mean concentrations (\pm s.e.m.) of hormone in plasma (ug/l)

Hormone	Genotype	Energy level (x maintenance)					
		0.4	0.8	1.2	1.6	2.0	
GH	W+	10.1 \pm 7.2	5.2 \pm 5.0	10.1 \pm 3.1	5.9 \pm 1.2	5.3 \pm 3.1	
	W-	9.9 \pm 2.2	10.7 \pm 6.9	7.5 \pm 3.5	7.3 \pm 2.5	5.9 \pm 1.6	
Ins	W+	10.4 \pm 2.3	12.4 \pm 4.5	12.4 \pm 2.3	14.0 \pm 4.5	17.8 \pm 2.3	
	W-	13.3 \pm 6.8	11.0 \pm 4.5	12.4 \pm 9.0	18.9 \pm 4.5	21.4 \pm 2.3	
IGF1	W+	98 \pm 15	113 \pm 17	97 \pm 12	127 \pm 32	117 \pm 5	
	W-	33 \pm 15	115 \pm 30	144 \pm 10	166 \pm 15	120 \pm 21	

The mean live weight of W+ animals prior to the experiment was significantly greater than that of the W- group (283 \pm 5.4 and 208 \pm 5.3 kg for the W+ and W- groups respectively; $P < 0.05$). There was no significant difference in circulating concentrations of either GH, Ins or IGF1 between genotypes when analysed over all energy concentrations. However, plasma insulin levels were positively correlated ($r=0.82$) and GH concentrations negatively correlated ($r=-0.69$) with level of dietary energy intake in both genotypes. By contrast no relationship was observed with IGF1 concentrations.

We conclude that the metabolic endocrine parameters are of little use as predictors of bovine growth potential. We suggest that the differences in the growth potential may be a function of target tissue sensitivity to endocrine stimuli rather than the level of circulating hormones to which the tissue is exposed.

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