CAN IGF1 BE USED AS AN INDIRECT SELECTION CRITERION FOR BEEF CATTLE?

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Concentration of insulin-like growth factor-l in blood (IGFl) is moderately to highly heritable in cattle and phenotypically associated with a range of important production traits (Herd *et al.* 1995). IGFl is lower in cattle aged a few days old than at 9 and 11 months (Herd *et al.* 1995; Herd 1992). If IGFl was to be considered as an indicator trait in young animals then any change in its concentration as the animal grows and its relationship with production traits must be known. This study is of IGFl from birth to weaning in Angus calves from the High, Control and Low growth-rate selection lines used in our previous studies.

The calves were born in late 1994 near Armidale, N.S.W., and were weighed and bled at birth and then fortnightly until 3 months of age, then monthly until weaning. Blood samples were stored on ice until centrifuged and plasma frozen for radiommunoassay (Hall *et al.* 1992). The males were castrated at 3 months of age. High-line calves showed the highest and Low-line calves the lowest liveweight increase to weaning. After 12 weeks liveweight differed ($P<0.05$) between the selection lines. Differences in IGFl between male calves from the 3 selection lines were small at birth: High-line 98 $\pm$ 15 (mean $\pm$ SE); Control-line 114 $\pm$ 14 and Low-line 12 1 $\pm$ 13 ng/mL. IGF1 rose to plateau within 4 weeks of birth. At weaning there was no difference between the High and Low-line calves (214 $\pm$ 11 v 216 + 10 ng/mL), with the Control-line calves having lower levels (180 $\pm$ 11 ng/mL; $P<0.05$). IGF1 did not increase with age to the same extent in heifer calves, being 120 $\pm$ 12, 89 $\pm$ 7 and 108 $\pm$ 13 ng/mL at birth, and 165 $\pm$ 14, 117 $\pm$ 7 and 130 $\pm$ 7 ng/mL at weaning in the High, Control and Low-line respectively. The means for the High and Control-line heifers differed ($P<0.05$). For all animals from the 3 lines considered together, no variation in birth weight was explained by IGF1 at birth ($r^2=0.00$), nor was any variation in weaning weight explained by variation in IGF1 at birth (r^2 ($r=0.01$) or at weaning ($r^2=0.02$).

These results were consistent with our earlier work which was also unable to demonstrate consistent differences in IGF1 between the growth rate selection lines and/or a close relationship between growth rate and IGF1 in these cattle. This is in contrast to other studies in young cattle that have demonstrated a strong correlation between IGF1 and growth rate (Davis and Bishop 1994). In our study IGF1 levels rose quickly in male calves between birth and 1 month of age, then appeared to plateau. Unpublished data of M. Bishop for Angus calves in Ohio, U.S.A. showed that IGF1 remained low until after weaning before beginning a slow prepubertal rise to levels 3-fold higher at 10 months of age in bulls and 12 months in heifer calves. Patterns of increase with age of IGF1 intermediate to those described by us and Bishop was reported in male calves by Skaar *et al.* (1994). Moreover the levels of proteins that bind circulating IGF1 also change with age and this may influence the action of IGF1 in young dairy calves (Skaar *et al.* 1994). These differences in both increase with age, and reported associations of IGF1 with production traits between studies suggest that, if selection using IGF1 to manipulate feed efficiency or body composition is to be successful, then more basic information on how IGF 1 operates is vital.

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