

# RELATIONSHIP BETWEEN GENOTYPE OF SIRE AND DAM AND SERUM INSULIN-LIKE GROWTH FACTOR-I

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## Story in Brief

Five breeds of sires (Hereford, Angus, Simmental, Brown Swiss, Jersey) were crossed with two breeds of dams (Hereford, Angus) to form eight crossbred groups of F<sub>1</sub> cows. Five to 20 mature cows per crossbred group were bled during the luteal phase of an estrous cycle and serum insulin-like growth factor-I and progesterone were measured. Breed of sire had a significant effect on IGF-I concentrations whereas breed of dam had no effect. IGF-I and body condition scores were positively correlated across breed groups. In conclusion, serum concentrations of IGF-I are influenced by breed/genotype in cattle.

(Key Words: Insulin-like Growth Factor-I, Body Condition Score, Crossbred Cows.)

## Introduction

Numerous studies have shown a positive association between concentrations of insulin-like growth factor-I (IGF-I) in blood of farm animals and skeletal mass, protein accretion and body weight gain. In addition, concentrations of IGF-I in blood of cattle are affected by quantity and composition of diet. A recent study has shown significant correlations between serum IGF-I and feed consumption and feed conversion in Angus cattle (Bishop et al., 1989). Results of studies like these suggest that selection for an improved economic trait (e.g., feed conversion) may alter expression of a single gene product such as IGF-I. However, much of this work has been conducted with animals of a single breed type. Because previous studies have demonstrated possible genetic determinants of blood concentrations of IGF-I in several species including cattle (Echternkamp et al., 1990), we set out to

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determine if serum concentrations of IGF-I varied with several breed combinations of cattle.

## Materials and Methods

Eighty-one cows were used in this study from a cow herd composed of eight crossbred cow groups produced by mating Hereford, Angus, Simmental, Brown Swiss and Jersey bulls to Angus and Hereford cows. Only cows which had normal, single births and were nursing a calf 85 days after calving were included in the study. Two blood samples were collected by venipuncture from these cows at a seven day interval approximately 85 days after calving. Body condition scores (BCS) (1 to 9; 9=fat) were assigned to each cow at the time a blood sample was collected. Concentrations of progesterone in all blood samples were measured by radioimmunoassay. Only those samples from cows with luteal activity (blood progesterone > 2 ng/ml) were assayed for IGF-I concentrations. Data were analyzed by separating variation among the eight crossbred cow groups into that due to breed of cows' sire and breed of cows' dam. Simple correlation coefficients were calculated for serum IGF-I and BCS.

## Results and Discussion

Breed of sire but not of dam had a significant effect on concentrations of IGF-I and BCS of mature cows. Crossbred cows with Angus and Hereford sires had significantly greater concentrations of IGF-I in serum than did crossbred cows with Simmental, Brown Swiss or Jersey sires. There were no differences in serum IGF-I between Simmental, Brown Swiss or Jersey crossbred groups. Least squares means for the crossbred groups are listed in Table 1. Body condition score was greater in Angus and Hereford crossbred cows than Jersey crossbred cows (Table 1). Simmental crossbred cows had BCS similar to those of Hereford, Angus and Brown Swiss crossbred cows. In addition, serum IGF-I and BCS were positively correlated across crossbred groups ( $r=0.55$ ,  $P<.001$ ). Although Jersey crossbred cows had lower serum IGF-I and BCS than Hereford and Angus crossbred cows, previous results have shown that a greater percentage of these Jersey crossbred cows returned to luteal activity following calving than did the Hereford and Angus crossbred cows (89% vs 56%) (Tinker et al., 1989).

In summary, this research shows that IGF-I is influenced by breed type and BCS. Thus, IGF-I may hold potential as a genetic marker for economical and biologically efficient beef production.



**Table 1. Least squares means for serum concentrations of IGF-I and body condition scores (BCS) of cows with luteal activity 85 days postpartum.**

Crossbred group	N <sup>a</sup>	IGF-I (ng/ml)	BCS
Hereford x Angus	12	89.3 <sup>b</sup>	5.6 <sup>b</sup>
Angus x Hereford	11	81.0 <sup>b</sup>	5.5 <sup>b,c</sup>
Simmental-sired	14	66.2 <sup>c</sup>	5.2 <sup>b,c</sup>
Brown Swiss-sired	11	56.3 <sup>c</sup>	5.1 <sup>c</sup>
Jersey-sired	33	65.0 <sup>c</sup>	4.5 <sup>d</sup>
Pooled SE		4.5	0.1

<sup>a</sup> Number of cows.

<sup>b,c,d</sup> Group averages within a column with different superscript are different ( $P < .05$ ).

### Literature Cited

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