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# Analysis of female reproductive traits in Angus beef cattle divergently selected for blood serum insulin-like growth factor I concentration☆

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**Abstract**

Insulin-like growth factor-I (IGF-I) is an anabolic polypeptide involved in reproductive performance in several species. The objectives of this study were to determine relationships of pregnancy rate, and age of heifers at puberty and at first calving with serum IGF-I concentration in Angus beef cattle. Data were obtained from an ongoing divergent selection experiment for IGF-I concentration involving purebred Angus cows. The IGF-I concentrations measured at Days 28, 42, and 56 of the 140-day postweaning test are abbreviated as IGF28, IGF42, and IGF56, respectively. Pregnancy rate did not differ between high and low IGF-I line females ($P = 0.95$; $n = 2618$), but high line heifers tended to be $4.02 \pm 2.18$ days younger ($P = 0.07$; $n = 281$) at first calving. Residual correlations of age of heifers at first calving (AFC) with IGF-I measurements were not significant. The linear and quadratic terms for regression of AFC on IGF-I concentrations were also non-significant. Contrast analysis showed no difference in age at puberty between the high and low IGF-I line heifers ($5.3 \pm 6.4$ days earlier in the high line; $P = 0.43$; $n = 51$). Residual correlations of age of heifers at

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puberty with IGF28, IGF42, IGF56, and mean IGF-I were −0.30 ($P = 0.03$), −0. 22 ($P = 0.12$), −0.35 ($P = 0.01$), and −0.34 ($P = 0.01$), respectively. The observed relationships between female reproductive traits and IGF-I concentration in Angus beef cattle suggest complex and multiple roles for IGF-I in reproduction.


*Keywords:* Age at first calving; Age at puberty; Beef cattle; IGF-I; Pregnancy rate

## 1. Introduction

Insulin-like growth factor I (IGF-I) is an anabolic polypeptide involved in reproductive functions in several species. Previous data suggest that IGF-I might be a candidate to improve reproductive performance in a herd because of its effects on both male and female reproductive traits. Only limited research has been performed to determine relationships between female reproductive traits and IGF-I concentration in Angus beef cattle divergently selected for blood serum IGF-I concentration.

Insulin-like growth factor I has been postulated to mediate communication between fetal and maternal tissues and to be involved in the initiation, development, and maintenance of pregnancy [1]. It is involved in the regulation of bovine ovarian function [2] and has been isolated from amniotic fluid, and embryonic [3] and fetal [4] tissues. The IGF-I receptor is expressed in the uterus during the estrous cycle and early pregnancy [5], suggesting that IGF-I might be important in the regulation of uterine function in cattle. Identical twin heifers with higher serum IGF-I concentrations calved earlier [6]. However, there was no difference in conception rates of mice divergently selected on the basis of blood plasma IGF-I concentration, although high IGF-I line females produced larger litters [7].

Age at puberty is an economically important trait in beef cattle, because it is related to lifetime productivity [8] and growth traits [9]. Effects of IGF-I concentration on age at puberty are inconsistent in the literature. Some researchers reported that increased IGF-I concentration was associated with decreased age at puberty [10], whereas others concluded that IGF-I concentration was not a predictor of age at puberty [11].

We began selecting Angus beef cattle for high or low blood serum IGF-I concentration in 1989. A significant difference in IGF-I concentrations of animals in the high and low IGF-I lines has been achieved [12]. Although several studies have clearly shown the involvement of IGF-I in reproductive functions, literature that examines the correlations of IGF-I with female reproductive traits in a divergent selection experiment in beef cattle is limited. Selection for IGF-I in cattle influences several other traits such as body weight and body composition and it is important to know how female reproductive performance is affected by those changes. The objectives of this study were, therefore, to analyze pregnancy rate, age at first calving and at puberty in our herd, and to detect possible relationships between these reproductive traits and blood serum IGF-I concentration.