

Could Circulating Concentrations of Insulin-Like Growth Factor-1 (IGF-1) be used as a Fertility Trait in Dairy Cows?

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We aimed to determine (1) the factors associated with serum concentrations of insulin-like growth factor-1 (IGF-1), (2) the relationship between serum IGF-1 during the first week postpartum and ovarian cyclicity status by 35 d postpartum (DPP), (3) an optimum serum IGF-1 threshold predictive of pregnancy to first artificial insemination (P/AI), (4) the associations among categories of serum IGF-1 and reproductive outcomes (P/AI and pregnancy risk up to 150 and 250 d postpartum [DPP]), and (5) identify single nucleotide polymorphisms (SNPs) associated with phenotypic variation in serum IGF-1 in dairy cows. Serum IGF-1 concentrations (ng/mL) were determined at ~7 d postpartum in 647 lactating Holstein cows from seven herds in Alberta. A subset of cows was genotyped on the 26 K Bovine Bead Chip for genome wide association analysis. The overall mean, median, minimum and maximum serum IGF-1 concentrations were 37.8 (± 1.23), 31.0, 20.0 and 225.0 ng/mL, respectively. Herd, age, parity, pre-calving body condition and season of blood sampling were all identified as factors associated with serum IGF-1 concentrations. Although serum IGF-1 concentration had no association with ovarian cyclicity status by 35 DPP in primiparous cows, it was greater in cyclic than in acyclic multiparous cows. The optimum serum IGF-1 threshold predictive of P/AI was 85.0 (sensitivity: 31.9; specificity: 89.1%) and 31.0 ng/mL (sensitivity: 45.5; specificity 66.9%) for primiparous and multiparous cows, respectively. Primiparous and multiparous cows with high serum IGF-1 (>85.0 ng/mL for primiparous cows and >31.0 ng/mL for multiparous cows) had ~5 and 2 times, respectively, greater odds of P/AI than those with low serum IGF-1. Pregnancy risk up to 150 and 250 DPP did not differ between IGF-1 categories. A total of 37 SNPs across ten *Bos taurus* autosomes were associated with phenotypic variation in serum IGF-1 concentrations; of these, four were associated with candidate genes related to fertility.

Take Home Message: Despite identification of SNPs, however, the collective findings indicate that serum IGF-1 concentration during the first week postpartum is not an accurate predictor of fertility in dairy cows.