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Effect of IGF-1 SnaBI polymorphism on reproductive parameters and metabolic parameters in dairy cows

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Insulin-like growth factor 1 (IGF-1) is associated with increased follicular estradiol production, stimulating the return of postpartum cyclicity (Butler et al., 2004). Therefore, it is possible that genetic variants of the IGF-1 gene can improve reproductive efficiency of postpartum cows. The aim of this study was to evaluate the effect of polymorphisms in the IGF-1 gene on reproductive parameters, and milk production of Holstein dairy cows. Genotyping was performed by electrophoresis of the PCR product after digestion with the enzyme SnaBI. Holstein cows (n=75) from 21 days prepartum up to 210 days in milk (DIM) were used in the study. These cows were submitted to an OvSynch-TAI protocol at 55 DIM, and the protocol was repeated in cows diagnosed as non-pregnant at 30 and 60 days after AI. Milk samples were collected twice per week for determining ovulation. Progesterone levels above 1 ng/mL in two consecutive samples indicated ovulation. Days from calving to first ovulation (CFO) and the calving to conception interval (CCI) were evaluated. Serum concentrations of IGF-1 and β -hydroxybutyrate (BHBA) were measured in samples collected at -21, 0, 7, 21 and 60 DIM. Data were analyzed using the GLM procedure of SAS. Genotype distribution was 14.7% for the TT genotype, 48% for CT and 37.3% for CC. Circulating IGF-1 levels were 79.2 ± 9.9 , 66.5 ± 5.2 and 56.6 ± 5.9 ng/ml for TT, TC and CC genotypes, respectively ($P=0.05$). The CFO interval for TT, TC and CC cows was 19.9 ± 4.2 , 30.6 ± 2.3 and 30.4 ± 2.5 days, respectively, indicating a shorter interval ($P<0.05$) for TT cows, which had the highest levels of IGF-I. A linear effect ($P<0.05$) was observed among genotypes for the CCI, which was 76.9 ± 12.6 , 96.9 ± 6.8 and 111.7 ± 7.8 for TT, CT and CC, respectively. Cows from the TT genotype had a shorter CCI that may be associated with earlier return to postpartum cyclicity and higher serum IGF-I levels. The TT cows had lower serum BHBA values than cows with TC and CC genotypes, 5.0 ± 1.4 , 8.2 ± 0.7 and 8.1 ± 0.8 mg/dL ($P<0.05$), respectively. Milk production was not different between groups ($P>0.05$). In conclusion, the IGF-1 SnaBI polymorphism (TT) was associated with reduced CFO and CCI in dairy cows.