Antral Follicle Count, and Circulating Anti-Müllerian Hormone in Trio Allele Carriers, a Novel High Fecundity Bovine Genotype

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Greater number of antral follicles has been proposed as component of the mechanism leading to multiple ovulations in high fecundity ovine genotypes. Similar genotypes in cattle had not been described until the recent identification of a major bovine allele, termed Trio, with a large effect on ovulation rate. Average ovulation rate in Trio carriers is ~3.5 with ~70% of the estrous cycles having 3-4 ovulations, while non-carriers have typically single ovulation. The present study was designed to evaluate antral follicle count (AFC), circulating ant-müllerian hormone (AMH), and the relationship between these measures and ovulation rate. We hypothesized that AFC and AMH would be similar between Trio carriers and non-carrier control cows and that there would be no association between these measures and ovulation rate. In experiment 1, nulliparous and multiparous crossbred beef cattle, carrying the high fecundity Trio allele (n=45) or age-matched, half-sibling controls (n=37) were used. Animals had their follicular wave synchronized by one of two methods. In the first method, animals (n=17) received a progesterone intravaginal controlled internal drug release device (CIDR) on D-8 and removed five days later (D-3). Prostaglandin F2α (PGF) was administered twice on D-3 and D-2, and ultrasound guided transvaginal follicle ablation was performed on D-1 and D0, and a new CIDR was inserted. In the second method, animals (n=65) received GnRH on D-9, PGF on D-2 and another GnRH treatment on D0. Antral follicle counts of all follicles ≥ 2 mm were performed using a B-mode ultrasound scanner equipped with a 7.5 MHz transducer at the expected time of wave emergence. Expected time of wave emergence was 36±12 h after follicle ablation or 48±12 h after GnRH for the first and second method, respectively. Potential differences in AFC between genotypes were evaluated using the MIXED procedure in SAS. Antral follicle count, at wave emergence, was not different (P=0.54) between carriers (24.5±1.3; n=45) and non-carrier controls (23.1±0.9; n=37), and no correlation was found between AFC and mean ovulation rate of previous cycles in either genotype (r=-0.009 and r=-0.07; P>0.70, respectively). Experiment 2, evaluated the circulating AMH concentrations in nulliparous and multiparous crossbred beef cattle, carrying the high fecundity Trio allele (n=27) or age-matched, half-sib controls (n=19). Follicular wave synchronization by follicle ablation was described in Experiment 1. Blood collection was performed via coccygeal venipuncture on the day of the second aspiration (D0) and 5 days later (D5). Serum AMH was analyzed in duplicate using a bovine AMH ELISA (MOFA Global, Verona, WI). Potential differences in AMH between genotypes were evaluated using the MIXED procedure. Serum AMH values for samples collected on D0 and D5 were highly correlated in both genotypes (r>0.83; P<0.001), thus the mean AMH value was used. Circulating AMH was not different (P=0.65) between Trio carriers (287±55 pg/ml) and non-carrier controls (236±28 pg/ml). In conclusion, similar AFC and AMH were found in the novel high fecundity bovine genotype Trio. Therefore, our results suggest that differences in follicle numbers are not a key component of the mechanism underlying multiple ovulations in Trio carriers.