

Trio a novel bovine high-fecundity allele: II. Hormonal profile and follicular dynamics underlying the high ovulation rate

ABSTRACT

The newly discovered Trio high-fecundity allele produces multiple ovulations in cattle. This study evaluated (1) size and growth rates of follicles in Trio carriers during a synchronized follicular wave, induced by follicle aspiration; (2) follicle-stimulating hormone (FSH) patterns associated with the follicular wave; (3) size of corpora lutea (CL) and circulating progesterone; and (4) intrafollicular estradiol concentrations prior to normal deviation. Trio carriers had mean dominant follicles that were significantly smaller in diameter and volume than noncarriers. Onset of diameter deviation occurred at ~3 days after the last follicle aspiration in both genotypes despite Trio carriers having much smaller individual follicles. Follicles of Trio carriers grew at a slower rate than noncarrier follicles (~65% in mm/day or ~30% in mm³/day) resulting in much smaller individual dominant follicles (~25% volume). However, total dominant follicle volume, calculated as the sum of all dominant follicles in each animal, was similar in carriers and noncarriers of Trio throughout the entire follicular wave. Circulating FSH was greater in Trio carriers during the 24 h encompassing deviation. Trio carriers had significantly more ovulations than noncarriers, and individual CL volume was smaller, although total luteal tissue volume and circulating P4 were not different. Thus, increased ovulation rate in Trio carriers relates to smaller individual follicles (one-third the volume) near the time of deviation due to slower follicle growth rate, although time of deviation is similar, with increased circulating FSH near deviation leading to selection of multiple dominant follicles in Trio carriers with similar total follicle volume.

Keyword: Cattle; Follicle; High fecundity; Deviation