Effects of acute and chronic infusion of kisspeptin on luteinizing hormone and follicle stimulating hormone in prepubertal bulls

S.L. Patterson, a E.A. Coffman, b L.G. Strickland, c K.G. Pohler, d J. A. Daniel, d B.K. Whitlock

College of Veterinary Medicine, University of Tennessee, Knoxville, TN; School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA; Department of Animal Science, University of Tennessee, Knoxville, TN; School of Mathematical and Natural Sciences, Berry College, Mount Berry, GA

Kisspeptin (KP) is a hypothalamic neuropeptide that stimulates the secretion of gonadotropin releasing hormone. The aim of the present study was to determine the effects of acute and chronic infusions of KP on the serum concentrations of luteinizing hormone (LH) and follicle stimulating hormone (FSH) in prepubertal bull calves. The hypothesis was that chronic infusion of kisspeptin would result in prolonged increased concentrations of LH and FSH. Holstein bull calves (n = 16; 12±1 wks; 96.5±14.5 kg) were treated with one of four doses of KP (KP-10; human Metastin 45-54; 0 [control], 0.125 [low], 0.25 [medium], or 0.5 ug/kg/hr [high]) by intravenous infusion for 76 hs. Blood samples were collected every 15 min for the first (acute; 1 to 6 hs) and last (chronic; 71 to 76 hs) 6 hs of the infusion to determine the serum concentrations and pulse parameters of LH and FSH. The statistical significance of LH and FSH concentrations was analyzed using a mixed effects repeated measures analyses of variance. Whereas acute infusion of KP-10 increased (P < 0.05) mean LH concentrations and the number of pulses (P < 0.05), chronic infusion had no effect. Nadir of LH concentrations was greatest following infusion of the medium and high doses KP-10 (P < 0.05) and during the acute period (P < 0.05). Mean FSH concentrations were greatest during the acute infusion period (P < 0.05) and least during the chronic infusion period with medium and high doses of KP-10 (P < 0.05). Number of FSH pulses was greatest during the acute infusion period (P < 0.05). Amplitude of FSH pulses was greatest during the acute infusion period (P < 0.05) and least during the chronic infusion period (P < 0.05). There was no effect (P > 0.05) on the nadir of FSH concentrations. In conclusion, acute infusion of KP-10 increased LH concentrations and pulse parameters, and chronic infusion of KP-10 decreased FSH concentrations and pulse parameters. Despite the potential suppression of the hypothalamic-pituitary-gonadal axis with chronic infusion of KP-10, there may still be potential applications of kisspeptin, kisspeptin analogs, or kisspeptin receptor agonists to hasten the onset of puberty in livestock.

Keywords: Kisspeptin, chronic infusion, bull, puberty