Introduction

Kisspeptin is hypothesized to integrate nutrition and hormones critical to metabolism and the regulation of reproduction. Since the negative feedback loop of early lactation is associated with decreased fertility and increased glucose levels in cattle, this study aimed to explore the impact of energy balance and lactation on kisspeptin-stimulated gonadotropin release. The molecular mechanisms underlying disruption of reproductive function during energy sufficiency remain to be fully understood. The hypothalamic-pituitary axis may be less sensitive to kisspeptin during lactation. The effects of negative energy balance and lactation on kisspeptin-stimulated gonadotropin release in cows have not been investigated. The present study therefore aimed to test whether stage of lactation and degree of negative energy balance affect kisspeptin-stimulated LH, GH, progesterone, NEFA and glucose concentration.

Materials and Methods

Five nonlactating and five lactating multiparous Holstein cows were used in the study. Cows were housed at the All Veterinary Teaching Dairy and experiments were conducted over a six month period (wk 1 – wk 11). Lactating cows were milked twice daily and individually fed grain and alfalfa hay and all blem coastal Bermuda grass hay following each milking. The diet consisted of approximately 1.80 Md ME (3.6% crude protein and 29% NDF). The nonlactating cows were fed the same diet as the lactating cows and also given alfalfa hay. Fatty acids and milk metabolites were measured at weeks 1, 5, and 11 after parturition. Samples of plasma were stored until assayed to determine LH, GH, progesterone, NEFA and glucose concentration.

Conclusions

These data...

...demonstrate the impact of energy balance and lactation on kisspeptin-stimulated gonadotropin increase in cattle.

...suggest the effect of energy balance and lactation on kisspeptin-stimulated gonadotropin in lactating cows is opposite that of lactating rodents.

A greater understanding of the mechanism where kisspeptin signaling may participate in the regulation of gonadotropin secretion in cows during certain physiological conditions may yield novel information into the mechanisms for lactation associated infertility.

References