

Gut Hormone Concentrations are Increased Post-Calving in Dairy Cows

Rizaldy C. Zapata,^{*} Reza Salehi,[†] Divakar J. Ambrose^{†‡} and Prasanth K. Chelikani^{*}

^{*}Department of Production Animal Health, University of Calgary, Calgary, Alberta T2N 4N1

[†]Department of Agricultural, Food & Nutritional Science, University of Alberta, Edmonton, Alberta T6G 2P5

[‡]Livestock Research Branch, Alberta Agriculture and Rural Development, Edmonton, Alberta T6H 5T6

E-mail: rczapata@ucalgary.ca; pchelika@ucalgary.ca

Understanding of the factors regulating dry matter intake (DMI) and energy balance is important for improving health and productivity of dairy cows. Dietary lipid supplementation during late pregnancy is one strategy to improve energy balance; however, little is known of the underlying hormonal and metabolic adaptations. We evaluated the effects of fat supplementation during late pregnancy on energy balance and plasma concentrations of purported satiety hormones from the intestine [glucagon-like peptide-1 (GLP-1), peptide YY (PYY)], liver (adropin), pancreas (insulin), fat (leptin), and metabolites [glucose, non-esterified fatty acid (NEFA), beta-hydroxybutyric acid (β HBA)].

Twenty-four pregnant Holstein cows were randomized to diets containing either rolled Canola (CAN) or Sunflower (SUN) seeds at 8% dry matter, or no supplementation (CON), during the last 5 weeks of gestation, followed by a common lactation diet. Energy balance was calculated and blood sampled before and after calving for various assays. We found that CAN and SUN alone did not affect energy balance, body weight and plasma concentrations of GLP-1, PYY, adropin, insulin, leptin, NEFA and β HBA; however, CAN decreased and SUN tended to decrease DMI. Importantly, we found that plasma GLP-1, PYY, adropin, NEFA and β HBA were greater post-calving, whereas glucose, insulin, leptin, body weight and energy balance were greater pre-calving.

Implications: Our novel findings demonstrate that the transition from pregnancy to lactation is a key determinant of plasma gut hormone levels than dietary lipid. It remains to be determined whether the hormones are associated with metabolic disturbances during the transition period.