

ABSTRACTS
*** Author Presenting Paper**

46 Changes in the somatotrophic axis associated with the initiation of lactation. M.C. Lucy*, H. Jiang, and Y. Kobayashi, *University of Missouri, Columbia.*

The change in nutrient metabolism that is required to support lactation in high producing dairy cattle is controlled by hormones that coordinate a variety of processes including the mobilization of fatty acids from adipose tissue and the synthesis of glucose from gluconeogenic precursors in liver. Growth hormone (GH or somatotropin) plays a central role in this process. The actions of GH are mediated by the GH receptor (GHR) and there are at least three alternative forms of the GHR mRNA in cattle (GHR 1A, 1B, and 1C). The GHR promoter 1 (P1) controls the transcription of GHR 1A mRNA. The primary location for GHR 1A mRNA is the liver of adult animals where GHR 1A represents the bulk of liver GHR mRNA. The binding of hepatocyte nuclear factor 4 (HNF-4) to GHR P1 may cause liver-specific expression of GHR 1A. The GHR P2 and P3 control the transcription of GHR 1B and 1C mRNA in a wide variety of tissues. The GHR P2 and P3 are 800 bp apart in the bovine genome and the activity of GHR P2 and P3 depends on an enhancer element that binds Sp1 as well as an unknown transcription factor. The presence of the common enhancer explains the similar pattern of expression for P2 and P3 transcripts (GHR 1B and 1C mRNA). The GHR 1A mRNA is different from GHR 1B and 1C because the mRNA amount is developmentally and nutritionally regulated. The liver GHR 1A is decreased at calving and then subsequently recovers during the early postpartum period. The decrease in liver GHR 1A mRNA in early lactation cows coincides with a period of liver refractoriness to GH when GH-dependent IGF-I synthesis and secretion are decreased. The activity of GHR P1 in periparturient cattle is independent from GHR P2 and P3 that control constitutive expression of GHR mRNA in liver. We hypothesize that the decrease in liver GHR 1A at calving leads to a decrease in the concentration of GHR in liver and a decrease in GHR second messenger signaling in early postpartum cows. Failure to regain GHR 1A expression during early lactation may compromise GH-dependent functions in liver and affect total milk yield.

Key Words: Growth hormone receptor, Bovine, Lactation