

Leptin: A Multifunctional Signal from Fat

Chelikani, P. K., D. R. Glimm, and J. J. Kennelly.

Dairy Research and Technology Center, 60th Avenue and 115th Street, Edmonton, Alberta.
E-mail: prasanth@ualberta.ca

An understanding of the hormonal signals that regulate feed intake and reproduction will be of benefit to the dairy industry. One such hormone that is receiving increasing interest in recent years is Leptin. Leptin is secreted primarily from body fat and has been reported to play a role in various physiological functions including feed intake and reproduction in humans and rodents. As a first step towards understanding the central and peripheral effects of leptin in cattle, it is necessary to demonstrate the gene expression of leptin and its cognate receptors in various tissues. We report here evidence of leptin expression in adipose depots and of leptin receptor gene expression in central and peripheral tissues of the bovine by reverse transcription and polymerase chain reaction analysis.

Leptin mRNA was detectable in mammary parenchyma and in adipose tissue with similar transcript abundance among the subcutaneous, pericardial, perirenal, and mesenteric adipose depots. The mRNA for the functional (long-form) of the leptin receptor, Ob-Rb, was detectable in all four adipose depots, mammary parenchyma, semitendinosus muscle, liver, adrenal cortex, spleen, kidney, testis, mesenteric lymph node, lung, aorta, abomasum, duodenum, jejunum, ileum, hypothalamus, pituitary, brain stem, cerebral cortex, cerebellar cortex, pons, and pineal gland. The mRNA for the short-form of the leptin receptor, Ob-Ra, was detectable in the liver, adrenal cortex, spleen, pituitary, and brain-stem, but not in the other tissues surveyed.

Implications: The specific expression of leptin in fat depots and the wide spectrum of tissues expressing functional leptin receptor genes reveals that leptin may have multiple physiological functions in cattle. Further research is needed on the effects of nutritional and/or hormonal manipulations on leptin receptor expression in various tissues. Such fundamental information could be of immense value to both the scientific community and the dairy industry.