

Leptin a potential marker for body composition in sheep

K.G. Kauter¹, M. Ball¹, R. Tellam² and J.R. McFarlane¹

¹Division of Animal Physiology, University of New England, Armidale NSW 2351

²Division of Tropical Agriculture, CSIRO, Long Pocket Laboratories, Indooroopilly Qld 4068

Leptin, a recently discovered hormone secreted from adipose tissue (Zhang *et al.* 1994) was first described as a regulator of adiposity, food intake and energy metabolism. The *ob* gene encodes a 4.5 kbp mRNA which appears to be expressed almost solely in adipose tissue, encoding a protein of approximately 16 kDa. There is no known homology with other proteins and the homology of the derived leptin amino acid sequence across the different species ranges from 95% to 84%. It is now apparent that leptin physiology is much more complex and is likely to play an important role in many other systems including reproduction, haematopoiesis and the immune system. Leptin levels have been shown to be well correlated with body fat in humans and rodents, and exogenous leptin administered to both rats and mice results in loss of body fat. Leptin is likely to be an important humoral signal to the central nervous system on body composition, thus regulating food consumption.

The currently available assays for leptin have limited or no cross reactivity with bovine leptin. This has restricted leptin research to work on rodents and humans, or to studies of mRNA levels in fat tissue. The aim of this study was to develop a leptin immunoassay suitable for use with sheep to allow the investigation of its role in body composition in ruminants.

Bovine recombinant leptin (brLeptin) which has a single amino acid difference from ovine leptin was used to immunise chickens. An antiserum (jmck#16) was used to develop a variation of a competitive ELISA. Using brLeptin as standard the assay has a sensitivity of 1 ng/ml with inter and intra assay variation of 15% and 7% respectively.

The dose response curve of ewe plasma was linear and parallel to brLeptin dose response curve as shown in Figure 1. Dose response curves from rams, and male castrate (wethers) plasma (data not shown) and an extract of sheep fat were also parallel to brLeptin (Figure 1). Using this assay, plasma from ewes, rams and wethers ($n = 5$) had mean (\pm SD) concentrations of

leptin of 6.2 ± 1.3 , 4.5 ± 1.2 and 5.3 ± 1.5 respectively. These data are consistent with previous reports that leptin levels in males are lower than females.

The availability of this assay will allow the large scale investigation of leptin levels in sheep to test the hypothesis that plasma leptin levels will reflect the amount of fat, which may assist in the selection of lines of sheep with differing body compositions suitable for various markets.

Zhang, Y.Y., Proenca, R., Maffei, M., Barone, M., Leopold, L. and Friedman, J.M. (1994). Positional cloning of the mouse obese gene and its human homologue. *Nature* **372**, 425–432.

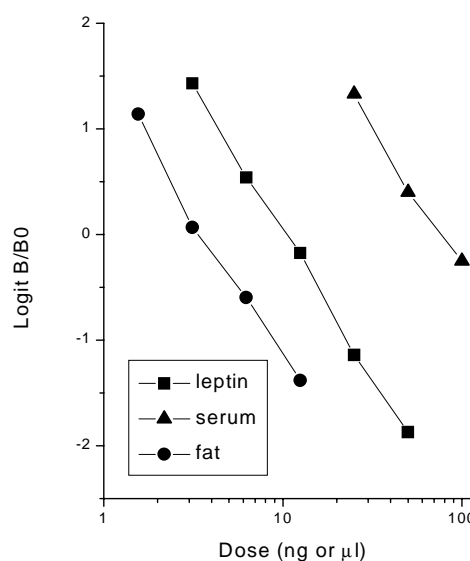


Figure 1 Dose response curves of recombinant leptin (ng), sheep serum (μ l) and sheep fat (μ l) extract.