

16. EARLY HORMONAL RESPONSES TO AN INCREASE IN PLANE OF NUTRITION IN MALE SHEEP

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In Merino rams, an increase in the plane of nutrition stimulates GnRH/LH pulse frequency within 3 days (1) and this effect is correlated with changes in the circulating concentrations of metabolic hormones such as insulin, leptin, IGF-1, and thyroid hormones (2). To provide information on the dynamics of these responses within the first 3 days, we studied intact rams that were fed continuously with diets that were low in energy (9 MJ ME/day) and protein ($n = 6$) or were changed from the Low diet to one that is high energy (21 MJ ME/day) and protein ($n = 6$). Jugular blood was sampled every 20 min for 96 h, including a control period of 24 h before the change of diet in the second group. No changes were observed in rams continuously fed the Low diet. In rams that were changed from the Low to the High diet, LH pulse frequency increased only 6 h after first feeding of the High diet, returned to pre-treatment values for 24 h, and then increased again ($P < 0.05$). In the same period, insulin concentration increased ($P < 0.05$) after 4 h and leptin concentration increased ($P < 0.05$) after 8 h. Thereafter, concentrations of both hormones remained high. Diet did not affect the concentrations of thyroid hormones or IGF-1 over the 3 days of observation. Thus, after increase in the level of nutrition, there are fluctuations in the response in LH pulse frequency, but the effect becomes stable after 48 h. The data support roles for both insulin and leptin in the early activation of the GnRH/LH axis, but the temporary decrease in LH pulse frequency that follows the initial increase, while concentrations of both insulin and leptin were still high, suggests that other mechanisms are also involved.

(1) Martin, G.B., Tjondronegoro, S., Blackberry, M.A. (1994). *J. Reprod. Fertil.* **101**, 121–128. (2) Miller, D.W., Blache, D., Boukhliq, R., Curlewis, J.D., Martin, G.B. (1998). *J. Reprod. Fertil.* **112**, 347–356.