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ASPECTS OF LIPOLYSIS IN SHEEP

A THESIS PRESENTED IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR
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ABSTRACT

1. Treatments which might be expected to produce lipolytic responses were applied to ewes. These treatments included fasting and the administration of ACTH, noradrenaline and BGH. Twelve experiments are reported, 3 of which involved indirect calorimetry and 9 which involved measuring the responses of blood hormones and metabolites including GH, insulin, FFA's and glucose.
2. Two groups of ewes were used. The first group consisted of 2 Romneys and 2 Southdowns. Each breed pair comprised a short, fat and a long, lean phenotype which may have been genotypically different in their propensity to be overfat. The second group of ewes comprised 4, 5 year cull Romney ewes.
3. Calorimetry showed that there were no differences in the normal fed metabolic rate of the first group of sheep sufficient to explain their differences in fatness.
4. Fasting (2-3 days) resulted in significantly elevated mean afternoon plasma FFA levels in the long, lean ewes.
5. The fat ewes had steeper regressions of RQ on time when fasted than the lean ewes, which probably indicated a greater rate of lipolysis.
6. The injection of ACTH into ewes produced inconclusive results in terms of plasma hormones and metabolites.
7. Injection of the catecholamine, Bronkephrine into the cull Romney ewes, did not produce any significant effects on blood hormones and metabolites in one study. In a second study N.A. resulted in transitory peaks in GH insulin and FFA's. These results were confused with concurrent responses to feeding.

8. Fasting cull Romney ewes resulted in higher mean afternoon levels of GH and FFA. Insulin levels were lower than in fed sheep but differences were not statistically significant.
9. Administration of ACTH and N.A. did not produce detectable changes in heat production or respiratory exchange ratios. However these studies were complicated by ruminal CO₂ production following feeding.
10. Both BGH and PBS infusions produced marked declines in plasma insulin and increases in FFA levels.
11. It is concluded that the prime control of lipolysis in sheep is probably the autonomic nervous system through the release of N.A. at sympathetic nerve endings. GH and insulin secretion are neurally mediated and these hormones have important roles in directing the transfer and utilisation of metabolites between tissues. GH potentiates lipolysis, defends tissue protein stores and promotes the transfer to and utilization of FFA in productive tissues such as muscle and mammary gland. Insulin is primarily anabolic and antilipolytic in adipose tissue. It antagonises GH action in adipose tissue yet supports the anabolic role of GH in the productive tissues.

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"What I do is me, for that I came" G.M. Hopkins

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