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Summary Only

PROTEIN DEFICIENCY IN GROWING LAMBS FED FRESH
RYEGRASS/CLOVER PASTURE *AD LIBITUM*

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Growing lambs, 4 months old, were fistulated in the abomasum, confined indoors in individual pens and fed fresh spring ryegrass/clover pasture *ad libitum* for 12 weeks. The adequacy of the diet to supply sufficient amino acids to sustain maximum production was assessed by infusing sodium caseinate (44 g/day) + L methionine (0.5 g/day) continuously into the abomasum of 13 lambs and comparing their performance with 12 control lambs that received an abomasal infusion of inorganic salts. Mean initial liveweight was 16.5 kg. An additional group of 12 lambs was slaughtered at the start of the experiment to predict the initial body composition of the 25 test lambs using standard comparative slaughter procedures. The diet contained 2.91% N, with an organic matter digestibility of 76%, from which the content of metabolisable energy (ME) was calculated to be 11.1 MJ/kg DM. Botanical composition was 70% perennial ryegrass (*Lolium perenne*) and 10% white clover (*Trifolium repens*), with the balance comprising other grass species.

The voluntary herbage intake of protein infused lambs tended to be slightly lower than that of control lambs ($P < 0.10$) but total ME intakes (including that infused as casein) were similar (Table 1). The infusion markedly increased protein deposition in both wool ($P < 0.05$) and body tissues ($P < 0.01$). Efficiency of utilisation of ME for growth was low (27%) and similar for the 2 groups; however protein formed a greater proportion of energy retained in infused (41.0%) compared with control lambs (27.2%).

After adjustment to equal herbage intake, glucose production tended to be greater for protein-infused than control lambs and it was calculated that 26% and 17% respectively of total glucose could have been derived by net synthesis from protein.

The infusion produced marked changes in the endocrine system, including an increase in the circulating concentration of thyroxine

TABLE 1: VOLUNTARY INTAKE OF METABOLISABLE ENERGY (ME), PROTEIN AND FAT DEPOSITION, GLUCOSE PRODUCTION AND ENDOCRINE CHANGES AS AFFECTED BY ABOMASAL INFUSION OF CASEIN + METHIONINE

		Control lams	Protein- infused lams	SED
ME intake (MJ/kgW ^{0.75} /d)	herbage	0.923	0.854	0.0371
	total	0.923	0.940	0.0373
Liveweight gain (g/d)		79.3	99.2	8.04
Protein deposition (g/d)	body	8.7	14.3	1.01
	wool	3.9	6.7	1.16
	total	12.6	21.0	1.31
Fat deposition (g/d)		21.2	18.5	2.86
Glucose irreversible loss (mg/min/kgW ^{0.75})	at <i>ad lib</i> intake	9.8	9.5	0.78
	at equal intake	9.2	10.0	0.60
Growth hormone (μ g/litre)		8.8	5.3	0.82
Thyroxine (n m/litre)		27.8	52.5	2.65
Insulin (m U/litre)		33.4	41.3	4.52
Glucagon (n g/litre)		159	179	12.7

($P < 0.001$), a reduction in growth hormone concentration ($P < 0.001$) and a trend for higher levels of insulin and glucagon.

It was concluded that protein deposition in these pasture fed lambs was limited by the supply of amino acids relative to ME. In addition to increasing the absorption of limiting essential amino acids, it is considered that part of the response to the protein infusion may have been mediated through increasing plasma concentrations of hormones known to increase protein deposition in wool (thyroxine) and in body tissues (insulin).