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# PROTEIN METABOLISM IN THE HINDLIMB OF LAMBS FED LUCERNE CHAFF

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Increasing the efficiency of protein deposition in muscle (meat), and in turn animal growth, is a major goal of animal production science. Protein deposition is the net result of the dynamic processes of protein synthesis and degradation, which are subject to independent, but coordinated control. Here we report the effects of nutrition on protein deposition, synthesis and degradation .

Twelve Border Leicester Merino first cross wether lambs (age 6 months, wt 29.9 ±0.7kg) were allocated into three treatment groups of four for 19 days. They were fed 3.7, 5.4 and 10.8 MJME/d calculated to provide approximately 0.6, 1.0 and 1.9 times the requirement to maintain liveweight. The kinetics of protein turnover (degradation, synthesis and gain) were calculated from the measurement of arteriovenous differences in phenylalanine and its specific radioactivity (Barrett et al. 1987; Oddy et al. 1988).

The liveweight changes over the treatment period of -1.2, -0.1 and +1.8kg ($P<0.001$) suggested that the three treatments achieved their objective. The m. semitendinosus weights were reduced by 6.6% on the sub-maintenance level and increased by 5.3% on the high level of nutrition ($P<0.05$) as compared to the maintenance feeding level.

Net protein gain ($P< 0.001$) and protein synthesis ($P< 0.10$) increased with nutrition level. There was a non-significant increase in protein degradation with nutrition level (see figure).

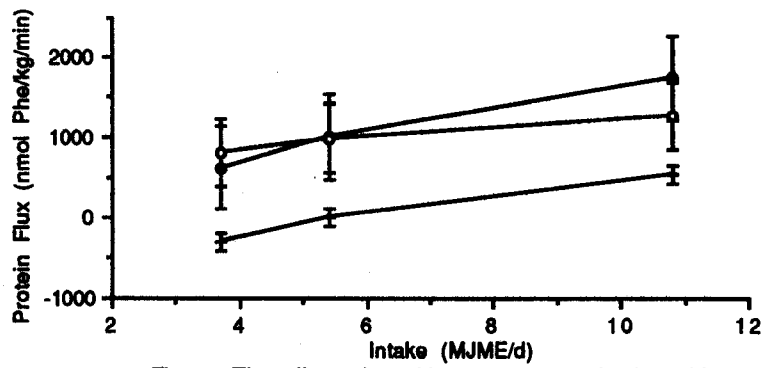


Figure: The effect of nutrition on net protein deposition, synthesis and degradation (nmol Phe/kg/min)
( prot deg prot gain
prot syn )

The increase in net protein deposition in the hindlimb was due to a large increase in protein synthesis, with a small increase in degradation. The ratio of synthesis to deposition is low (1.2:1-1.4:1), suggesting that the conversion of protein into muscle can be extremely efficient. Protein deposition has a relatively low efficiency in the whole animal (Kielanowski 1976), however at least in the muscle this does not have to be the case. In rats, Millward et al. (1975) also found relatively high efficiencies under different nutritional regimes. Moreover the results suggest that tissues associated with maintenance (gut, liver, heart, skin etc.) each of which individually have high turnover rates are major sources of inefficiency in meat production. Research directed to the reduction of protein wastage in these areas could well be fruitful.

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