

DUODENAL FLOW OF DIETARY AND MICROBIAL NITROGEN IN SHEEP FED SUBTERRANEAN  
CLOVER HARVESTED AT FOUR STAGES OF MATURITY

I.D. HUME\* and D.B. PURSER†

Dinninup subterranean clover was harvested at four stages of maturity (green (harvest I), at wilting (II), 3 weeks post-wilting (III), and mature (IV)), and fed to four Merino wethers fitted with ruminal and re-entrant duodenal cannulae in order to study changes in dietary protein digestion with maturity of the clover.

The rate of flow of digesta into the duodenum was estimated with continuous ruminal infusions of  $^{51}\text{Cr}$ -EDTA, and the relative proportions of dietary and microbial nitrogen in the duodenal digesta were estimated from the incorporation into microbial protein of  $^{35}\text{S}$  from ruminal infusions of  $\text{Na}_2^{35}\text{SO}_4$ .

Sheep fed the green clover (I) consumed more digestible organic matter (DOM) (643 versus 421, 364 and 430 g/day) ( $P < 0.01$ ) and retained more nitrogen (1.89 versus 1.33, 1.50 and 1.24 g/100 g DOM intake) ( $P < 0.01$ ) than sheep fed the other three diets.

Preliminary analysis indicates that the difference in nitrogen retention was due to differences in the amount of microbial protein flowing into the duodenum, rather than to any difference in the amount of dietary protein digested and absorbed post-ruminally.

More extensive ruminal degradation of the protein in the green clover (74% (I) versus 47% (II), 54% (III) and 45% (IV)) ( $P < 0.05$ ) resulted in less dietary protein flowing into the duodenum (1.45 versus 1.91, 1.90 and 2.20 g/100 g DOM intake) ( $P < 0.05$ ). However, it was calculated that the post-ruminal digestibility of the protein of I and II was higher than that of the other harvests (72% and 65% versus 52% and 51%) ( $P < 0.05$ ); hence the amounts of dietary protein digested post-ruminally were 1.08 (I), 1.32 (II), 1.03 (III) and 1.21 (IV) g/100 g DOM intake, which were not significantly different.

The greater production of microbial protein in the rumen on I (2.42 versus 1.97, 1.96 and 1.89 g/100 g DOM I) ( $P < 0.10$ ) was due to a greater proportion of the total DOM being digested in the rumen (85% versus 72%, 60% and 75%) ( $P < 0.10$ ); the yield of microbial protein (g/100 g OM digested in the rumen) was similar on all treatments (18.4, 21.6, 20.9 and 16.2).

Thus, even though more dietary protein was degraded in the rumen when the clover was green than when mature, the green clover protein was more digestible post-ruminally, and consequently the animal absorbed as much dietary amino acids from the small intestine (per 100 g DOM intake) as when fed the dry material. Greater protein production in the rumen as a consequence of greater availability of energy resulted in a greater retention of nitrogen per 100 g DOM intake on the green subterranean clover.

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\* Department of Animal Science and Production, University of Western Australia, Nedlands, W.A. 6009. Present address: Department of Biochemistry and Nutrition, University of New England, Armidale, N.S.W. 2351.

† C.S.I.R.O. Division of Land Resources Management, Wembley, W.A. 6014.