

THE EXTENT OF NITROGEN DIGESTION IN THE SMALL INTESTINE OF SHEEP

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A survey has been made of published data on the passage of non-ammonia nitrogen (NAN) through the small intestine of sheep offered forage diets. Daily intakes of organic matter ranged from 265 to 1291 g and nitrogen intake from 5.0 to 45.0 g. The amount of NAN that passed each day from the abomasum ranged from 5.4 to 49.0 g, and the corresponding amount that passed from the terminal ileum was from 3.1 to 15.6 g. The relationship between NAN leaving the ileum (Y, g/day) and the abomasum (X, g/day) was as follows:

$$Y = 2.01 (\pm 0.51) + 0.251 (\pm 0.017) X$$

The intercept suggests that approximately 2 g NAN/day passing through the terminal ileum is derived from endogenous sources, while the slope of the relationship suggests a mean digestibility of approximately 75% for the NAN passing from the abomasum.

However, the usefulness of this estimate for predictive purposes with individual feeds is reduced by the large standard errors associated with estimates of both slope and intercept. In seeking causes of this variability, attention has been paid to the nitrogen associated with the plant cell walls in abomasal digesta.

Studies were made of the passage of digesta from the abomasum and terminal ileum of sheep offered either a low quality roughage, wheaten hay, or a high quality roughage, dried rye grass. Estimates were made of the amounts of organic matter, NAN and cell wall in digesta at these two points in the tract. Cell wall material was further analysed for nitrogen and amino acids. The cell wall constituents in abomasal digesta of sheep fed wheaten hay and rye grass diets contained respectively 0.37% and 1.20% nitrogen. Corresponding figures at the terminal ileum were 0.25% and 0.70%. As cell wall constituents other than nitrogen are not digested in the small intestine, the intestinal digestion of cell wall nitrogen with the two diets was approximately 32% and 42%. About half the cell wall nitrogen in samples of abomasal and ileal digesta was identified as amino acids.

Preliminary estimates indicate that cell wall nitrogen comprises 10% of the NAN that passed from the abomasum with wheaten hay but only 3% with rye grass. The low digestibility of this fraction thus has a proportionately greater effect on the digestibility of abomasal NAN from low quality rather than high quality forage diets, and is undoubtedly a major cause of the variability observed in the extent of nitrogen digestion in the small intestine of forage-fed sheep.

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