DIGESTIBILITY OF METHIONINE FROM RUMEN FUNGAL PROTEINS

S.K. GULATI and J.R. ASHES

Anaerobic fungi have been shown to proliferate in the rumen on diets high in roughage (Bauchop 1979) and contribute to the digestion of plant structural carbohydrates (Gulati et al. 1985). These fungi are high in protein and the amino acid (A.A.) profile shows that they are relatively high in sulphur amino acids compared to rumen protozoa and bacteria (Williams 1986). The availability of the A.A. in the fungal proteins is the major determinant of their biological value. Methods have recently been developed for growing fungi in batch culture (Gulati et al. 1987) facilitating the assessment of their A.A. availability. In the present study the availability of methionine (MET) in protein from the fungus Neocallimastix sp. LM1 was determined.

Three sheep with permanent fistulae in the abomasum and terminal ileum, were given a diet of lucerne hay and oats, (3:2 w/w) at 800 g/d. Rumen fungi were labelled by introducing ^{14}C MET (0.37 M.Beq) at day 2 of batch culture. Fungal biomass (0.5 g dry wt) was hydrated in distilled water (10 h) and infused into the abomasum together with Cr-EDTA as the digesta flow marker. Digesta samples were subsequently collected at the terminal ileum every 0.5 h for 10 h and then analysed for chromium and ^{14}C. The proportion of A.A. unabsorbed was calculated by procedures of Ashes et al. (1984).

The A.A. fractions of the fungal hydrolysate showed that 94% of the radioactivity was contained in a single peak corresponding to MET. This suggested that ^{14}C MET was incorporated into fungal protein without major degradation products. The emergence of Cr-EDTA and ^{14}C MET from the terminal ileum was simultaneous at 4 h. The fraction of [^{14}C] MET appearing unabsorbed at the terminal ileum averaged 0.120 ± 0.001. Due to the short time span for the passage of radioactive fungal protein through the abomasum and small intestine the likelihood of A.A. recycling would be minimal. Consequently the true fractional digestibility of MET from rumen fungal protein would be approximately 0.88. This is superior to that of microbial protein (0.74), reported by Elliot and Little (1977) and approaches that of high quality milk protein (0.94) (Ashes et al. 1984). Anaerobic fungi have chitin in their cell walls, and may be resistant to microbial attack in the rumen (Orpin 1977). Enhanced rumen fungal populations may result in increased quantities of sulphur A.A.'s being absorbed from the small intestine. This could be expected to stimulate wool growth, and may have important implications for wool production in sheep grazing low quality roughages.

ASHES, J.R., MANGAN, J.L. and SIDHU, G.S. (1984). Br. J. Nutr. 52: 239.
BAUCHOP, T. (1979). Appl. Environ. Microbiol. 38: 148.
ELLIOT, R. and LITTLE, D.A. (1977). Br. J. Nutr. 37: 285.
GULATI, S.K., ASHES, J.R., GORDON, G.L.R. and PHILLIPS, M.W. (1985). Proc. Nutr. Soc. Aust. 10: 126.
GULATI, S.K., ASHES, J.R., GORDON, G.L.R. and ROGERS, P.L. (1987). Aust. J. Biotech. 1(1): 55.
ORPIN, C.G. (1977). J. Gen. Microbiology 99: 215.
WILLIAMS, A.G. (1986). Microbiol. Reviews 50: 25.

CSIRO, Division of Animal Production, P.O. Box 239, Blacktown, New South Wales 2148