

## MEAN RETENTION TIME AND INTRA-RUMINAL DEGRADATION OF RUMEN PROTOZOA

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Protein synthesis by rumen protozoa and their intra-ruminal turnover can be measured using  $^{14}\text{C}$ -labelled protozoa (Leng 1982). The method has been used to determine the half time ( $T_{1/2}$ ; Leng 1982, Leng et al. 1984) or the turnover time (TT; Punia 1988) of protozoa but their rumen mean retention time (MRT) has not been reported. However, MRT can be calculated if one of the two routes by which  $^{14}\text{C}$  disappears from the rumen, viz., as methane or flow of protozoa to the duodenum, is measured since it can be considered that  $\text{TT} = \text{pool size}/\text{disappearance rate}$  and  $\text{MRT} = \text{pool size}/\text{outflow rate}$  (note that  $T_{1/2} = \ln 2 \times \text{TT}$ ). Thus  $\text{MRT} = \text{TT}/\text{fraction of disappearance as outflow}$ .

Calculations were made using data from the references cited and are compared in the Table with MRT values for the solute marker CrEDTA and for particle MRT estimated as CrEDTA MRT  $\times 2.7$  for chopped diets and  $\times 4$  for ground and pelleted mixed diets (Faichney et al. 1989). The fractional degradation rate (FDR) of protozoa was calculated as  $\text{FDR} = 1/\text{TT} - 1/\text{MRT}$ .

Reference	Dry Matter Intake ( $\text{gd}^{-1}\text{kg}^{-3/4}$ )	MRT		Rumen Protozoa		
		CrEDTA (h)	Particles (h)	TT (h)	MRT (h)	FDR ( $\%h^{-1}$ )
Leng (1982)	49 <sup>A</sup>	11.2	30	19.5	54.6	3.29
Leng et al. (1984)						
Control	54 <sup>A</sup>	9.1	25	16.0	45.7	4.06
Monensin	54 <sup>A</sup>	15.6	42	19.2	83.5	4.01
Punia (1988)						
41 <sup>B</sup>		12.8	51	26.5	109	2.86
60 <sup>C</sup>		10.7	43	29.1	83.6	2.26

<sup>A</sup> 4 sheep given chopped roughage; <sup>B</sup> 2 sheep and <sup>C</sup> 2 heifers given ground and pelleted lucerne/barley (3/2).

The protozoal populations were reported to be largely Entodinia with some Holotrichs; counts of protozoa were around  $10^6 \text{ ml}^{-1}$  rumen fluid. The FDR of protozoa was  $2-4\% h^{-1}$  and protozoal MRT's, ranging from 45 to 110 h, were roughly twice those for particulate matter. This might be explained, at least in part, by protozoal migration towards and attachment to freshly ingested feed particles (Orpin and Letcher 1978), a suggestion consistent with reduced rumen fluid counts of protozoa observed after feeding (Warner 1966).

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