

DYNAMICS OF PROTOZOA IN THE RUMEN OF CATTLE

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The absence of protozoa appears to increase both the energy and protein from rumen fermentation in cattle (Bird and Leng 1978) and sheep (Bird et al.: 1979) given high energy diets with less than optimal concentrations of bypass protein. As part of a study to more clearly understand the role of protozoa in the rumen, isotope dilution procedures have been used to estimate the dynamics of protozoa in the rumens of sheep and cattle (Leng et al. 1981; Leng 1982). The results reported here are part of this project. Studies of the dynamics of protozoa in the rumen of cattle on diets containing forage and molasses, were made by injecting ^{14}C -labelled protozoa into the rumen and measuring the specific radio-activity of protozoa for up to 3 days post-injection (see Leng 1982). Rumen fluid turnover was estimated by using Cr-EDTA (see Downes and McDonald 1964). The proportion of the ^{14}C that was injected in protozoa and lost in methane was also estimated using previously reported methods and was taken to indicate the extent to which protozoa were lysed in the rumen. The results are shown in Table 1.

TABLE 1 Pool size, $t_{\frac{1}{2}}$ and apparent production rate of protozoa, and the $t_{\frac{1}{2}}$ of fluid in the rumen of cattle given diets consisting of (g/100 g) oaten chaff (35), molasses (+3% urea) (65) (Diet A) or oaten chaff (65) and molasses (+3% urea) (35) (Diet B)

	No. animals	$t_{\frac{1}{2}}$ rumen fluid (min)	Protozoa			
			$t_{\frac{1}{2}}$ (min)	Pool size (g N)	Apparent production rate (g N/d)	% protozoa retained*
Diet A	7	619	990	20	20	84
Diet B	7	413	1068	22	20	64

* This is estimated as the percentage of injected isotope lost via methane (see Leng, 1982)

The protozoal populations were largely dominated by Entodinia spp (>20 μ) in contrast to the previous work with cattle where the protozoal species were mainly large protozoa (<100 μ). In general the half-time of protozoa is longer than that of fluid indicating a retention in the rumen. The largest proportion of protozoa evidently do not move to the lower tract and appear to be lysed in situ. The pool size of the small Entodinia spp. was roughly similar to that reported for the large Holotrich spp. in cattle on sugar cane based diets (see Leng et al. 1981), but their half-times are quite different and the apparent production rate of entodinia is some ten times greater than that of the large holotrichs.

The different populations of protozoa therefore behave quite differently in the rumen and the results of studies of the effects of the elimination of protozoa from the rumen on production will depend on the populations established under different management systems.

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