DILUTION RATE OF CHROMIUM AND RUTHENIUM MARKERS
IN THE RUMEN AND FECES OF CATTLE

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Many experiments using penned animals have been undertaken to determine the nutritive value of forage, but accurate and convenient methods are difficult to find for use under field conditions. Thornton and Minson (1972), working with sheep, showed that apparent mean retention time (MRT) of dry matter in the rumen was inversely related to dry matter intake. Grovum and Williams (1973), also working with sheep, showed that dilution rate (1/MRT) in the rumen, as estimated using inert markers, was the same as that calculated from the terminal exponential of the marker excretion curve in the faeces.

Work with cattle has been undertaken at James Cook University to measure marker dilution rates within the rumen and excretion patterns in the faeces. Cr-EDTA was used to mark the liquid phase and Ru-Phenanthroline to monitor the solid phase. Using three fistulated steers, fed poor quality (0.3%N, 82%NDF) pasture hay, the excretion rates of the intraruminally administered markers were measured using time-sequence sampling. Typical results from one steer are shown in Fig. 1.

![Graphs of chromium and ruthenium dilution rates in rumen and faeces](image)

**Fig. 1** The dilution of chromium and ruthenium in the rumen (o) and faeces (x) of cattle. Mean retention times (MRT) and correlation coefficients (r) are also shown.

For both chromium and ruthenium the gradient (or dilution rate) of the terminal portion of the faecal excretion curve was not significantly different (P>0.05) from that obtained for the rumen curve, thus indicating that non-fistulated animals can be used to obtain a value for rumen mean retention time. These results have been further substantiated using grazing animals. Current research in this laboratory is studying the relationship between marker mean retention time and nutritive value of forage for cattle. Preliminary data indicate high correlations (r>0.9, n=7) between dry matter intake and mean retention times for both chromium and ruthenium.


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