Nutritive value of foodstuffs is reflected in volatile fatty acid (VFA) production rates in the rumen. Leng and Brett (1966) suggested that VFA production rates could be predicted from their concentrations, however concentrations of rumen fermentation end-products are influenced by time and site of sampling (Bryant 1964). Playne and Kennedy (1976) have claimed that such variations tend to be minimal in a grazing situation. As part of an investigation into the feasibility of predicting the nutritive value of tropical pastures for dairy cows from the concentration of rumen fermentation end-products, it was necessary to establish diurnal changes and variation between sites within the rumen of grazing cattle.

Two experiments were conducted at D.P.I. Dairy Research Station, Ayr, using 4 rumen fistulated Jersey cows grazing Pangola grass pasture. The first trial examined pH, VFA and ammonia (NH₃) concentrations in fluid collected manually from the reticulum, dorsal, mid and ventral rumen, and the posterior ventral sac at 3 hourly intervals for 24 hours. To overcome suspected interference to grazing from the frequency and duration of sampling, animals in the second trial were sampled only from the mid-ventral rumen at 3 or 6 hourly intervals for 24 hours in a crossover design.

Differences in concentrations between sites were significant (P<0.01) for all metabolites. Concentrations of VFA and NH₃ decreased from the dorsal to the ventral rumen and from posterior to anterior, with the lowest always being recorded from the reticulum. Samples from the mid-ventral site were representative of the rumen as a whole. Values for pH followed the reverse trend to VFA. Variation in NH₃ concentrations was considerable. Diurnal variation was significant (P<0.01) for all metabolites; with VFA concentrations recorded at 2400 hours being some 25% higher than those recorded between 0900 and 1500 hours. The diurnal pattern for pH was the reverse of that for VFA concentration, while the NH concentration followed the VFA pattern but lagged behind by 6 hours.

The higher concentrations of VFA measured at night reflect the extent and importance of night grazing, and should not be ignored. VFA concentrations in rumen fluid collected between 9 a.m. and 5 p.m. would have underestimated the average nutritive value of the pasture by up to 12 per cent.