curve represents degradation where all the cell wall is accessible to enzymes and the 'Within tissue' curve represents degradation where access is restricted by other tissue.

PROTEIN METABOLISM

Turnover of microbial protein during in vitro rumen fermentations.

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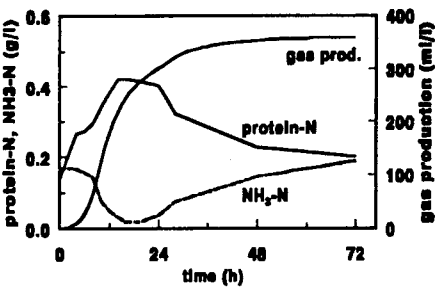
Recently developed techniques using continuous measurement of gas production in vitro are being used to study the fermentation kinetics of ruminant feeds [1]. Cumulative gas production curves can be described by a three-phasic model. The first two phases represent fermentation of soluble and insoluble carbohydrates respectively. The third phase, starting after *c.* 16h, had an unknown source. The present study indicates that the final phase is caused by degradation of microbial mass.

Strained rumen fluid was diluted with 2 volumes of buffer and incubated with glucose, starch or cellulose at 39°C for 72h. Maximal microbial protein concentrations were reached after 8 (glucose) to 16h (cellulose). After 48 and 72h incubation protein levels had decreased to, respectively, 25-50% and 10-25% of the maximal levels. No effect of the type of substrate on the maximal protein level was observed. Ammonia concentrations mirrored that of protein, demonstrating the dual role of ammonia as a precursor of protein synthesis and end-product of protein degradation. The observed protein degradation was at least partially dependent on the presence of protozoa. Rumen fluid from which protozoa were removed by centrifugation (10min 200*g*) showed a 2-3 fold reduced rate of protein degradation.



Cumulative gas production and protein-N and ammonia-N concentrations during incubation of crystalline cellulose in buffered rumen fluid.

1. Cone JW, van Gelder AH, Driehuis F (1997) *Anim. Feed Sci Technol* 66, 31-45

A role for plant enzymes in the early stages of herbage protein digestion in ruminants.

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Proteolytic enzymes in plants are intimately involved in controlled cell-death (apoptosis) during plant senescence. They also cause much of the digestion of plant proteins in the silo after cutting grass for silage. Although in ensiled herbage it is accepted that plant enzymes initiate the conversion of herbage proteins to low molecular weight peptides [1], microor-