

RUMEN DEGRADATION OF INDIVIDUAL PROTEINS IN OIL SEEDS AND  
LEGUME GRAINS

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The rumen degradation of feed proteins has been estimated both from *in vitro* studies, using rumen liquor or buffer solutions (Broderick 1982) and from the incubation of samples in synthetic fibre bags suspended in the rumen (Freer and Dove 1984). Neither approach, on its own, provides information about the degradation of individual proteins in feeds, by rumen micro-organisms. This information is important if, through genetic manipulation, attempts are made to alter seed protein composition in order to better meet animal requirements for amino acids.

Samples of rapeseed meal (RSM), lupin grain (LG) and pea grain (PG) were finely ground (0.8 mm screen) and added to diluted strained rumen liquor (0.5 g sample/50 ml liquid) anaerobically maintained at 39°C for 24 h (Tilley and Terry 1963). Samples of the pure proteins ovalbumin (OA) and bovine serum albumin (BSA) were similarly incubated. Aliquots of 1.0 ml of incubation mixture were withdrawn after 0, 1, 2, 4, 8 and 24 h and from these, the equivalent of 150 µg of protein was fractionated by SDS-polyacrylamide gel electrophoresis (Spencer et al. 1980) followed by staining with Coomassie Brilliant Blue dye. Proteins of rumen origin contributed only an unresolved background and did not interfere with test protein detection.

The proteins studied differed widely in their susceptibility to rumen breakdown. Ovalbumin and BSA were relatively resistant, as earlier reported (Annison 1956; Mangan 1972). Pea grain, RSM and LG each contained some resistant and some susceptible protein components. In PG, the higher molecular weight polypeptides, such as convicilin ( $M_r$  75000),  $M_r$  50000 vicilin and  $M_r$  40000 legumin were degraded rapidly (relative to OA and BSA). The  $M_r$  20000 legumin sub-unit and the  $M_r$  24000 and 6000 albumins were as stable as OA and BSA. Similar results were obtained with a total soluble extract of PG proteins.

The  $M_r$  6000 pea albumin contains high levels of cysteine and methionine (11.5%). Given the high demand of wool growth for these amino acids, the relative resistance of this protein to rumen degradation is of particular interest.

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