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PREDICTION OF PROTEIN AVAILABILITY TO RUMINANTS

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Dietary crude protein (CP) is a poor guide to the availability of protein for digestion in the intestines, due to the intervention of ruminal fermentation. Proteins which are available comprise microbial and dietary fractions. Microbial protein production is determined by the amount of energy available in the rumen, which can be predicted with reasonable accuracy from the content of digestible organic matter (DOMD) determined in vitro. The dietary fraction has been assumed to equate with dietary protein which is insoluble in mineral buffer solutions (Wohlt, Sniffen and Hoover 1973).

Present work took advantage of the availability of 22 herbages on which had been determined, *in vivo*, DOMD and flows to the intestines of non-ammonia nitrogen (NAN) and bacterial nitrogen (10 herbages), using diamino pimelic acid as a bacterial marker. From the latter 10 herbages, the flow of bacterial CP was found to be 129±5 mg/g DOM (8.7 g/MJ ME).

DOMD was measured *in vitro* (Tilley and Terry 1963) and microbial protein production predicted from the ratio established *in vivo*. Protein solubility was measured after grinding herbage samples to pass through a 1 mm screen.. Samples' (0.5 g) were incubated in 20 ml artificial saliva (McDougall 1949) at 38°C for 24 h. After filtration through silica filter cones (porosity 1), the liquid was analysed for nitrogen and the insoluble nitrogen determined by difference.

Regression relationships were obtained between Y (abomasal flows of CP *in vivo* in g/kg DM intake) and X (bacterial CP + insoluble dietary CP in g/kg DM intake as determined in the present study).

TABLE 1: Relationships between *in vitro* and *in vivo* measurements of protein availability.

No.	Dietary CP (g/kg DM)	n		CV	r	$\bar{Y}$	$\bar{X}$
1	54-155	10	Y=0.74X + 29.15	11.6	0.82	125.4	130.0
2	168-303	12	Y=0.67X + 22.54	11.1	0.73	197.0	259.2

$\bar{X}$ was substantially higher than $\bar{Y}$ in equation 2, which indicates that, with herbages containing 168-303 g CP/kg DM, protein availability *in vivo* was overestimated by the techniques reported here. It appears that solubility of dietary CP in a mineral buffer solution underestimates the extent to which it is degraded in the stomach.

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