USE OF WOOL GROWTH RESPONSE TO ESTIMATE ESCAPE OF PROTEIN SUPPLEMENTS FROM THE RUMEN

S.A. NEUTZE*

The proportion of protein supplements escaping the rumen intact may be measured using a wool growth index (WGI) (Leng et al. 1984). The present trial was designed to evaluate this procedure in more detail, and remove possible specific effects of the sulphur amino acid content of supplements tested.

Forty-eight 3-year old Merino wethers (mean 45 kg) of high wool growth potential were individually penned indoors and given a basal maintenance ration of (g) 900 oaten chaff, 12 urea, 2.4 D,L-methionine, and minerals. Also, 100 g protein supplement or 60 g casein or HCHO-casein were given. Sheep (6 per treatment) were adapted to the supplements for 5-6 weeks then wool growth was measured by clipping midside patches on both sides. WGI was the incremental wool growth rate (WGR) above the basal diet, on an equivalent crude protein basis, as a percentage of incremental WGR from 60 g HCHO-casein.

TABLE 1 Comparison of WGI and literature estimates for escape of supplementary protein from the rumen (mean + s.e.)

Supplement:	CAS	LSM	SFM	PM	FM	LUP	PEAS	CSM	SBM	F-SFM
WGI (%)	10	82	84	68	113	83	29	83	73	83
	(14.8)	(20.9)	(15.3)	(10.6)	(14.8)	(26.9)	(34.6)	(21.5)	(15.1)	(22.4)
Lit. escape(%)	10	40	20	30	70	(30)	(20)	40	25	(50)

CAS,casein;LSM,linseed meal;SFM,sunflower meal;PM,peanut meal;FM,fishmeal;LUP,whole lupins;PEAS,whole peas;CSM,cottonseed meal;SBM,soyabean meal;F-SFM,HCHO-SFM
LUP,PEAS,F-SFM: ( ) = estimated as no data available

Average basal WGR was 0.880 mg/cm^2/day (C.V. = 14.9%). Individual WGR from a preliminary period was used as a covariate. There were large differences within treatments in WGR and differences in WGI between supplements approached significance (P = 0.054). The correlation between WGI and mean in vivo literature estimates of escape was significant (P < 0.01) (r2 = 0.62, s.e. 19.3), but removal of casein and FM (i.e. either extreme value) reduced r^2 to 0.27.

Variation in literature values for escape, due to different experimental conditions, contributed partly to the poor correlation. However, there are some serious problems with the WGI technique. Possible factors contributing to the poor correlation and large variability in WGI include :- (i) the effects of additional energy from the protein supplements on rumen microbial protein synthesis and tissue deposition, (ii) the partitioning of protein in the different supplements into wool and other tissues, and (iii) the relatively small proportion of absorbed amino acids deposited in wool.

The WGI depends on the ratio of two relatively small increments in wool growth. This, together with the above factors, results in insensitivity and poor estimates of the proportion of supplementary protein escaping the rumen.

LENG, R.A., DAVIS, J. and HILL,M.K.(1984). Estimation of bypass protein based on wool growth. Proc. Aust. Soc. Anim. Prod. 15, 431-433.

* NSW Agriculture-and Fisheries, Nutrition and Feeds Evaluation Unit, Glenfield, N.S.W. 2167.