BIOMECHANICAL PROPERTIES OF PLANT SPECIES IN ANNUAL PASTURES GRAZED TO DIFFERENT LEVELS OF FEED ON OFFER.

R.A. DYNES and D.A. HENRY

CSIRO Livestock Industries, Private Bag No 5 Wembley, WA 6913

The feeding value of a pasture or forage is the animal production response when voluntary feed intake (VFI) is not limited by feed availability. Ulyatt (1973) estimated that variation in VFI accounts for at least 50% of the observed variation in feeding value of forages. Measurement of *in vitro* digestibility and proximate analyses will provide estimates of relative nutritive value (production response per kg of feed) but no estimate of feeding value of forage. VFI is correlated with some proximate analyses, however Weston and Davis (1991) found a stronger relationship between biomechanical characters/ fibre composition of forages and what animals did not eat (forage consumption constraint; FCC). Energy required to comminute was positively correlated (r=0.96) with FCC, as was energy required to shear and FCC (r=0.94, Baker unpublished). Plant biomechanical properties together with digestibility can be used to estimate FCC as an index of potential feeding value. In grazing experiments alkanes can be used to determine digestibility, intake and selection thus allowing the comparison of actual FCC and FCC estimated from biomechanical properties.

The aim of this study was to determine the effect of grazing to different levels of feed on offer throughout the season on the energy required to shear the different plant species present and further to investigate the relationship between energy required to shear and proximate analyses.

The plant material was collected as part of an experiment at Mt Barker (530km south of Perth), where pregnant/lactating ewes and wethers of low or high condition score were grazed on plots maintained at a level of feed on offer of 600, 900, 1200, 1600, 2000 or 2500 kg DM per hectare from mid June (approximately 1 month before lambing) until early October 2000. Pastures were sampled intensively on 11 July (winter), 28 August (spring) and 3 October (wilting), by plucking pure species at predetermined intervals along a W transect across the plot.

Table 1. Mean (sem) shear energy, *in vitro* digestibility and NDF content of annual pasture species

	Clover			Grasses			Capeweed		
	July	August	October	July	August	October	July	August	October
Shear (kJ/m^2)	6.9 (0.72)	5.6 (0.76)	7.4 (1.2)	8.1 (0.91)	7.9 (0.97)	9.6 (0.79)	8.2 (0.49)	6.4 (0.57)	6.6 (0.76)
IVD (%)	73 (1.2)	71 (2.0)	69 (1.1)	72 (3.9)	69 (2.7)	67 (3.3)	79 (1.2)	77 (1.3)	75 (1.7)
NDF (%)	37 (1.8)	41 (1.6)	41 (1.9)	52 (1.8)	53 (1.8)	55 (1.7)	43 (1.8)	44 (1.9)	35 (1.9)

There was no effect of level of feed-on-offer on the energy required to shear plant material ($P>0.05$), despite visual differences in sward structure. Pasture species and time of sampling significantly affected shear energy. The energy required to shear grass increased from winter/spring to wilting, ($P<0.001$), capeweed decreased significantly over the season and clover decreased in spring but increased again at wilting. Although these changes were statistically significant, energy required to shear of less than 10 MJ is significantly lower than found with hays and dry mature pastures where the energy required to shear is commonly in the 12-24 kJ/m^2 range (Baker & Dynes 1999). NDF and IVD were significantly but relatively poorly correlated with shear ($P<0.001$; $r=0.51$: $P=0.008$; $r=-0.29$).

In conclusion, maintaining annual pastures over a wide range of levels of feed on offer did not affect the energy required to shear plant material, although further research on the contribution of plant parts to average shear is required. The energy required to shear the plant material remained relatively low even following wilting and unlikely to constrain intake.

BAKER, S.K. and DYNES, R.A. (1999). *In* 'Genetic Resources of Mediterranean Pasture and Forage Legumes' p. 120-131.

Ulyatt, M.J. (1973*). In* 'Chemistry and Biochemistry of Herbage' p. 131-78.

WESTON, R.H. and DAVIS, P. (1991). *Proc. 3rd Int. Symp. Nutr. Herb*. **31**.

Email: Robyn.Dynes@csiro.au