Rumen degradation characteristics of four species of native pastures from central Mexico in three growing periods

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Introduction The smallholder cattle systems of the Toluca valley in central Mexico are based on the use of maize and native grasses. Research has been devoted to nutritional characterisation of improved pastures, but native species of grasses have not been studied, despite their importance. The aim of this experiment was to evaluate the *in vitro* rumen degradation kinetics of four species of native pastures.

Material and methods *Pennisetum clandestinum* (PC), *Sporobolus indicus* (SI), *Trifolium amabile* (TA), *Eleocharis dombeyana* (ED) and pooled samples (PS), which included all the species, were collected. Sample selection was based on the preference shown by grazing livestock and their abundance within four communities in Toluca valley. Four plots of native pastures were selected by community - 16 plots in total. Samples were harvested in 2003 in July (P1), September (P2) and November (P3). All samples were analysed for *in vitro* gas production (GP) as described by Theodorou *et al*. (1994); digestibility of the NDF (dNDF) and organic matter digestibility (OMD) were estimated from the GP analyses. The cumulative GP was fitted to the model of Jessop & Herrero (1996). A split plot design was used, where the main plots were the species and the split plots were growing periods and communities were blocks. Data was analysed by analysis of variance, Minitab v13.

Results and discussion As expected ,there was a significant decline from P1 to P3 for all degradation parameters and for gas production. Significant differences were observed between species for *a* ($P<0.05$), *b*, *c2* and *lag* time ($P<0.001$) (Table 1). There was a significant interaction between species and period for *b* and *lag* phase ($P<0.05$). The *a* fraction ranged from 38.9 ml/g dry matter in SI to 63.9 in TA. No significant differences ($P>0.05$) were observed for *c1*. The species with the highest *b* fraction (202.5 ml) was SI, while ED had the lowest value (139.1 ml). Highly significant differences ($P<0.001$) were observed for *c2*; TA having the highest rate (0.046/h) and SI the lowest (0.026(/h). As a consequence of its low NDF degradation rate, SI and ED had the highest lag times, whilst TA showed the shortest *lag* phase.

Table 1 Rumen degradation parameters

Species	a (ml)	cl (/h)	b (ml)	c2 (/h)	lag (h)
PS	59.6	0.08	165.9	0.032	9
PS	55.9	0.076	180.7	0.038	8.7
SI	38.9	0.14	202.5	0.026	10.3
TA	63.9	0.089	164.3	0.046	5.1
ED	55.1	0.083	139.1	0.028	10.7
s.e.m	14.7	0.041	36.1	0.013	3.4
Period	*	NS	***	***	***
P1	61.9	0.113	192.1	0.039	6.4
P2	52	0.073	157.1	0.034	10.1
P3	50.1	0.095	162.37	0.029	9.8
s.e.m	7.1	0.022	21.1	0.005	2.2
	NS	NS	***	***	***

The opposite tendency was observed for the *lag* phase, as in PS it increased from 6.4 h in P1 to 9.8 h in P3, probably as a response to the increase in NDF content from P1 to P3. TA had the highest gas production rate at 8 h (9.4 ml gas/h), released probably from its pectin content. It also showed the highest GP at 24 h, which is probably through fermentation of the NDF. These data for TA suggest that most of the insoluble fraction was degraded before 48 h and at a faster rate than for the other species. Degradation data suggest that TA will permit high intakes for the animal because of its high degradation rate of the insoluble fraction and short *lag* time.

Conclusion The results obtained here suggest that nutritive value was highest from early July to late September (P1 and P2). TA showed the best degradation parameters.

References

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