EFFECT OF CALLIANDRA TANNINS ON RUMEN MICROBIAL FUNCTION

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Condensed tannins in the shrub legume *Calliandra calothyrsus* (calliandra) complex protein and reduce nitrogen digestibility but their impact on rumen microbial function has not been investigated.

Sixteen Merino wethers were randomly allocated to five treatment groups as follows: (1) buffel grass (*Cenchrus ciliarus) ad libitum*, G; (2) G plus 30% calliandra, G+Call; (3) G+Call plus 40g polyethylene glycol 4000/day, G+Call+PEG; (4) G plus 30% lucerne (*Medicago sativa*), G+Luc; (5) G+Luc+PEG. PEG was included to counteract the effect of tannins. Efficiency of microbial protein synthesis in the rumen was estimated by the urinary purine method (Chen *et al.* 1990). Protozoa were enumerated by light microscopy. Bacterial and fungal numbers were determined using selective media for functional groups (Mackie and Wilkins 1988; Joblin 1981; Dehority *et al.* 1989) and ribosomal RNA based methods. The three-tube MPN tables were used to estimate the number of fibrolytic bacteria and fungi growing in broth medium for two animals in each group (Dehority *et al.* 1989).

Sheep supplemented with legume had a significantly higher ($P < 0.05$) digestible organic matter intake (DOMI) than the grass fed controls. Treatment with PEG did not affect DOMI. Urinary purine excretion was lower ($P < 0.1$) in sheep fed grass alone or supplemented with calliandra. Diet did not significantly affect the efficiency of microbial protein synthesis in the rumen (Table 1). The total number of cellulolytic bacteria was lower in sheep fed calliandra ($2.0x10^6$ to $2.0x10^7$/gm digesta) compared with those treated with PEG or supplemented with lucerne ($1.1x10^8$ to $2x10^9$). *Fibrobacter* spp. (Table 1) were significantly lower ($P < 0.05$) in number in calliandra supplemented animals compared with lucerne fed sheep. The proportion of fungi was unaffected by the presence of tannins based on colony counts and rRNA hybridisation (Table 1). PEG treatment did not significantly affect the number of microorganisms in sheep fed lucerne. The number of protozoa (1.0 vs $3.4x10^4$), xylanolytic (6.4 vs $4.7x10^8$), pectinolytic (2.7 vs $3.4x10^8$) and proteolytic (2.2 vs $1.8x10^8$) bacteria were not significantly different between sheep fed calliandra alone or with PEG.

Table 1. Effect of calliandra and lucerne, with and without polyethylene glycol (PEG) on digestible organic matter intake (DOMI), urinary purine excretion, microbial N yield in relation to OM digested in the rumen, and fibrolytic microorganisms in roughage fed sheep

Treatment	DOMI (g/d)	Purine excretion (mmol/d)	Microbial N (gN/kg DOMR)	*Fibrobacter* spp. (% tot. rumen organisms*)	Fungi (% tot. rumen organisms*)
Grass	328 ± 25^{a}	7.52 ± 0.5^{A}	29.3 ± 0.5	-	-
Grass + Calliandra	387 ± 14^{b}	8.28 ± 0.5^{AB}	28.0 ± 2.5	1.7 ± 0.7^{a}	1.1 ± 0.5
Grass + Calliandra + PEG	412 ± 12^{b}	9.10 ± 0.9^{B}	29.2 ± 2.8	3.7 ± 0.8^{a}	0.8 ± 0.2
Grass + Lucerne	394 ± 26^{b}	9.36 ± 0.2^{B}	31.5 ± 1.9	8.3 ± 1.7^{b}	1.8 ± 0.5
Grass + Lucerne + PEG	426 ± 9^{b}	8.98 ± 0.7^{B}	27.6 ± 2.3	10.0 ± 1.9^{b}	1.6 ± 0.5

Means in the same column with different superscripts differ significantly (^{a,b} $P < 0.05$, ^{A,B} $P < 0.1$)
*Estimated from the relative abundance of either 16S or 18S rRNA

It is concluded that the presence of calliandra tannins in the diet (approx. 3 to 4%) probably inhibits fibre degrading bacteria in the rumen but the effect on rumen microbial metabolism is insufficient to alter the efficiency of microbial protein synthesis.

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