Nitrogen Retention and Microbial Protein Yield of *Desmodium uncunatum, Mucuna pruriens* and *Vigna unguiculata* Forage Legumes in Goats

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Introduction

Forage legumes have high potential degradability, indicating that they might need to stay in the rumen for a longer time (Molina-Alcaide *et al.*, 1996) to increase microbial protein yield. Microbial protein contributes about two thirds of the amino acids absorbed by ruminants (Pathak 2008). Protein supplements which have proper levels of rumen undegradable protein provide growth limiting amino acids like lysine and methionine (Rezai *et al.*, 2012). Nyambati *et al.* (2003) showed that milk production can be increased by supplementing with velvet bean, highlighting the importance of integrating legumes into the low-input, mixed cropping systems in the tropics. The current study was to determine total microbial protein yield from *Vigna unguiculata* (cowpea), *Desmodium uncinatum* (silverleaf desmodium) and *Mucuna pruriens* (velvet bean) legume forages in goats.

Materials and Methods

Four growing indigenous Nguni-type male goats (29±0.5 kg) were used in a 4x4 Latin- square experimental design. The goats were fed veld hay supplemented with legume forage dietary treatments of either 16.3% CP commercial goat feed (CF) *ad libitum* or supplemented with velvet bean (VB) or silverleaf desmodium (SD) or cowpea (CW). Each goat was fed each treatment for 15 days (10 days of adaptation and 5 days of measurement), before being switched to the next treatment. Microbial protein yield was determined estimating allantoin in the urine using the purine derivatives technique as described by Chen and Gomes (1992).

Results and Discussion

Nitrogen retention was negative for goats supplemented with velvet bean and silverleaf desmodium, but positive with cowpea supplement and commercial feed. There were no significant differences ($P > 0.05$) in microbial protein synthesis and animals on the commercial feed diet were as efficient as those supplemented with silverleaf cowpea and velvet bean in microbial protein production (Table 1). Digestible microbial true protein, digestible organic matter in the rumen, microbial true protein, microbial nitrogen yield and allantoin levels were all significantly different ($P<0.05$).

Table 1: Nitrogen retention (g/d) and excretion of purine derivatives and the microbial protein production in goats

	Treatment group				
Parameter	**VB**	**SD**	**CW**	**CF**	**SEM**
N retention	-1.29^{c}	$-0.46b^{c}$	0.84^{ab}	2.13^{a}	0.40
Allantoin ($mmol.d^{-1}$)	3.63^{d}	4.27^{b}	3.80^{c}	4.67^{a}	0.04
Microbial nitrogen yield (^{5}MNY) ($g.d^{-1}$)	2.64^{d}	3.10^{b}	2.76^{c}	3.40^{a}	0.03
Digestible Microbial true protein ($g.d^{-1}$)	11.2^{d}	13.2^{b}	11.7^{c}	14.43^{a}	0.12
Digestible organic matter in the rumen (DOMR)	136^{c}	162^{ab}	156^{ab}	192^{a}	0.12
$^{1}E_{mns}$ ($g.kg^{-1}$ DOMR)	2.21^{a}	2.01^{a}	2.06^{a}	1.95^{a}	0.23

^{a,b,c,d}Means in the same row with different superscripts are significantly different ($P < 0.05$), $^{1}E_{mns}$ = efficiency of microbial nitrogen synthesis (AFRC, 1993), SEM = standard error of means

Conclusion

Nitrogen retention was negative for goats supplemented with velvet bean and silverleaf, but positive with cowpea supplement and commercial feed. Digestible microbial true protein, digestible organic matter in the rumen, microbial true protein, microbial nitrogen yield and allantoin were all significantly different amongst the dietary groups.

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