

Influence of tanniniferous shrubs (*Calliandra calothyrsus* and *Flemingia macrophylla*) in tropical diets on energy metabolism and methane emission of lambs

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Problem

Tropical fodder shrub legumes are often characterized by high contents of condensed tannins (CT). While the influence of CT on protein metabolism is well studied, few data are available on their effects on metabolic energy turnover and the existing indications for methane-suppressing effects of CT require further confirmation.

Aim

The aim of the present study was to measure the effect of partly replacing an expensive, CT free high-quality legume (*Vigna unguiculata*) by promising tanniniferous shrub legumes (*Calliandra calothyrsus*, *Flemingia macrophylla*) to a tropical grass diet (*Brachiaria brizantha*) on digestion, energy metabolism and methane emission of sheep.

Methods

- Six dried tropical plant diets.
- Six 22.7 ± 3.8 kg Swiss White Mountain breed lambs.
- Latin square design.
- Dry matter allocation: 60 g kg⁻¹ of BW^{0.75}.
- Data collection:
 - 2 weeks: adaptation to diets.
 - 1 week: quantitative recording of intake and excretion.
 - 2 days: gaseous exchange in open circuit respiratory chambers.
 - Two blood & rumen fluid samples per experimental run.



Sheep kept in metabolic crates within respiratory chambers.

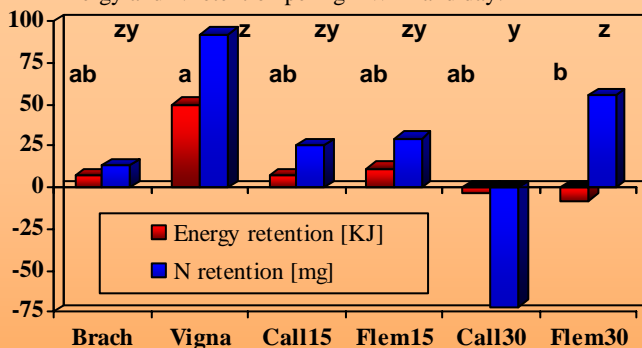
Ingredient composition of the diets offered and nutrient composition of the actually consumed diets (in g/kg DM).

Diet	Brach	Vigna	Call15	Call30	Flem15	Flem30
Brachiaria brizantha	100	55	55	55	55	55
Vigna unguiculata	--	45	30	15	30	15
Calliandra calothyrsus	--	--	15	30	--	--
Flemingia macrophylla	--	--	--	--	15	30
Crude protein	61	108	103	107	93	107
NDF	638	544	542	558	567	571
ADF	376	338	340	351	349	364
ADL	45.9	53.1	60.8	68.6	64.3	85.1
Gross energy (MJ/kg DM)	16.6	16.4	16.7	16.8	16.9	17.1
Condensed tannins						
Total	nd	nd	22.3	14.2	32.8	28.8
Extractable	nd	nd	12.5	4.2	18.4	8.6
Bound	nd	nd	9.8	10.0	14.4	20.2

nd = not detected

Results & Conclusions

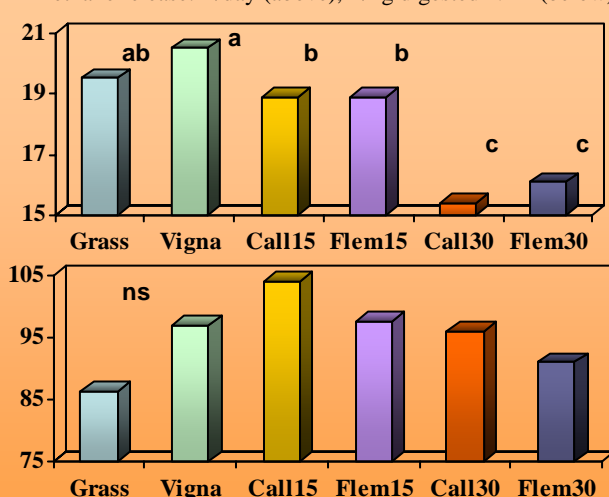
Energy and N retention per kg BW^{0.75} and day.



The results demonstrate that the use of tanniniferous tropical shrub legumes, in replacement of a high-quality legume, results in a reduced metabolic energy and protein supply.

However, as an alternative on poor acidic soils, characterized by low-protein grass species, part of the care-intensive CT-free Vigna could be replaced by *Flemingia macrophylla* in improving such tropical grass-only diets. *Calliandra calothyrsus* can not be recommended.

Methane release: L/day (above), L/kg digested NDF (below).



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