EVALUATION OF NON-CONVENTIONAL ENERGY AND PROTEIN SOURCES IN LACTATING EWES' RATION

By

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ABSTRACT

This study was conducted to evaluate using of some non-conventional feed resources such as *Leucaena leucocephala* (leucaena), *Manihot esculent* (cassava) leaves, and rejected banana (RB) in lactating ewes' diet. This study consisted of three parts; the chemical evaluation, *in vitro* and *in vivo* studies.

The chemical composition, HPLC analysis and GC-MS analysis were performed for the tested ingredients. The *in vitro* study was conducted using gas production technique, to evaluate the rate of gas production and fermentation patterns at 24 hrs of incubation. Regarding the *in vivo* studies two separately lactation trials were conducted using lactating Blackbelly ewes (1 week after lambing). In the 1st lactation trial, 24 ewes were divided randomly into four groups to evaluate the total replacement of alfalfa pellets with leucaena leaves pellets with/without RB. In the 2nd lactation trial, another 24 ewes were divided randomly into four groups to evaluate the total replacement of alfalfa pellets with cassava leaves pellets with/without RB.

The chemical analysis showed that leucaena and cassava leaves had higher crude protein (22 and 20.5%), total phenols (40.7 and 22.1 eq- to Gallic acid (g)/DM (kg)), and total tannins (4.43 and 1.79%) than alfalfa. The HPLC results mentioned that leucaena and cassava leaves extract had high content of valuable phenolic components that have antioxidant and anti-inflammatory properties like gallic acid, ellagic acid and naringenin. The *in vitro* study demonstrated that leucaena leaves had the lowest total accumulative gas production being 90.7 ml/g DM. The RB recorded the lowest ruminal pH (5.24) and ammonia concentration (9.0 mg/100ml) compared to other feed ingredients, while it had the highest gas production (192.9 ml/100ml) and degraded organic matter (905.3 g/kg). The 1st *in vivo* trial illustrated that there were insignificant differences in total DM intake as well 4% fat corrected milk and milk yield and composition between different diets. The 2nd *in vivo* trial indicated that there were insignificant differences in forage pellets intake, however RB addition decreased grass hay intake being 1317.5 g DM/day comparing with diets without RB (1441.3 g DM/day), with insignificant difference in 4% fat corrected milk, milk yield and composition. Addition of RB to diets showed a positive effect (insignificant) on ewes' milk yield.

In general, substitution of alfalfa by leucaena or cassava leaves with RB as non-conventional protein and energy sources in ration detected no depressive effect on lactating ewe's performance and lambs growth rate.

Key words: *Leucaena leucocephala*, *Manihot esculent*, rejected banana, *Medicago sativa* L., *Dichanthium spp., in vitro, in vivo.*

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LIST OF ABBREVIATIONS

ADF	:	Acid detergent fiber
ADL	:	Acid detergent lignin
AOAC	:	Association of Official Agriculture Chemists
BCS	:	Body condition score
BW	:	Body weight
C_2/C_3	:	Acetate to propionate ratio
CF	:	Crude fiber
CP	:	Crude protein
DG	:	Daily gain
DM	:	Dry matter
DMI	:	Dry matter intake
DNDF	:	Degraded neutral detergent fiber
DOM	:	Degraded organic matter
EE	:	Ether extract
FCM	:	Fat corrected milk
GC-MS	:	Gas chromatography-mass spectrometry
GP	:	Gas production
H	:	Head
HPLC	:	High performance liquid chromatography
Hrs.	:	Hours
Kg	:	Kilogram
L	:	Liter
µ	:	Micro
NCFRs	:	Non-conventional feed resources
NDF	:	Neutral detergent fiber
NFE	:	Nitrogen free extract
NH_3-N	:	Ammonia nitrogen
OM	:	Organic matter
SEM	:	Standard error of the mean
VFA	:	Volatile fatty acids
VS.	:	Versus