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Mohamed Rashid, Harry Archimède

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Response of lactating Blackbelly ewes to fed pellets of *leucaena leucocephala* leaves with dry banana fruits

Rashid M.R.^{1,2} and Archimède H.¹

¹INRA, UR143, Unite de Recherches Zootechnique, Guadeloupe, French West Indies; harry.archimede@inra.fr

²Regional Center for Food and Feed, Agricultural Research Center, Giza, Egypt; Mohamed.rashid@inra.fr

Introduction

The productivity of ruminants in tropics, limited by poor nutritional conditions that are characterized by highly lignified, lack of feed during drought and low digestible feed from poor or nitrogen limited native grass pasture. In tropical and subtropical regions, using non-conventional protein and energy sources could play an important role in livestock nutrition. *Leucaena leucocephala* is one of the main tropical shrub species which contains condensed tannin with potential to reduce methane emissions. Further, leucaena leaves were highly degradable in the rumen and could be used to improve rumen ecology (Pineiro-Vázquez et al., 2018). Banana fruits have been identified as alternative sources of energy in animal production systems with a sustainable approach. Therefore, this study was conducted to determine the response of feeding *leucaena leucocephala* leaves with dried green banana fruits in pellets form as an innovation technique to increase animal feed intake, with focusing on performance of tropical ewes.

Materials and methods

The present experiment was conducted according to the guidelines of the French Ministry of Agriculture for Animal Research, at the Plateforme Tropicale d'Expérimentation sur l'Animal (PTEA), Petit Bourg, Guadeloupe. Twenty eight lactating Blackbelly ewes were divided randomly into four groups using individual feeding group design. First group received 2kg of hay as a control ration. Second, third and fourth groups received 1.5kg of hay plus 400, 800 or 1400g LBP respectively. The offered hay based on an early regrowth of *Dichanthium spp.*. The chemical composition of the hay was 910, 120, 740, 470 and 70 g/kg DM for OM, CP, NDF, ADF and lignin content respectively. The equivalent values for *leucaena* were 910, 270, 390, 250 and 40 g/kg DM, in the same order. Green banana fruits OM, CP, NDF and starch were 950, 44, 120 and 696 g/kg DM, respectively. The amounts of refused feeds were recorded daily for all animals. Milk yield for each ewe (hand milking method) and lambs weight were measured at day 14, 21, 28 and 35 after lambing. Ewes' body weight (BW) and body condition score (BCS) also recorded at the 1st day then at the last day of the trial. The change of the BW and the BCS of ewes, from lambing to day 35, were calculated for each variable as the difference between both measurements. Rumen liquor samples were taken in the last day of the trial 6 hrs post feeding for rumen ecology parameters. The statistical analysis was performed using the MIXED procedure of SAS 9.2 release (SAS 2008).

Results and discussion

Table 1. shown the main results, the amount of hay intake (g DM/day) was differ between treatments. The highest value (1099.8 g DM/day) for T1 compared with other treatments ($p < 0.0001$), in a way to cover nutrients requirements from the available feed source. Increasing the amount of LBP intake caused decrease of the intake. As a results of the variance between LBP and hay intake for treatments, the total DM intake values differs ($p < 0.0001$) between treatments. T4 showed the highest total DM intake value being 114.5 then T3 = 85.6 and T2 = 78.2 g DM/day per kilogram body weight^{0.75} (BW^{0.75}) with the lowest value for the control group = 68.1 g DM/ day. As a consequence, the milk production (g/day) differed significantly between treatments. Hence, the lowest average milk production was observed for T1 = 218.3 g/day. Furthermore, disappearance of significant difference between T2, T3 and T4 could be due to the variance of production within the same group. These results are in agreement with the results of Clavero and Razz (2003) the milk yield increased with 52.7% when goats had access to browsing leucaena 2 hrs/day compared with grazing pasture only (buffel grass). The changes of ewes' BCS for tested treatments showed a significant difference with linear increase for animals which received LBP in T2, T3 and T4 being 0.36, 0.42 and 0.62 respectively. Whereas, a decrease was recorded for the ewes' BCS in the control group = -0.04. The changes of ewe's body weight were higher in the T4 = -9.62 kg, with no-significant difference between the other treatments. The offspring growth for the ewe's in T4 (159.1 g/day) reported the highest ($p = 0.0044$) value compared with the other treatments T1, T2 and T3 being 102, 119.2 and 131.2 g/day respectively. Rumen ecology parameters indicated that mean values of ruminal pH were similar among the four treatments. However, ruminal NH₃-N concentration was significantly different among treatments. The highest value was found in treatment with 1400 (g/head/day) of LBP and consecutively with 800, 400 and 0 of (g/head/day) LBP. Similar observations were recorded for rumen ecology parameters by Hung et al. (2013) who tested the effect of using 0, 150, 300 and 450 g/head/day of *Leucaena* leaf pellet beside rice straw.

Table 1. Least square means of feed intake and the other measured parameters for the experimental diets.¹

Items	Treatments groups				SEM	P-value
	T1	T2	T3	T4		
Hay Intake g DM/day	1099.8 ^a	989.5 ^b	783.4 ^c	790.6 ^c	222.2	<0.0001
TDM intake g/kg BW ^{0.75}	68.1 ^d	78.2 ^c	85.6 ^b	114.5 ^a	14.6	<0.0001
Milk production gram/day	218.3 ^b	353.6 ^a	412.3 ^a	429.5 ^a	135.7	<0.0001
BCS changes	-0.04 ^b	0.36 ^{ab}	0.42 ^{ab}	0.62 ^a	0.54	0.049
Ewes body weight changes kg	-3.11 ^a	-1.30 ^a	-0.14 ^a	-9.62 ^b	5.6	0.0192
Lambs daily weight gain g/day	102.0 ^b	119.2 ^b	131.2 ^b	159.1 ^a	32.4	0.0044
Rumen liquor pH	6.84	6.73	6.73	6.62	0.23	0.366
Rumen liquor NH ₃ -N mg/litre	152.1 ^b	153.2 ^b	188.9 ^{ab}	199.8 ^a	34.6	0.0427

Means in the same row with different superscripts letters are significantly differ (P<0.05).

T1: Control group feed hay only ad libitum; T2, T3, T4: feed 400, 800, 1400 g /day pellets consists of 50% *leucaena leucocephala* leaves with 50% dried green banana fruits

Conclusion

The innovation of mixing protein and energy sources from non-conventional plants in pellets form provide a new way to increase feed intake and enhance animal performance. This research point needs further studies to clear the effects of using the tested non-conventional sources with more animal's number or in different production section.

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