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Intake and digestibility of *Acacia macracantha* and *A. tamarindifolia* in mixed rations with agricultural byproducts in goats*

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ABSTRACT

Intake and digestibility of leaves, *Acacia macracantha* (Am) and *A. tamarindifolia* (At), in rations mixed with ammoniated rice straw (R) and maize hominy (C), was evaluated for growing goats. 8 goats (20.5 kg liveweight) were used in the experiment. A complete randomized experimental design with a factorial (2×2) arrangement was conducted. The factors were: 1. Am and At; 2. Two different inclusion levels: low (18.75%) (L) and high (37.5%) (H). The intake of Am was higher (803 g DM/day) compared with At (638 g DM/day). Intake at different inclusion levels did not differ between species (H=685 and L=765 g/goat/day, P=0.247). The digestibility of the two *Acacia* species differed: DM, Am=80.02 and At=74.62%; NDF, Am=80.33 and At= 74.79%; hemicellulose, Am=94.35 and At= 88.50%. It was concluded that intake and digestibility of Am was higher than of At.

KEY WORD: *Acacia macracantha, Acacia tamarindifolia,* goat, byproducts

INTRODUCTION

The effort of trying to improve nutrition of animals and promoting use of local feed resources and its optimization, have led to an interest on evaluating native forages, from semiarid areas in Lara State (Venezuela) and use them as feed sources for ruminants. Species like *Acacia macracantha* (Am) and *A. tamarindifolia* (At) as a protein source was tested in combination with ammoniated rice straw (ARS) as fibre source and maize hominy (CH) as carbohydrate source. The main objective of this study was to evaluate intake and digestibility of rations that include Am and At mixed with ARS and CH in goats.

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MATERIAL AND METHODS

This study was conducted in the Unidad de Investigación en Producción Animal from Decanato de Agronomía, Universidad Centrocidental "Lisandro Alvarado", Cabudare, Lara State (Venezuela); where altitude is 510 m.o.s. and averages of temperature, rainfall and evaporation are 24ºC, 870.3 mm and 978.8 mm, respectively. Branches from Am and At were collected and dried by the sun to get the leaves. Leaves of At were also dried by an air forced oven, at 60ºC for 48 h. After this dry process, the leaves were grinded using a 2 mm strainer. Rice straw was ammoniated using an urea solution (10 kg of urea in 100 L of water) to spray on the straw and hereafter put in a hermetic sealed plastic bag for more than 15 days. Experimental design was completely at random with a 2×2 factorial design, the factors: a. Am and b. At; at two inclusion levels: low (18.75%, L) and high (37.5%, H). To avoid an animal effect a change over was necessary (Lucas, 1976). Variables evaluated were: individual DM intake and DM, NDF and hemicellulose digestibility. Eight Creole growing male goats were selected from the same farm. Their average weight was 20.5 kg. Four of them were selected at random and placed in a metabolic cage (120×155× 80 cm) to collect faecal outputs. A daily ration was offered to them, always at 13.00 h. The ration offered to each goat was increased from four percent to six percent of it's liveweight. Additionally, they were supplemented with salt (62 g/animal).The treatment rations were: T_1= L Am + 56.25% ARS + 25% maize hominy (CH); T_2= H Am + 37.5% ARS + 25% CH; T_3= L At + 56.25% ARS + 25% CH; T_4= H At + 37.5% ARS + 25% CH. The study completed 4 experimental periods of 14 days each, including 7 adaptation days. Excreta outputs and feed intake were recorded during the last 7 days of the experimental periods to complete 56 days. At the end of each period, treatments were rotated between animals and after 28 days the animals were changed. Rations were formulated considering goats' nutritional requirements (NRC, 1981), for maintenance and growth. Individual ration intake was determined by subtraction of offered and rejected quantities. Apparent DM digestibility (ADDM) was estimated by total collection method (Moore and Waller, 1975). Excreta was processed and analysed by proximal analysis (Van Soest, 1963; AOAC, 1984). Data was analysed using Statistic for Windows (1996), whenever treatment means' differences appeared, a Tukey test was used to separate them. In Table 1 proximal analysis of treatments is presented.

RESULTS AND DISCUSSION

DM intake for T_1, T_2 and T_3 (801, 806, and 713 g/day) was higher than for T_4. Although statistically just T_1 and T_2 intake were different ($P<0.05$) from

T_4. There were no significant differences between digestibility values although lower values were shown for treatments containing At. Further, DM intake was lower for treatments containing At. The effects of vegetal species and inclusion level were higher than the effect of intake. There was no interaction between vegetal species (Am and At) and inclusion level (H and L). When vegetal species was evaluated we could observe that DM intake was affected significantly (P=0.0113) by species. Rations with Am were superior to rations with At since DM intake was 803 vs 638 g/day. Am contains less CP than At (34.33 and 35.06%; Table 1), which suggests that the lower DM intake of rations with At occurred because the animals had already satisfied their protein needs. Thus, rations with less CP were consumed in higher quantities. There was no significant difference in DM intake when inclusion level of both species were compared, although at the low level, intake was superior to intake at the high level (765 vs 685 g/day) for any of the species. It could be because of high CP levels in rations caused for legume forages and ammoniated rice straw. These results differ from those obtained by Nguyen (1988) and Benavides (1993), who indicated a positive correlation between legume forage level in rations and DM intake.

Table 1. Chemical composition of feed and rations, %

Feed or ration	DM, 60°C	Crude protein	NDF	ADF	Hemicellulose	Ash
A. macracantha	88.96	34.33	71.94	56.16	15.78	6.62
A. tamarindifolia	92.47	35.06	73.62	48.99	24.63	4.99
ARS	90.54	9.98	67.77	51.69	16.08	15.15
CH	83.2	13.41	26.91	6.90	20.01	2.59
T_1	92.05	15.07	70.94	44.00	26.94	16.86
T_2	93.42	19.55	64.11	43.38	20.73	14.21
T_3	92.16	15.70	71.35	47.47	23.89	16.68
T_4	92.34	20.10	63.25	43.43	19.87	14.50

There was a significant difference (P=0.0553; Table 2) in DM digestibility by species. Am was superior to At (80.02 and 74.62%). Digestibility of Am in this study was higher than reported by Nguyen (1998) for some other legume species as *Leucaena leucocephala* and *Sesbania grandiflora* that presented digestibility values for goats as 65.5 and 63.7%, respectively. Digestibility of NDF (DNDF) for Am differed significantly (P=0.0662) from At (80.33 and 74.79%). A high digestibility of hemicellulose (DHemi) was found for both species (94.35 and 88.5%) with no significant differences between them. When inclusion levels were considered, there was no statistic difference in digestibility although higher levels of NDF and hemicellulose digestibility were found at the low inclusion level.

Table 2. Mean values of intake and digestibility for vegetal species and inclusion level

	Vegetal species			Inclusion level, %			Interaction Prob.
	Accia						
	macracantha	*tamarindifolia*	Prob.	18.75	37.5	Prob.	
DM, g/d	802.92[a]	638.00[b]	0.0113	765	685	0.2470	0.2195
ADDM, %	80.02[a]	74.62[b]	0.0553	76.06	76.06	0.3596	0.5192
ADOM, %	79.91[a]	74.70[b]	0.0726	78.61	75.99	0.3569	0.5634
DNDF, %	80.33[a]	74.79[b]	0.0663	79.95	74.98	0.1084	0.7275
DADF, %	72.68	67.79	0.1511	73.24	67.24	0.0810	0.3922
Dhemi, %	94.35	88.50	0.0963	91.93	90.92	0.7698	0.7511

Note: different letters in same row indicate that means are significantly different by the least significant difference level ($P<0.05$)

CONCLUSIONS

There was no interaction between evaluated species and inclusion levels in rations. Intake and digestibility of DM, NDF and hemicellulose were good for both species (from 74 to 94%), although *Acacia macracantha* is significant superior compared to *A. tamarindifolia*. A negative correlation between inclusion level of legume species in the ration and DM intake and digestibility of NDF and hemicellulose was shown.

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