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Intake and digestibility of *Acacia glomerosa* and *Leucaena leucocephala* mixed with ammoniated rice straw in rations for growing goats*

E. Yépez[1,2], F.F. Villasmil[1], G.E. Nouel[1,3] and M.A. Espejo[1]

[1]Unidad de Investigación en Producción Animal (UIPA),
Decanato de Agronomía de la Universidad Centroccidental Lisandro Alvarado (UCLA)
Tarabana, Lara State, Venezuela

ABSTRACT

Intake and digestibility of *Acacia glomerosa* (A) and *Leucaena leucocephala* (L), mixed with ammoniated rice straw (ARS) and maize by-product flour (CB) was evaluated for growing goats. Eight goats were used (21 kg average liveweight). A factorial arrangement 2×2, in Latin square design was conducted. The factors were 2 vegetal species and 2 inclusion levels. The study was conducted in 56 days. The cell wall intake (NDF) was superior for A vs L (652.13 vs 535.3 g/goat/day). Digestibility of organic matter (OM) was superior for A vs L (79.83 vs 71.37%). The same occurred with: NDF (83.19 vs 76.85%) and acid detergent fibre (ADF) (81.82 vs 67.39%). Higher intake of dry matter (DM) occurred at the smallest inclusion level (18.75%). Further, the low inclusion level showed higher digestibility of DM, OM, NDF and ADF than the high inclusion level.

KEY WORDS: *Acacia glomerosa*, *Leucaena leucocephala,* growing goats, agroindustrial by-products

INTRODUCTION

There are native forages from semiarid areas in Lara State (Venezuela), that have not been evaluated as feed source for ruminants, so there is a need to evaluate species like *Acacia glomerosa* (A) and *Leucaena leucocephala* (L) as protein sources in order to try to improve animal nutrition and to promote use of local feed resources. Therefore, the main objective of this study was to evaluate intake and digestibility of rations that included A and L mixed with ammoniated rice straw (ARS) and maize by-product flour (CB) in goats.

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[3] Corresponding author: e-mail: gustavonouel@ucla.edu.ve

MATERIAL AND METHODS

An experimental Latin square design in a factorial arrangement 2 × 2 was used. The factors were: L and A foliages and level of inclusion (18.75 and 37.50%). The effect on intake and digestibility of the dry matter (DM), organic matter (OM), crude protein (CP), neutral detergent fibre (NDF), and acid detergent fibre (ADF) was studied. The goats were placed in individual metabolic cages during 4 experimental periods of 14 days each, each period divided into 7 days for adaptation and 7 days for measurement of consumption. Total data collection lasted for 56 days. At the end of each experimental period the treatments were rotated between animals and after 28 days 4 different animals were used. Eight Creole, male growing goats were selected from the same origin and with a 21 kg average weight. Before initiating the trial, the animals were treated to eliminate parasites and supplied with a vitamin supplement. The animals received the rations in individual cages and they received water *ad libitum*. The rations were offered in fixed schedule (13.00 to 14.00 h), and the quantity of the ration corresponded to 4% of their liveweight (LW), that subsequently was increased to reach 6% of LW. The rations had the following composition: T_1: 18.75% leaf flour L (HHL) + 56.25% ARS + 25% CB; T_2: 37.5% HHL + 37.5% ARS + 25% CB ; T_3: 18,75% leaf flour A (HHA) + 56,25% ARS + 25% CB; T_4: 37.5% HHA + 37.5% ARS + 25% CB. *Acacia glomerosa* (A) and *Leucaena leucocephala* (L) were used as protein sources and agro industrial by-products like CB and ARS were used as source of energy and fibre, respectively. Voluntary intake of the ration was determined by the difference among offered and rejected amounts (Moore and Waller, 1975). The apparent digestibility of DM, OM, CP, NDF and ADF (ADDM, ADOM, ADCP, DNDF and DADF, respectively) were calculated, according to AOAC (1984) by total collection method (CTH) proposed by Moore and Waller (1975). The samples were placed in a stove at 60°C during 48 h, and then grinded in a Willey mill to analyse them according to the parameters of the proximal analysis Van Soest and colorimetric (Van Soest, 1963; AOAC, 1984; Bilbao et al., 1999). The data was analysed using the Statistix (1996), for analysis of the variance and for separation of averages Tukey's test was used.

RESULTS AND DISCUSSION

The chemical composition of the feeds and rations are shown in Table 1. The content of CP and ash are similar for A and L, while A possesses higher values of NDF and ADF than L. In Table 2 it is clearly appreciated that A is superior to L in consumption and digestibility of evaluated fractions. It indicates a very interesting potential for the native species A as source of CP for goats. A clear tendency of greater digestibility of CP and fractions of the fibre is observed for the smaller level

of inclusion, this could have been caused by the content of tannins of the evaluated species. *A.glomerosa* presents higher values of digestibility and similar consumption values to those reported by Hove et al. (2001) for the *Acacia angutissima* (21.87% CP, 52.5% NDF and 38.6% ADF). He reported apparent digestibilities to be 53.76% of DM and 52.35% of OM when *A. angutissima* was used like complement in rations at 12.5%, with native grass hay, for goats weighing 30±1.8 kg. Somewhat similar to *Acacia brevispica* (21.87% CP, 42.8% NDF and 26.2% ADF) when it was offered to goats (LW = 21.5±1.2 kg), as a complement in rations with *Eragrostis abyssinica*, reaching consumption from 631 to 660 g/goat/day when included as 39.8 and 41.2% of the ration, respectively. On the other hand the degradability of the cell wall of the ration is considerably higher than that reported for *Acacia belandieri, A. farnesiana, A. greggii* and *A. rigidula* (10.8; 39.7; 34.5 and 13.4% of DNDF, respectively) (Ramírez et al., 2000). That experiment was conducted on Pelibuey sheep cannulated in the rumen. It is understood that native goats used in this experiment could be more adapted to consumtion of plants with tannins that the Pelibuey sheep.

Table 1. Chemical composition of feeds and rations

Feed or ration	DM 60°C	Crude protein	NDF	ADF	Ash
L. *leucocephala*	92.73	18.04	42.43	28.00	10.8
A. glomerosa	93.82	20.05	64.97	51.11	8.66
ARS	90.54	9.98	67.77	51.69	15.15
CB	83.20	13.41	26.91	6.90	2.59
T_1	94.09 ± 0.90	11.74 ± 0	67.00 ± 5.50	41.5 ± 5.1	16.4 ± 0.80
T_2	94.52 ± 2.03	13.46 ± 0	64.52 ± 5.40	40.6 ± 4.6	15.7 ± 0.45
T_3	94.52 ± 0.80	12.12 ± 0	64.02 ± 3.30	42.5 ± 4.6	16.8 ± 1.01
T_4	95.00 ± 0.70	13.79 ± 0	64.30 ± 3.90	36.2 ± 3.6	16.8 ± 1.43

Table 2. Mean values of intake and digestibility of fraction evaluated (DM, OM, CP, NDF, ADF) of vegetal species and inclusion level

	Vegetal species			Inclusion level, %			Interaction
	L. leucocephala	*A. glomerosa*	Prob.	18.75	37.5	Prob.	Prob.
DM, g/day	777.03	912.23	0.170	860.46	828.83	0.74	0.84
OM, g/day	680.9	802.73	0.106	796.73	686.29	0.143	0.162
NDF, g/day	535.3[b]	652.13[a]	0.024	629.5	561.56	0.184	0.246
ADF, g/day	519.83	489.7	0.607	532.5	476.96	0.345	0.292
CP, g/day	166.62	151.22	0.445	151.85	165.33	0.264	0.832
ADDM, %	77.00	82.30	0.101	81.10	78.2	0.361	0.264
ADOM, %	71.37[b]	79.83[a]	0.025*	78.27	72.93	0.143	0.095
DNDF, %	76.85[b]	83.19[a]	0.008*	81.73	78.31	0.131	0.091
DADF, %	67.39[b]	81.82[a]	0.005*	78.12	71.09	0.145	0.053

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

CONCLUSIONS

The present study indicates that A compared with L is a species with a great potential for inclusion in the diet of goats as a supplement in low protein rations, when inclusion is in the range of 18.75 to 38.5%. It should be studied deeper in relation to growth and production of goats. Also secondary compounds (like tannins) that can reduce digestibility should be studied further *A. glomerosa* can be promoted as a forage species in tropical dry zones.

REFERENCES

AOAC, 1984. Official Methods of Analysis, Association of Official Agricultural Chemists. 14th Edition. Washington, DC

Bilbao B., Giraldo D., Hevia P., 1999. Quantitative determination of nitrogen content in plant tissue by colorimetric meted. Commun. Soil Sci. Plant Anal. 30, 1997-2005

Hove L., Topps J., Sibanda S., Ndlovu L., 2001. Nutrient intake and utilization by goats fed dried leaves of the shrubs legumes *Acacia angustissima*, *Calliandra calothyrsus* and *Leucaena leucocephala* as supplements to native pasture hay. Anim. Feed Sci. Tech. 91, 95-106

Moore J., Waller C., 1975. Procedure for determining voluntary intake and nutrient digestibility with sheep. University of Florida, Department of Animal Science (Mimeo)

Ramírez R., Neira R., Ledezma R., Garibaldi C., 2000. Ruminal digestion characteristics and effective degradability of cell wall of browse species from northeastern Mexico. Small Ruminant Res. 36, 49-55

Statistix 1.1 for Windows, 1996. By Analytical Software

Van Soest P.J., 1963. Use of detergents in the analysis of fibrous feeds. II. A resid method for determination of fiber and lignin. J. Assn. Official Agr. Chem. 46, 829

Woodward A., Reed J., 1997. Nitrogen metabolism of sheep and goats consuming *Acacia brevispica* and *Sesbania sesban*. J. Anim. Sci. 75, 1130-1139