NOTA BREVE

PERFORMANCE OF TSWANA GOATS FED *ACACIA MELLIFERA, EUCLEA UNDULATA,* AND *PELTOPHORUM AFRICANUM* AS A SUPPLEMENT TO BUFFEL GRASS

CABRAS TSWANA ALIMENTADAS CON LEÑOSAS Y HENO DE *CENCHRUS CILIARIS*

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INTRODUCTION

Browse is a foliage, bark and twigs of shrubs and trees eaten by livestock. Goats, like all ruminants, are forage eaters with a gut system particularly adapted to a large intake of plant material. The most important factors that are considered responsible for the goat's ability to utilize a wide variety of vegetation are its high tolerance of bitter substances compared to other ruminants (Church and Goacher, 1970), the high mobility of the upper lip which enables the goat to select palatable feed, particularly when grazing on thorny shrubs, and its bipedal standing during browsing.

MATERIALS AND METHODS

The experiment was conducted at Botswana College of Agriculture content farm, from early February to mid May 1999 (90 days). Twenty-eight Tswana male (castrated) goats weighing on average 11.3 kg were used. The goats which were of average age of 7 months were randomly allocated to four groups of 7 animals (completely randomised design). The goats were dewormed with a broad spectrum anthelmintic and dipped for ectoparasites before the experiment and they were then individually penned under a common roof. The goats were also given a week to acclimatise to their pen environment and experimental diets.

Buffel grass hay (*Cenchrus ciliaris*) was fed along with Lucerne (*Medicago sativa*) to the control group. The other three treatments were supplemented with three browse species: *Euclea undulata*, *Peltophorum africanum*, and *Acacia mellifera*. Buffel grass hay constituted 40 p.100 of the ration and the protein source (Lucerne, *Euclea undulata*, *Peltophorum africana*, *Acacia mellifera*) constituted 60 p.100 of the ration offered to the goats daily on dry matter basis. Feed offered were in sufficient amounts to ensure *ad libitum* consumption (i.e.10-15 p.100 in excess to voluntary intake). However, all goats were provided with mineral block *ad libitum*. Cleaning of pens and removal of left-overs of the previous day was done daily before placement of the

Table I. *Percentage chemical composition of feeds used in the test diets.* (Composición química porcentual de los alimentos usados en las dietas experimentales).

	CP	NDF	ADF	ADL	IVDMD	ASH	TANNINS
Lucerne hay	11.4	48.0	38.5	10.0	65.0	7.7	-
Buffel grass hay	6.1	61	41	5.0	48.0	9.6	0.07
Peltophorum africanum	8.8	40.5	34.0	15.3	57.0	5.2	0.44
Acacia mellifera	10.3	51.7	42.7	10.7	49.0	5.7	0.2
Euclea undulata	10.9	38.7	35.0	10.7	53.0	5.7	1.24

day's ration. Daily the volume of water given and left over was measured using a measuring cylinder and a platform electronic scale was used to measure the feed given and left over. Goats were weighed individually every two weeks before the morning feed using an Avery walk-in scale.

TREATMENTS

Control: 40 p.100 Buffel grass hay and 60 p.100 Lucerne.

Treatment 1: 40 p.100 Buffel grass hay and 60 p.100 *Acacia mellifera*.

Treatment 2: 40 p.100 Buffel grass hay and 60 p.100 *Peltophorum africanum*.

Treatment 3: 40 p.100 Buffel grass hay and 60 p.100 *Euclea undulata*.

FEEDSTUFF ANALYSIS

Dry matter was determined as the loss in weight which resulted from drying in an oven at 40 °C for 96 hrs (A.O.A.C., 1995). Minerals were determined using an atomic absorption spectrophotometer (GBC 908 AA, Scientific equipment Pty Ltd, Dandenong, Victoria, Australia) and a flame photometer (Ciba-corning flame photometer 410) as described by A.O.A.C. (1995). Ash was also determined by using procedures of A.O.A.C. (1995). Acid detergent fibre (ADF), Neutral detergent fibre (NDF) and Acid detergent lignin (ADL) were determined by methods of Goering and Van soest (1970). Dry matter digestibility was determined using an *in vitro*

Table II. *Mineral composition of feeds used.* (Composición mineral de las dietas experimentales).

	Macro minerals in g/kg					Micro minerals in mg/kg			
FEED	Mg	Na	P	Ca	K	Zn	Fe	Mn	Cu
A. mellifera	1.4	0.5	2.0	11.0	17.3	1.3	943	56	6.3
E. undulata	1.7	0.9	0.8	6.7	10.9	0.8	870	190	4.5
Lucerne	1.2	1.2	2.7	8.4	12.5	1.0	380	53.8	9.5
Buffel grass	0.9	0.5	2.5	2.9	17.4	0.9	843	184.3	12.0
P. africanum	1.3	0.3	0.8	13.0	10.1	1.5	1407.5	200.3	16.5

***Table III**. Intake and response of Tswana goats during the experimental period.* (Ingestión y respuesta de las cabras Tswana durante el periodo experimental).

Feed types	Control Lucerne	Treatment 1 *A. mellifera*	Treatment 2 B. grass+ P. *africanum*	Treatment 3 *E. undulata*
Initial body weight (kg)	9.80±1.24[a]	10.80±1.11[a]	12.80±0.66[a]	11.80±0.58[a]
Final body weight(kg)	13.40±1.36[a]	14.60±0.74[a]	15.00±0.71[a]	15.20±0.86[a]
Body weight gain(kg)	3.6±1.21[a]	3.8±0.86[a]	2.2±0.38[a]	3.4±0.4[a]
Average daily weight gain(g)	43.0±1.4[a]	45.0±1.0[a]	26.0±0.4[b]	41.0±0.5[a]
Metabolic weight (kg $w^{0.75}$)	6.26±0.48[a]	6.72±0.34[a]	7.19±0.25[a]	7.03±0.28[a]
Average daily feed intake(g)	457.0±12.87[a]	381.6±15.87[b]	422.3±16.77[a]	459.6±21.48[a]
Average daily Buffel grass intake (g)	189.8±5.39[b]	186.4±5.11[b]	229.1±7.92[a]	229.5±7.05[a]
Average daily legume intake(g)	267.2±8.29[a]	195.2±11.74[c]	193.2±11.83[c]	230.1±14.58[b]
Average daily water intake(ml)	1147.97±41.32[a]	1127.56±41.6[a]	1135.93±38.38[a]	1135.84±38.78[a]
Feed conversion ratio(g/g)	10.63±5.10[b]	8.48±2.76[b]	16.24±4.97[a]	11.21±2.22[b]
Average daily water intake (ml)/kg $w^{0.75}$	189.59±20.4[a]	169.29±7.46[a]	158.96±7.07[a]	162.59±7.2[a]
DM intake (g)/kg $w^{0.75}$	73.0±4.95[a]	56.8±5.24[c]	58.7±1.34[c]	65.4±4.43[b]

Mean ± standard error *Means in the same row having different superscript are significantly different ($p<0.05$).

method (Tilley and Terry, 1963).

Nitrogen content was determined using the Kjeldal method and protein was computed as Nitrogen (N) multiplied by 6.25. Condensed tannins were determined using the colorimetric determination method as described by Makkar (1999). The data collected were subjected to analysis of variance, following the procedures of Steel and Torrie (1980).

RESULTS AND DISCUSSION

As shows **table I**, Lucerne comprised a high crude protein of 11.4 p.100, while crude protein in browse plants ranged from 8.8 p.100 to 10.9 p.100; *Acacia mellifera* contained high ADF content with 42.7 p.100 and Lucerne had lower ADF value of 38.5 p.100. The ADL in browse plants ranged from 10.7 p.100 to 15.3 p.100. The grass hays contained more ash than the browse plants. With respect to tannins **(table II)** *Euclea undulata* had more tannins (1.24 p.100), followed by; *Peltophorum africanum* (0.44 p.100), *Acacia mellifera* (0.2 p.100), Buffel grass (0.07 p.100), Lucerne (below detectable level). Calcium content in browse plants ranged from 6.7 g/kg to 13 g/kg. Calcium content in grass hay was 2.9 g/kg and lucerne had 8.4 g/kg. Potassium was generally high in all the feeds while sodium was generally low in all the feeds provided. *Euclea undulata* had the highest content of magnesium (1.7 g/kg) and Buffel grass the lowest (0.9 g/kg).

Table III: shows data on feed

conversion ratio, daily dry matter intake, growth, and daily water intake of the goats during the experimental period. According to the results, treatments effects on average daily dry matter intake were highly significant ($p<0.05$), goats on *Euclea undulata* had the highest intake of 459.6 g/day and those supplemented with *A.mellifera,* had the least intake of 381.6 g/day. Treatments effects on average daily browse intake were significant at ($p<0.05$), but there was no significant difference between *Acacia mellifera* and *Peltophorum africana*, however there was significant difference ($p<0.05$) between *Euclea undulata* and the two other browsable plants (*A. mellifera* and *P. africana*). Lucerne intake was significantly higher than the intake of all browsable plants with 267.2 g/day. There were also high significant differences ($p<0.05$) in the average daily Buffel grass intake. The intake of *Peltophorum africana* and *Euclea undulata* had no significant difference ($p>0.05$) on average daily grass intake. In fact the highest grass hay intake was 229.53 g/day.There was no significant difference ($p>0.05$) on average daily water intake under the different treatments. The intake was almost the same. In **table III**, it was shown that there was no significant difference ($p>0.05$) in body weight gain, and metabolic weight. However it was shown that the mean for the average daily weight gain of treatment two was significantly different ($p<0.05$) to that of the other treatments. The weight gains of Tswana goats fed *A. mellifera and E. undulata* were similar to those fed lucerne as a supplement, showing that Tswana goats can utilize these browses as efficiently as they utilize lucerne.

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