

NUTRITIVE EVALUATION OF TWO CULTIVARS OF *STYLOSANTHES GUYANENSIS*

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SUMMARY

Two introduced cultivars of *stylosanthes guyanensis* were evaluated in feeding and metabolism trials with Yankasa rams and wethers. The Perennial legume species were established in July, 1975 from seeds brought from Queensland, Australia.

Digestibility, intake, liveweight gains and nitrogen utilisation were determined. The legumes were found to give satisfactory animal performance that is comparable, if not superior, to other varieties of stylo earlier in use on the station.

INTRODUCTION

In Nigeria, the quest for high yielding, high quality and all seasons pasture to maintain year-round animal production continues in view of the low productivity and nutritive value of the native pastures (Rains, 1963; De Leeuw and Brinckman, 1973; Olubajo and Oyenuga, 1974) and the high cost of concentrate feeds.

In tropical Australia, for example, high levels of livestock production has been based on the use of improved, good quality pasture species, particularly legumes which do not require costly nitrogenous fertilisers. At Shika, Nigeria, pasture species introduction and evaluation are important aspects of the livestock improvement programmes. This paper reports on the chemical composition, intake, digestibility and estimated nutritive value of hays from two cultivars of *stylosanthes guyanensis* which have been successfully established at Shika (Anon, 1976).

MATERIALS AND METHODS

The two legume cultivars used in this experiment namely *stylosanthes guyanensis* cv Cook and *stylosanthes guyanensis*

cv Endeavour were established on a sandy-loam soil in July, 1975 from seeds brought from Queensland, Australia. After ploughing and two harrowings, the seeds were drilled by hand in rows, 60cm apart. The cultivars were sown alternately in four strips of 0.2 hectare each. At establishment 125kg per hectare of single superphosphate was applied and the pasture was hand-weeded 6 weeks after sowing. The legumes received no further treatment until mid-December, 1976 when hay cuts used in the present study were made.

16 Yankasa rams; about 1½ years old and with liveweights ranging from 22 to 28kg were used in a feeding trial. The rams were randomly divided into 2 groups of 8 animals. A parallel metabolism study was conducted with 12 Yankasa wethers aged about 3 years and weighing between 32 and 43kg.

During the feeding trials, which lasted 60 days, individually housed rams were given 220g groundnut cake per day at about 7 a.m. Thereafter, each ram received 1kg of hay per day fed in 2 equal instalments at 9 a.m. and 3 p.m. A preliminary run showed that this rate of feeding allowed about 15% refusal. Water and salt licks were provided *ad libitum*. The rams were weighed weekly.

In the metabolism study, the wethers were kept in metabolism cages with slatted wooden floors for 2 collection period of 7 days each after adjustment periods of 2 weeks each. On the day prior to collection, each ram was harnessed with a collection bag attached for total faeces collection. Six wether received the hay and groundnut cake diets, while the others 6 wether divided randomly into 2 groups

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of 3 each received only the hays *ad libitum*. The total wet faeces excreted daily were collected, weighed and a representative 10% sample dried in a forced-draught oven at 105°C to constant weight. The daily dried faeces samples were bulked for each animal, milled and stored in air-tight bottles until required for analysis.

Urine was collected in buckets containing 5ml H₂SO₄ (to avoid loss of ammonia) placed underneath the metabolism cages. Urine volume were measured and about 10% of daily urine output from each wether was stored at -5°C until required for analysis.

Weekly samples of feeds and residues were oven dried, milled and stored. Bulk-fed feed and faeces samples were analysed for nitrogen following the procedures of A.O.A.C. (1975).

A formula given by Harris, Kearl and Fonnesbeck (1972) which computes TDN from the proximate analysis was used to estimate the energy content of the hays.

All response data were statistically analysed and treatment means compared (Steel and Torie, 1960).

RESULTS

The chemical composition of the hays and groundnut cake is presented in table 1. It would be seen from the table that the composition of both Endeavour and Cook stylo is very much comparative, particularly with respect to the dry matter, Organic matter, Crude protein and ether extract. Although Cook stylo tended to show higher values for almost all the proximate principles determined, the differences were not significant.

TABLE 1
Chemical Composition of Feedstuffs (%)

<i>Component</i>	<i>Endeavour stylo hay</i>	<i>Cook stylo hay</i>	<i>Groundnut cake</i>
Dry matter	95.13	95.36	93.95
Organic Matter	93.06	93.83	93.12
Crude Protein	8.41	8.89	51.88
Crude Fibre	45.79	44.01	3.82
Ether Extract	1.48	1.59	5.92
Nitrogen-free-extract	37.38	39.34	31.50
Total Ash	6.94	6.17	6.88
Digestible energy ^a	2262	2355	3951

^aDigestible energy in kcal/kg was derived from formula (Harris *et. al.*, 1972).

Digestibility data for the hays are presented in table 2. The dry matter, organic matter, crude protein, crude fibre and ether extract components in Endeavour stylo were significantly (P = 0.05) more digestible than the cor-

responding components in Cook stylo. Cook stylo had significantly (P = 0.05) better digestible nitrogen-free extract. Energy digestibility was higher in Cook than in Endeavour stylo, the difference not being significant.

TABLE 2
Apparent digestibility coefficients of feedstuffs (&)^a

<i>Constituents</i>	<i>Endeavour stylo hay</i>	<i>Cook stylo hay</i>
Dry matter	52.44 (94.26)	51.16 (93.90)
Organic matter	96.47 (90.17)	95.51 (92.14)
Crude protein	95.35 (83.31)	69.34 (73.29)
Crude fibre	67.51 (91.64)	61.22 (79.83)
Ether extract	53.37 (79.14)	51.87 (77.64)
Nitrogen-free-extract	49.54 (69.41)	45.73 (69.01)
Energy	49.27 (72.09)	48.06 (67.41)

^a Values for groundnut cake in brackets.

Table 3 shows the animal response data in terms of intake and liveweight gains. Daily dry matter intake was significantly ($P = 0.05$) higher in Cook than in Endeavour stylo. However, the dry matter and crude protein intakes per unit of metabolic body size were not significantly different in both stylos. Cook stylo had

higher relative intake and nutritive value index than Endeavour stylo; the differences were, however, not significant. Daily liveweight gains were significantly ($P = 0.05$) higher in rams fed Endeavour hay. The observed to expected weight gain ratio was estimated to be over one in both hays.

TABLE 3
Intake, liveweight gains and nutritive value index of hays

<i>Variable</i>	<i>Endeavour stylo hay</i>	<i>Cook stylo hay</i>
Dry matter, g	670.76	752.01
Dry matter, g/LW ^{0.75}	58.23	60.55
Crude protein, g/LW ^{0.75}	7.70	7.46
Dry matter, % body weight	2.58	2.62
Relative intake ^a	72.78	75.69
Nutritive value Index ^b	35.86	36.38
Daily gain, g	142.86	91.37
Daily gain, g/LW ^{0.75}	12.40	7.36
Expected gain ^c , g	97.00	83.00
Observed/Expected gain	1.47	1.10

^aRelative intake = $\frac{\text{Observed Intake}}{80 \text{ g/LW}^{0.75}} \times 100$

^bNutritive Value Index = Relative Intake x percent energy digestibility. (Crampton *et. al.*, 1960).

^cExpected gain calculated from Garret *et. al.* (1959) formula.

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The nitrogen balance data are summarised in Table 4. Cook stylo gave better nitrogen retention than Endeavour stylo

when nitrogen retention was expressed as a proportion of digested nitrogen.

TABLE 4
Nitrogen balance data

Variable	Endeavour stylo	Cook stylo hay
Nitrogen Intake, g/day	26.28	34.35
Apparent nitrogen digestibility %	80.77	81.36
Urinary nitrogen, g/day	6.30	7.36
Digestible nitrogen, intake, g/day	21.23	27.95
Nitrogen retention, % digested nitrogen	60.48	54.60

DISCUSSION

The crude protein content of hays is the most important component that influences voluntary intake. Zemmeling, Haggard and Davies (1972) reported that animals on all the hays tested selected for protein and the mean intake of the different hays was closely related to the protein content of the consumed forages. Similar findings have been reported by Elliot and Topps (1963), Milford and Minson (1965), Minson and Milford (1968). The dry matter intake figures from the present study are in line with earlier findings. The hays used in this study were superior in crude protein content to those used by Brickman (1974) in spite of the late harvesting of the former. Intakes were also higher in the present study than those recorded in Australia (Newman, 1968) as well as those recorded for the local sheep (Brinckman, 1974) fed hays commonly in use at Shika.

Forage intake was generally lower than the standard forage intake of 80/kg metabolic weight (Crampton, Denefer and Lloyd, 1960). This might be due to the low energy digestibility of the forages which is below 70%.

Liveweight gains were better in rams fed Endeavour hay. The intake and digestibility figures showed that

Endeavour hay was better utilised. A comparison of the observed and expected weight gains indicates whether the expected gain and thus the estimated energy content of the hays was in agreement with the resulting gain. The ratios obtained in the present study seem to suggest that the formula of Harris *et. al.* (1972) underestimates the feeding value of the hays.

The fact that both hays gave positive nitrogen retention showed that the rams were obtaining sufficient nitrogen to meet their requirements from the hays. Endeavour stylo hay tended to be superior to Cook stylo hay in that Endeavour hay had a better utilisation of digested nitrogen which was reflected in a significantly lower output of urinary nitrogen.

It is concluded that the 2 cultivars of stylo evaluated are highly nutritious, could sustain substantial body weight gains and are comparable, if not superior, to the legume hays earlier in use at Shika.

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