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Adebowale N. Fajemisin
Federal University of Technology, Nigeria

Timayin Salihu
Federal University of Technology, Nigeria

Akinyemi Fadiyimu
Federal College of Agriculture, Nigeria

Adebayo Alokun
Federal University of Technology, Nigeria

Olusola Agbede
Federal University of Technology, Nigeria

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Dietary effect of substituting *Panicum maximum* with *Tithonia diversifolia* forage on performance of Yankasa sheep

Adebowale N Fajemisin^A, Timayin Salihu^A, Akinyemi Fadiyimu^B, Adebayo Alokun^A and Olusola Agbede^A

^A Department of Animal Production and Health, Federal University of Technology, PMB 704, Akure, Nigeria

^B Department of Animal Production and Health, Federal College of Agriculture, Akure, Nigeria

Contact email: debofajemisin@yahoo.co.uk

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Introduction

Ruminant livestock production in Nigeria is based predominantly on native grassland (especially *Panicum maximum*); the nutritive value of the natural pasture varies drastically according to season (Ademosun, 1992). Changes in nutritional status of these native plants result in very irregular growth and marked fluctuations in seasonal weights of farm animals. Consequently, it becomes imperative to source for alternative feed resources which are more efficient, economical and can be incorporated into ruminant's diet with a view to reducing feed costs and hence, achieving a greater profit margin for the producer. *Tithonia diversifolia* is an herbaceous weed of field crops and is widely distributed in the humid and sub-humid tropical Africa. *Tithonia diversifolia* could be considered a higher ranking forage species considering its crude protein content that varies between 14.8 and 28.8% (Navarro and Rodriguez 1990), the average of this values compared favourably with the protein content of *Gliricidia* (14.7%) *Leucaena* (22.2%) and *Peppigina* (21.4%) as reported by Rosales (1996). However, there is dearth of information on its use as ruminant feed in Nigeria.

Therefore, this study was designed to evaluate the dietary effect of substituting *Panicum maximum* with *Tithonia diversifolia* forage on performance of Yankasa sheep.

Materials and Methods

Twenty (20) Yankasa sheep (males) within the age range of 8 – 10 months and average weight of 12.57±0.46kg were sought from the flock of the Teaching and Research farm, Federal University of Technology, Akure, Nigeria and randomly distributed such that four animals were allocated respectively to diets of varying levels of *Panicum maximum* and *Tithonia diversifolia* at ratio 100:0 (A), 75:25 (B), 50:50 (C), 25:75 (D), for 105 days in a completely randomized design experiment. Parameters assessed are feed intake, digestibility, nitrogen utilization and weight gain. The *Panicum maximum*, *Tithonia diversifolia* and faecal samples were analyzed for dry matter, crude protein, crude fibre, ether extract and nitrogen free extract while urine was analyzed for nitrogen AOAC (2002). The data obtained were subjected to one-way analysis of variance and significant differences among treatment means were separated using Duncan's multiple range test (Duncan, 1955).

Results and Discussion

Result of proximate composition (Table 1) showed that *Tithonia diversifolia* contained dry matter (DM) 79.11%, organic matter (OM) 62.23%, crude protein (CP) 22.23%, and crude fibre (CF) 11.85% while *Panicum maximum* contained DM 72.64%, OM 63.39%, CP 11.95% and CF 25.98%.

Table 1. Proximate compositions of *Panicum maximum*, *Tithonia diversifolia* and experimental diets fed to Yankasa sheep (males).

Parameters	Diets					
	<i>Panicum maximum</i>	<i>Tithonia diversifolia</i>	A	B	C	D
Dry matter (%)	72.64	79.11	72.64	74.26	75.88	77.49
Organic matter (%)	63.39	62.23	63.39	62.62	63.50	62.21
Crude protein (%)	11.95	22.23	11.95	17.60	19.59	21.35
Crude fibre (%)	25.98	11.85	25.98	23.87	17.30	12.96
Ether extract (%)	3.58	5.20	3.58	4.74	4.78	4.86
Ash (%)	9.25	16.88	9.25	11.64	12.38	15.28
Nitrogen free extract (%)	49.24	43.89	49.24	42.15	45.95	45.55
Energy (KJ/gDM)	13.72	14.39	13.72	13.89	13.93	14.31

Table 2. Nutrients intake and performance characteristics of Yankasa sheep fed varying levels of *Panicum maximum* and *Tithonia diversifolia* diets.

Parameters	Diets				±SEM
	A	B	C	D	
Nutrients intake					
Dry matter (g)	1580 c	1970 b	2070 a	2130 a	65.8
Organic matter (g)	1430 a	1230 b	1320 ab	1320 ab	30.2
Crude protein (g)	190 c	347 b	402 ab	455 a	32.5
Crude fibre (g)	410 ab	470 a	3623 bc	275 c	24.7
Ether extract (g)	62 c	95 b	98 b	105 a	4.9
Ash (g)	147 c	230 b	258 b	325 a	19.6
Nitrogen free extract (g)	775 c	838 b	958 a	961a	24.1
Energy (MJ)	22.0 c	27.4 b	29.2 ab	30.5 a	1.0
Nutrients digestibility (%)					
Dry matter	61.47 c	70.63 b	69.88 b	75.31a	1.53
Organic matter	54.04 c	66.83 b	67.33 b	73.89 a	2.22
Crude protein	74.82 b	77.27 a	77.70 a	77.99 a	0.48
Crude fibre	68.56 c	75.98 ab	73.46 b	76.77 a	1.01
Ether extract	43.33 b	63.33 a	50.61 b	62.78 a	2.85
Nitrogen free extract	59.43 b	67.64 ab	70.42 ab	75.42 a	2.24
Energy	55.56 c	63.98 a	60.46 b	63.77 a	1.09
Nitrogen utilization					
Nitrogen intake (g)	30.50 d	55.60 c	64.40 b	72.80 a	4.79
Nitrogen retention (g)	15.49 d	39.96 c	48.48 b	55.83 a	4.59
Weight gain (g/day)	44.05 c	58.33 b	61.31 b	76.55 a	3.51
Feed gain ratio	35.87 a	33.77 b	33.76 b	27.82 c	0.93

a, b, c, = means within the same row with different letters are significantly different ($P < 0.05$)

Table 2 presents the results of nutrients intake, digestibility and nitrogen utilization. DM, CP and energy intake values of the animals increased with increased levels of *Tithonia diversifolia* while fibre fractions intake decreased accordingly. Animals fed diet D had significantly ($P < 0.05$) higher DM (2130g/day), CP (455g/day) and ether extract (105g/day) intake than the animals fed control diet. Percentage digestibility of DM, CP, and NFE was significantly ($P < 0.05$) increased with the increased levels of *Tithonia diversifolia* in the diets. Nitrogen utilization, weight gain and feed/gain ratio values of the animals fed diet D were significantly ($P < 0.05$) higher than the values recorded for animals fed control diet. Thus, feeding *Tithonia diversifolia* and *Panicum maximum* at ratio 3:1 could lead to improve dry matter intake, digestibility, nitrogen utilization and weight gain in Yankasa sheep and this could help to enhance small ruminant production in sub-humid tropical regions.

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