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Performance and nutrient digestibility of weaned rabbits fed forages supplemented with concentrate.

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Abstract

An experiment was conducted to examine the effect of feeding three forages (Panicum maximum, pawpaw leaves and Tridax procumbens) in addition to concentrate on the performance and nutrient digestibility of crossbred weaned rabbits. Four rabbits were assigned to each dietary treatment in a completely randomized arrangement. The study lasted for 8 weeks. The forage and concentrate had moderate to high crude protein contents (12 to 33%) . The DM intakes were very high on P.maximum and T.procumben treatments (av. 108g/day). Forage constituted about 75% of the intakes. Dry matter intake on pawpaw leaves treatment (47.31g/day) was the least (P<0.05). Daily weight gain (10.94g) and feed conversion ratio (4.3) were best on the pawpaw leaves treatment. Tridax procumbens had the highest nutrient digestibility and significant differences (P<0.05) exist on most of them .The three forages can be used in feeding rabbits when supplemented with concentrate at 2% of body weight. However, pawpaw leaves gave the best feeding value.

Keywords: Rabbits, forage supplements, concentrate, utilization.

Introduction

In Nigeria, the state of nutrition of the populace is predominantly marked by inadequate protein intake both in quantity and quality. Food and Agricultural Organization (FAO) (1993) recommended 27g as the animal protein daily requirement for human being. However, the intake per average Nigerian is grossly inadequate (3.24g animal protein / day FAO, 1993). This shortage has given rise to high prices of animal protein. Therefore, efforts should be directed towards exploring all reasonable options to meet the recommended level at a reduced cost. Poultry production has been suggested as a means of massively producing animal protein because of its short generation interval and high growth rate. Nevertheless, the high cost of production involved due to high cost and competition with man for some feed ingredients (e.g. maize) has not made this possible.

Production of meat from rabbits is suitable because their feeding do not compete much with man for feed ingredients. Some of the advantages of keeping rabbits include its short generation interval, high fecundity rate, low cost of investment and small body size which makes its suitable for backyard rearing and easily consumable by a family. Also many types of

forage can be given to rabbits as feed.

Tridax species are annual herbs which are commonly found growing in the wild. They are good sources of cheap rabbit food (Adjare, 1984). The leaves appear rich in ash content and moderate in protein and nitrogen free extract (Animo *et al* 1999). *Panicum maximum* is among the grasses fed to rabbits. It is palatable and nutritious during the early stage of growth (Olubajo, 1977). It contains modest protein while the dry matter and crude fibre contents increase with advancing growth (Olubajo 1977). When *P. maximum* matures the grass is essentially unpalatable and has low energy and protein contents. Pawpaw (*Carica papava*) is a small upright tree that can grow up to 10 meters in height. The fruits are fleshy and rich in vitamins A and C. The fruits and leaves of pawpaw are used for feeding snails (Akinnusi, 1998). Pawpaw trees produce a white juice or latex which contains an enzyme called papain which is a protein denaturing agent (Esonu, 1999). Thus the objectives of the study were to compare the performance and nutrient digestibility of weaned rabbits fed on *P. maximum*, *T procumbens* and pawpaw leaves supplemented with concentrate.

Materials And Methods

The experiment was carried out at the Rabbittary unit of the Institute of Agricultural Research and Training, Ibadan, Nigeria. The study lasted for eight weeks with an initial two weeks for adjustment period for the rabbits to get accustomed to the feeds and the environment. Five weeks old cross bred weaned rabbits of both sexes were used for the study. Four rabbits were randomly allotted to each of the dietary treatments. The experimental design was completed randomized arrangement.

Rabbits on treatments 1, 2 and 3 were fed on *P. maximum*, pawpaw leaves and *T. procumbens* respectively. Supplementary concentrate was offered at 2% of body weight to the rabbits on all the treatments. The concentrate comprised of maize (24%), maize offal (34%), groundnut cake (15%), palm kernel cake (20%), fishmeal (2%) bonemeal (2.5%), oyster shell (2.0%), salt (0.3%) and premix (0.2%).

Each rabbit was housed in an individual hutch. Before the commencement of the experiment the hutches were thoroughly disinfected with Diazintol ® and allowed to dry . Each hutch was provided with feed and water troughs for daily provision of feed and fresh water. Antibiotics and coccidiostat were used before the experiment as prophylactic treatment against bacterial and coccidial infections. Rabbits were fed in the morning (7.00 – 8.15 am). The quantity of feed supplied were weighed every morning and the left over from previous daily feed weighed to compute feed intake. The concentrate was moistened with water to reduce dustiness thereby preventing the inhalation of dry feed that might cause respiratory distress. The forages given were rinsed with water to remove all attached dust and allowed to wilt overnight before offering them to the animals. The initial body weight of each rabbit was taken and subsequently at weekly intervals. Also, data on the daily feed intake and weekly weight gain were computed. A digestibility study was carried out at the eighth week of the experiment. Faecal samples were collected from the animals for five days. . The wet faeces were oven dried to determine their dry matter contents. All the dried faeces for each experimental unit were collected, bulked and analyzed for their proximate contents by the A. O. A. C. (1990) methods.

The analysis of variance technique (Steel and Torrie,1980) was used to analysis the data. Significant means were separated using the Duncan's multiple range test (Duncan,1955).

Table 1: Chemical composition of forages and supplementary concentrate fed to rabbits.

	Dry matter (%)	Crude protein (%)	Crude fibre (%)	Ether extract (%)	Ash (%)	Nitogen free extract (%)	Gross energy Kcal/kg
Concentrate	90.57	17.11	5.44	4.36	6.64	66.42	4.82
P.maximum	29.98	12.18	20.54	2.54	16.14	48.60	4.18
Pawpaw leaves	10.51	32.81	9.17	9.17	5.82	49.96	3.89
T.procumbens	26.49	24.47	18.15	18.15	15.95	36.53	3.33

Results and Discussion

The chemical composition of the feeds is presented in Table 1. The highest values for dry matter (DM) (90.57%) and gross energy (4.82kcal/kg) were recorded for the concentrate feed. Crude protein (CP) content was highest (32.89%) in pawpaw leaves and least in *P. maximum* (12.18%). The crude protein value of about 25% recorded for *T. procumbens* is comparable to the range of 18 to 31% CP obtained at 14 days of age in another study (kalu *et al* 1986).

Table 2: Performance characteristics of rabbits fed on three forages supplemented with concentrate.

Parameters	*Panicum maximum* (1)	Pawpaw leaves (2)	*Tridax procumbens* (3)	SEM
Daily feed intake (g)				
——forage	81.56	18.35	81.01	
——concentrate	28.65	28.75	25.82	
——total	110.20 ^{a}	47.31 ^{c}	106.80 ^{b}	4.43
(%) feed intake				
——forage	74.00	39.00	75.90	
——concentrate	26.00	61.00	24.10	
Daily water intake (ml)	160.80 ^{a}	158.60b	152.2 ^{c}	2.88
Initial live weight (g)	775	750	756.3	
Final live weight (g)	1325	1362.50	1231.3	
Actual weight gain (g)	550	612.50	475	
Daily weight gain (g)	9.82 ^{b}	10.94 ^{a}	8.48 ^{c}	0.64
Feed conversion ratio	11.20 ^{b}	4.3 ^{a}	12.5 ^{c}	1.36

^{a,b,c} Means with different superscript on the same rows are significantly different ($P<0.05$).
SEM: standard error of means

The highest values of crude fibre (CF) (20.54%) and ash (16.14%) were obtained for *P. maximum*. Pawpaw leaves had the least values of dry matter, ether extract and ash. The crude fibre and nitrogen free extract (NFE) in *T. procumbens* in this study are similar to those reported elsewhere (Fanimo *et al* 1999, Bello 2003). The CP recorded for *P. maximum* was higher than that obtained elsewhere (Onifade *et al* 1999). This could be due to its stage of harvesting.

The performance of rabbits on the dietary treatments is outlined in Table 2. The highest daily feed intake ($P<0.05$) was recorded on *P. maximum* diet (110.2g) while the least was on pawpaw leaves treatment (47.31). The low DM on pawpaw leaves treatment could be due to the effect of papain in it that could have acted as an anti-nutritional factor. This could also be as a result of its high moisture content (about 90%). The forages constituted about 75% of the feed intake on *P. maximum and T. procumbens* diets, while it was only about 40% on the pawpaw leaves treatment. Relatively high feed intakes were recorded in this study than elsewhere (Agunbiade *et al* 1999, 2001). This could be due to the high crude fibre and ash contents that suggested that the metabolizable energy would be low. Thus, the rabbits used in this study consumed more feed in order to satisfy their energy requirements.

The daily water intake was in the range of 152.5 to 160.8ml with rabbits on *P. maximum* treatment consuming the highest ($P<0.05$) volume of water. Water intakes recorded in this study were higher than those elsewhere (Agunbiade *et al* 1999). This could be a function of the quantity of dry matter of feed consumed as more water is required as feed intake increases.

Rabbits on the pawpaw leaves treatment had the highest ($P<0.05$) daily weight gain. This could be as a result of its high protein content which is essential for body growth. Feed conversion ratio (FCR) was best (4.3) on the pawpaw leaves treatment and poorest on the *T. procumbens* treatment (12.5). The daily weight gain and FCR obtained on pawpaw leaves treatment were poorer than those obtained on cassava peel based diets for rabbits (Agunbiade *et al* 1999, Ikurior & Akem 1998).

The nutrient digestibility of the dietary treatments is presented in Table 3. There were significant

Table 3: Nutrient digestibility of rabbits fed three types of forages supplemented with concentrate.

	P. maximum (1)	*Pawpaw leaves (2)*	*T. procumbens(3)*	SEM
Dry matter	60.09^{c}	78.79^{b}	90.7^{a}	1.78
Crude protein	60.45^{c}	85.81^{b}	93.54^{a}	1.61
Crude fibre	88.22^{b}	85.86^{c}	97.4^{a}	0.96
Either extract	66.91	70.56	93.24	6.20
Ash	85.29	90.55	96.84	2.40
Energy	81.30^{c}	88.11^{b}	94.77^{a}	0.74

^{a,b,c} Means with different superscripts on the same row are significantly different ($P<0.05$).
SEM: Standard error of means.

differences (P<0.05) in the DM, CP, CF and energy values among the treatments. *Tridax procumbens* treatment had the highest (P<0.05) digestibility values for DM, CP, CF and energy while the least values were obtained on *P. maximum* based treatment. The in – vitro dry matter digestibility values for *T. procunbens* at different canopy ages of harvest, 14 – 70 days (Kalu *et al* 1986) were lower than value obtained in this study. No significant differences (P>0.05) were observed for ether extract and ash among the treatments. Despite the high digestibility of nutrients in *T. procumbens* , poor weight gain and FCR were recorded for it. This could be due to its poor nutrient retention.

Conclusion

Based on the encouraging daily weight gains obtained on the three forages (*P. maximum, pawpaw leaves and T. procumbens), they* can be fed to rabbits when supplemented with concentrate . However, pawpaw leaves based treatment gave the best result considering the weight gain and its feed conversion ratio.

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