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NUTRIENT INTAKE, DIGESTIBILITY AND GROWTH PERFORMANCE OF YANKASA SHEEP FED VARYING PROPORTIONS OF *FICUS POLITA* AND *PENNISETUM PEDICELLATUM* SUPPLEMENTED WITH WHEAT-OFFAL

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ABSTRACT

The nutrient intake, digestibility and growth performance of Yankasa sheep was evaluated on 16 Yankasa rams of approximately 1 - 1¹/₂ years old with average initial weight of 25kg. *Ficus polita* was fed with *Pennisetum pedicellatum* at different proportions of 100:0 (*F. polita*: *P. pedicellatum*) 0:100, 60: 40, and 40:60 constituting diets 1, 2, 3 and 4 respectively. Each animal was supplemented with wheat offal at the rate of 1% body weight per head per day. The total basal feed intake (DM basis) was highly significant ($P < 0.01$) which increased with decrease in the inclusion levels of *Ficus polita* in the diets. Animals fed diet 1 (100% FP) recorded the least total basal feed intake of 676.76g/day, while those on the 100% PP diet obtained the highest value of 1280.94g/day. Daily dry matter intake (DDMI) values of 959.95, 1564.14, 114.28 and 1307.58g/day were obtained for animals fed diets 1, 2, 3, and 4 respectively, indicating that the DDMI also followed similar trend as the total basal feed intake. Other nutrients intake including crude protein intake (89.42-129.06g/day), crude fibre (209.78-391.46g/day) and nitrogen free extract (5 11.91-743.16g/day) followed similar pattern as DDMI. However, the intake of ether extract was highest ($P < 0.01$) for animals on treatment 4 (40% FP/60%PP) (40.7g/day) and lowest for those on treatment 1 (100% FP) (25.99g/day). Water intake was not significant ($P > 0.05$) across the treatments. The result of the daily weight gain showed significantly ($P < 0.05$) higher values (47.57g/day) for animals fed diet 4 (40% FP/60% PP), while those on diet 1 (100% FF) recorded the least (26.14g/day). Feed Conversion Ratio (FCR) result showed significant difference ($P < 0.05$) across the treatments, with animals in treatment 4 (40% FP/60%PP) having best FCR (27.48) while those fed diet 2 had the lowest (38.69), indicating that animals on diet 4 utilized their diets more efficiently compared to others. The result of nutrients digestibility showed that Crude Protein Digestibility (CPD) showed significant difference ($P < 0.05$), with animals on diet 1 (100% FP) having the least (44.29%) and highest for those on the other treatments. Feed cost per kg gain was least for animals fed diet 4 (N17.66), and high for animals on diet 1 (N32.13). It was concluded that feeding various levels of *Ficus polita* and *Pennisetum pedicellatum* supplemented with wheat offal to Yankasa sheep improved total dry matter intake which gave rise to daily weight gain of the animals and reduced feed cost per kg gain especially for animals fed diet 4 (40% FPL/60% PPG).

Key words: Digestibility, *Ficus polita*, growth, nutrient intake, *Pennisetum pedicellatum*, wheat-offal, Yankasa sheep

INTRODUCTION

Livestock production has been faced with the problem of meeting up with the competition between human needs and those of farm animals for the scarce conventional food stuffs like the cereals, pulses and root crops. The high cost and sometimes unavailability of the conventional feeds all the year round coupled with the shortages in the foreign exchange and poor quality feeds have rendered livestock production an expensive venture in Nigeria (Ndamitso *et al.*, 2010). In addition, this country has been classified as one of the vulnerable countries in terms of food security considering some salient factors that militate against

her adequate food production especially in recent years. This has therefore made the situation of these materials very critical in the country which led to rises in the prices of the locally available feedstuffs most especially the concentrates. Studies on alternative feedstuffs to the conventional carbohydrate and protein sources are very important.

In recent years, studies have been conducted on the use of other non conventional feeding stuffs especially the non protein nitrogen (NPN) in order to replace the relatively more expensive plant protein supplements like

groundnut cake, cotton seed cake and soybean cake among others (Adegbola *et al.*, 1985). The toxicity of this NPN at high concentrations could, nonetheless, be highly dangerous unless experience hands are available to ensure the use of these supplements at safe levels (Ndamitso *et al.*, 2010). Also, due to the high poverty level among the local livestock farmers in the country, chaffs of cereals, crop residues, agro-industrial wastes, grasses and leaves of trees are being used to feed farm animals without minding their nutritional constituents or their toxicity, because they are relatively cheap and readily available (Oluremi *et al.*, 2007). The use of these non-conventional sources to complement the conventional ones is however, affected by several factors ranging from low protein contents, high fiber content, amino acid imbalance to the presence of anti-nutritive factors which generally have significant negative effects on livestock production as they interfere with the bioavailability of the mineral elements required for healthy growth of livestock (Oluremi *et al.*, 2007). This experiment was therefore designed to study the nutrient intake, digestibility and growth performance of Yankasa sheep fed varying proportions of *Ficus polita* and *Pennisetum pedicellatum* supplemented with wheat-offal

MATERIALS AND METHODS

Experimental Location

The feeding trial was conducted at the department of Animal science Teaching and Research farm, Faculty of Agriculture, Bayero university Kano, located in the new site along Gwarzo road in Ungoggo local government area, Kano state. The state lies between longitude 9° 30' and 12° 30' north and latitude 9° 30' and 8° 42' east (KNARDA, 2001).

The area has two distinct seasons a wet season, (May-Sept) and dry season (Oct-April). Annual rainfall and temperature ranges between 787mm-960mm and 21°C-39°C respectively (KNARDA, 2001).

Experimental Animals and Their Management.

Sixteen (16) Yankasa rams of approximately 1-1½ years old, with average initial weight of 25 kg obtained from the Ruminant Animal section of the Department of Animal Science Teaching and Research farm were used for the study

Before the start of the experiment, the experimental pens were cleaned and disinfected with Rambo (Pimethrin 0.60%) and labeled. The animals were quarantined for two weeks during which they were given Ivermectin (0.5ml/25kg body weight) against endo-and ectoparasites and Terramycin (Long Acting) (1.0ml/10kg body weight) (against bacterial diseases) as suggested by Benjamin (1985). During the quarantine period, the animals were fed *Ficus polita* and

Data Collection

Daily feed and water intakes of the animals were recorded. The animals were weighted at the beginning of the experiment and weekly thereafter throughout the experiment.

Statistical Analysis

Data generated were subjected to analysis of variance (ANOVA) using the general linear model (GLM) of the Statistical Analysis System (SAS, 2000). Where significant differences existed between means, least

Pennisetum pedicellatum leaves free choice to assess the voluntary dry matter intake of the individual animals. Good Clean drinking water was also provided to the animals *ad libitum*.

The animals were randomly divided into four (4) groups of four (4) animals each and kept in individual pens, which had been previously washed and disinfected with Izal solution. The pens have concrete floors and are well ventilated with space of 4.0m² each. The animals were given their respective diets every morning at about 0800 hours. Both the *Ficus polita* leaves and *Pennisetum pedicellatum* grass were allowed to wilt for few hours before feeding them to the animals. However, the supplement was fed before the diets were offered. The left over of the previous day were weighed and discarded before feeding fresh ones. The animals were also provided with good clean drinking water *ad lib*. The pens and feeding containers were cleaned daily.

Experimental Diets and Animal Feeding

Four diets were formulated using *Ficus polita* leaves (FPL) and *Pennisetum pedicellatum* grass (PPG). The four diets were formulated in such a way that the FPL and PPG were included at various levels, so that the two ingredients collectively constituted 100% of the diets. The diets designated as 1, 2, 3, and 4 were as follows. 1 (100% FPL), 2(100%PPG), 3(60%FPL/40%PPG) and 4(40%FPL/60PPG). Each animal was supplemented with wheat offal at the rate of 1% body weight per head per day. Gross composition of the experimental diets is shown in Table 2. The experiment lasted for 10 weeks (70 days). The animals were randomly allocated to the four dietary treatments of four animals each in a completely Randomized Design (CRD) (Steel and Torrie, 1990).

Digestibility Study

Digestibility study was conducted at the end of the trial. All the animals in the trial (16) were used for the digestibility study. The animals were maintained on their respective treatment diets and faecal samples were collected for a period of seven days (7) using harness bags. Faeces voided daily by each animal were collected in polythene bags, weighed and oven-dried at 60-65°C for 24 hours. At the end of the collection period, all samples from each animal were bulked, thoroughly mixed and 5% sample taken for chemical analysis in the laboratory.

Proximate Analysis of Experimental Diets and Faeces.

Representative samples of *Ficus polita* leaves (FPL) and *Pennisetum pedicellatum* grass (PPG) experimental diets, wheat offal (WO) supplement and faecal samples were dried at 65°C for 24 hours and analyzed for proximate composition according to the standard procedures of AOAC (1990). Proximate composition of the experimental diets and supplement is presented in Table 3.

significant difference (LSD) was used to separate them (Steel and Torrie, 1990).

RESULTS AND DISCUSSION

Proximate composition of the experimental feedstuffs and diets indicated that the crude protein contents of the basal feeds (5.47-6.56%) were lower than the values of 11.40% obtained for *Ficus polita* (Ndamitso *et al.*, 2010) and 10% reported for *Pennisetum pedicellatum* grass (Smith, 1992).

These values were also not within the range of recommended crude protein levels for growing sheep and goats (16-19%) by ARC (1990).

Total basal feed intake (DM basis) increased with decrease in the inclusion levels of *Ficus polita* in the diets. Animals fed diet 1 (100% FP) recorded the least total basal feed intake of 676.75g/day, while those on the 100% PP diet obtained the highest value of 1280.94g/day. Daily dry matter intake (DDMI) values of 959.95, 1564.14, 1142.28 and 1307.58g/day were obtained for animals fed diets 1,2,3, and 4 respectively, indicating that the DDMI also followed similar trend as the total basal feed intake. Other nutrients intake including crude protein intake (89.42-129.06-g/day), crude fibre (209.78-391.4bg/day) and nitrogen free extract (511.91-743.16g/day) followed similar pattern as DDMI.

However, the intake of ether extract was highest for animals on treatment 4 (40% FP/60% PP) (40.71g/day) and lowest for those on treatment 1 (100% FP) (25.99g/day). The observed low DDMI and other nutrients intake with higher levels of *Ficus polita* could probably be due to the presence of some ant nutritional factors such as cyanide, saponins, tannins, oxalates and phytates (Ndamitso *et al.*, 2010) which might have

interfered with the utilization of available nutrients in the diets by the animals. Water intake was not significant across the treatments. The result of the daily weight changes showed higher weight gains (47.57g/day) for animals fed diet 4 (40% FP/60%PP), while those on diet I (100% FF) recorded the least (26.14g/day). This could be due to the higher ether extract contents of the diet, which is in consonance with an earlier report by Udedibie *et al.* (1986) who reported that high body, weight can be attributed to high dietary fat (ether extract). Feed conversion ratio (FCR) was best for animals fed diet 4 (27.48), followed by (31.98) for those on diet 3. Animals fed diet 2 had the worse FCR (38.69), indicating that animals on diet 4 utilized their diets more efficiently compared to others. The result of nutrients digestibility showed that crude protein digestibility (CPD) was least for animals on diet 1 (44.29%) and highest for those on the other treatments. Ether extract digestibility also followed similar trend as CPD.

Feed cost per kg gain was least for animals fed diet 4 (N 17.66), followed by those on diet 2 (N20. 78), while animals fed diets 3 and 1 had the highest feed cost per kg gain values of N23.52 and N32.13 respectively.

Table 1: Proximate Composition of the Test Ingredients (%)

Parameter	Treatments		
	Wheat Offal	<i>Ficus polita</i> Leaves	<i>Pennisetum pedicellatum</i> grass
Dry Matter	94.40	93.65	91.87
Organic Matter	86.34	84.22	79.27
Crude protein	15.00	6.56	6.56
Ash	13.67	15.79	20.74
Ether extract	3.48	2.29	1.48
Nitrogen free extract	54.14	51.62	45.32
Crude fibre	19.92	23.75	25.90

Table 2: Nutrient Composition of the Experimental Diets

Ingredients	Treatments/Diets (%)			
	1	2	3	4
<i>Ficus polita</i>	100.00	-	60.00	40.00
<i>Pennisetum pedicellatum</i>	-	100.00	40.00	60.00
Total	100.00	100.00	100.00	100.00
Nutrients Analysis				
Dry Matter	91.87	93.65	93.43	94.28
Organic matter	79.27	84.22	83.25	83.54
Crude protein	6.56	6.56	6.56	5.47
Ash	20.74	15.79	16.76	16.47
Ether extract	1.48	2.29	2.95	2.46
Nitrogen free extract	45.32	51.62	50.41	58.14
Crude fibre	25.9	23.75	23.32	23.32

NB: Wheat offal supplemented at 1% BW

Table 3: Nutrient Intake, Growth Performance and Feed Efficiency of Yankasa Sheep Fed the Experimental Diets

Parameters	Treatments				SEM	LS
	1	2	3	4		
Basal feed intake (as fed)g/day	1041.16 ^d	1970.69 ^a	1321.67 ^c	1575.96	261.59	**
Concentrate feed intake (as fed)(g/day)	300.00	300.00	300.00	300.00	12.45	NS
Concentrate dry matter intake (g/day)	283.2	283.2	283.2	283.2	12.10	NS
Basal dry matter intake (g/day)	676.75 ^d	1280.94 ^a	859.08 ^c	1024.38 ^b	212.60	**
Total DMI (g/day)	959.95 ^d	1564.14 ^a	1142.28 ^c	1307.58 ^b	149.50	**
Organic matter intake (g/day)	828.82 ^c	1274.23 ^a	971.52 ^c	1111.59 ^b	129.42	**
Crude protein intake (g/day)	89.42 ^c	129.06 ^a	91.98 ^c	112.23 ^b	9.10	**
Crude fibre intake (g/day)	220.39 ^c	391.46 ^a	209.78 ^c	298.58 ^b	11.49	**
Ether extract intake (g/day)	25.99 ^c	29.45 ^b	31.63 ^b	40.71 ^a	6.79	**
Nitrogen free extract intake (g/day)	511.91 ^c	743.16 ^a	662.03 ^b	678.96 ^b	11.49	**
Water intake (litre/day)	1.01	0.87	0.73	0.90	0.12	NS
Initial weight (kg)	28.62	24.02	25.30	20.22		
Final weight (kg)	30.45	26.84	27.79	23.54		
Total weight gain (kg)	1.83	2.82	2.49	3.32		
Daily weight gain (g)	26.14	40.42	35.71	47.57	8.61	*
Feed conversion ratio	36.72	38.69	31.98	27.48	7.93	*

a, b, c = means in the same row with different superscripts are significantly (* = P<0.05; ** = P<0.01) different. SEM = standard error of mean, LS = level of significance, NS = Not significant.

Table 4: Effect of Feeding Various Levels of *Ficus polita* And *Pennisetum pedicellatum* with Wheat Offal Supplement on the Nutrient Digestion of the Diets

Parameters	Treatments				SEM	LS
	1	2	3	4		
Dry matter	41.42 ^c	46.02 ^b	45.89 ^b	49.50 ^a	9.10	*
Organic matter	37.69 ^a	38.46 ^a	32.46 ^b	39.47 ^a	8.47	*
Crude protein	44.29 ^b	51.27 ^a	52.26 ^a	53.10 ^a	9.89	*
Crude fibre	49.20	48.34	53.49	51.49	7.12	NS
Ether extract	48.44 ^c	58.29 ^b	57.89 ^b	62.49 ^a	11.42	*
Nitrogen free extract	41.40	39.70	39.69	40.27	8.19	NS

a, b, c = means in the same row with different superscripts are significantly (* = P<0.05) differently. SEM = standard error of mean, LS = level of significance

Table 5: Feed Cost per kg Gain of Yankasa Sheep Fed Various Levels of *Ficus polita* Leaves and *Pennisetum pedicellatum* Feed Supplement.

Parameters	Treatments			
	1	2	3	4
Initial weight (kg)	28.62	24.02	25.30	20.22
Final weight (kg)	30.45	26.84	27.79	23.54
Total weight gain (kg)	1.83	2.82	2.49	3.32
Daily weight gain (g)	26.14	40.42	35.71	47.57
Total feed consumed (kg)	93.88	158.94	113.51	131.31
Feed cost per kg (#)	40	40	40	40
Total cost of feed consumed (#)	840	840	840	840
Feed cost per kg gain (#)	32.13	20.78	23.52	17.66

CONCLUSION AND RECOMMENDATION

From the results of this trial, it was concluded that feeding various levels of *Ficus polita* and *Pennisetum pedicellatum* supplemented with wheat offal to Yankasa sheep improved total dry matter intake which gave rise to increased daily weight gain of the animals and

reduced feed cost per kg gain especially for animals fed diet 4 (40% FP/60% PP). This diet is therefore recommended for Yankasa sheep. However, future research should focus on treating the *Ficus polita* to reduce the amount of anti-nutritional factors present for better utilization of nutrients therein.

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