CARCASS TRAITS OF CROSSBRED RABBIT BUCKS FED DIETS SUPPLEMENTED WITH PUMPKIN STEM WASTE

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ABSTRACT

A study was conducted to evaluate the effect of supplementing diets with varying levels of pumpkin stem waste (PSW) on carcass traits as well as performance of rabbits. Twenty four crossbred (Dutch x Chinchilla) rabbit bucks aged 6 to 7 weeks were divided into four treatment groups of six (6) bucks each with two bucks per replicate. The bucks were randomly allotted to four dietary treatments arranged as follows; T_1 (basal diet only); T_2 (basal diet + 5% PSW); T_3 (basal diet + 10% PSW); T_4 (basal diet + 15% PSW). Each diet was fed to a group of the six rabbit bucks. At the end of 56 days, 8 bucks were slaughtered (2 per treatment). Results obtained indicate that bucks fed diets T_2, T_3 and T_4 increased in feed intake significantly ($p < 0.05$) compared to those fed the control diet while daily weight gain, feed conversion ratio and cost per weight gain indicated no significant differences ($P > 0.05$) . However, carcass traits particularly abdominal fat and liver weights indicate significant reduction ($P < 0.05$) as dietary pumpkin stem increased. These results suggest that supplementing rabbit diets with pumpkin stem waste could increase feed intake as well as improve meat quality due to fat reduction.

Keywords: Pumpkin stem, Supplement, Carcass, Rabbit, Performance.

INTRODUCTION

The importance of feed in the animal industry is well recognized eventhough feed industry in Nigeria is suffering set back due to high cost of feed ingredients. This emanate from serious competition between humans and livestock for available cereals and legumes grain which makes it difficult to meet up the nutrient requirement of these animal at a more economic cost (Aduku and Olukosi, 1990). Efforts are therefore geared towards exploring plant waste for livestock feeding and nutrition. One of such plant waste is Pumpkin stem wastes which is apparently rich in most nutrients required by the rabbit. Fluted pumpkin is one of the largest consumed vegetable in the West African sub-region and therefore creates one of the major agro waste problems in Nigeria. Preliminary investigations showed that several tons of these waste are produced daily in market places around the country but are scarcely useful and therefore create environmental nuisance (Ekpete *et.al,* 2011). However, to attain substantial increase in the domestic animals as well as meat supplies in order to mitigate the deficiency in animal protein availability; one of the serious challenge facing the country today (Owen *et al.,* 2010), makes rabbit production necessary . Populace is gradually becoming aware of rabbit as fast growing animals with ability to convert forage and other agro-by-product to meat more efficiently than cattle (Lebas *et al*., 1986). The aim of this study therefore is to assess the performance and carcass traits of rabbits fed diet supplemented with pumpkin stem waste.

MATERIALS AND METHODS

Location of the Study

This experiment was conducted in the rabbitary of the livestock research farm of the department of Animal science, Akwa Ibom state University, Akwa Ibom, Nigeria. Akwa

Ibom State falls within the rainforest zone of the humid tropics which is characterized by hot and humid climate. It is in the Niger Delta region of the South-South coastal part of Nigeria, lying 70m above sea level, located between latitude $4^{o}58^{/}$ and $5^{o}08^{/}$N and longitude $8^{o}02^{/}$and $9^{o}47^{/}$E, temperature range between 25.0^{o}C and 26.0^{o}C with average relative humidity of 75-80% while mean annual rainfall vary from 2250mm to 2926mm in a year (Wikipedia, 2010).

Source of rabbits and Test Material:

Cross-bred (Dutch x Chinchilla) male rabbits aged 6-7 weeks used for the study were acquired from research farm in Akwa Ibom State University, Nigeria. Similarly, Pumpkin stems were collected from pumpkin harvesters and sellers in the study area. The stems collected fresh were washed and chopped into sizes of about 5cm each before incorporated into the animal's diets daily. Samples of pumpkin stem waste used were analyzed to determine its proximate and chemical composition using standard procedures (AOAC, 1990).

Experimental Diets

An appropriate rabbit diet was formulated (Table 1) and offered *ad libitum* to all rabbits. In addition, four graded levels of pumpkin stem waste were given which represented four dietary treatments (0%, 5%, 10% and 15% of body weight).

Management of Experimental Rabbits

On arrival, the animals were conditioned for 2weeks. The initial weight of the animal was taken and recorded accordingly before allowing them to a have access to the experimental diet. Weight measurement was sequentially carried out on weekly basis. The rabbits were divided into four treatment groups each comprising of 6 rabbits. The four rabbits groups were randomly assigned to any of the four diets (0%, 5%, 10%, and 15% PSW based on body weights) .The experiment lasted for 56 days.

Table 1: Ingredients and Chemical Composition of Experimental Diets

Ingredient	T1 (Basal Diet)	T2 (BD +PSW)	T3 (BD+PSW)	T4 (BD+PSW)
Maize	45.00			
Soya bean	15.00			
Wheat offal	37.00			
Fish meal	1.00			
Bone meal	1.50			
Vit./ min. premix	0.25			
Salt	0.25			
Total	100			
PSW	0.00	5.00	10.00	15.00
Calculated Composition of Experimental Diets				
Crude protein	17.40			
Crude fiber	5.50			
Ether extract	3.98			
Ash	3.86			
ME (kcal/Kg)	2.530			

Vit/min. premix to provide the following per kg diet, vit. A, 10 10,00iu, vit. D_3, 1,500 IU; vit. E, 3 IU; vit. K 2mg; Riboflavin, 3mg, pantothenic acid 6mg; Choline chloride 3mg; vit. B_{12}, 0.08mg; folic acid, 4mg; Mn8mg; Zn 0.5mg; Iodine, 1.0mg; Co, 12mg; Cu, 10mg; Fe 20mg.

Data collection and Analysis

Daily feed consumption was obtained by taking the difference between feed supplied and quality left in the feeding trough every morning (7-8am). Weight gain was determined by the difference between the initial weight and final body weight. Daily weight gain was calculated by dividing the weight gain by the number of days the trial lasted. Feed conversion ratio was computed by dividing the average daily feed intake by the average daily weight gain

Carcass evaluation: The carcass evaluation was based on the method recommended by Ekpo *et al*, (2009). Two rabbits per treatment (8 in all) were randomly selected and starved for twelve hours prior to slaughtering. The rabbits were killed by striking a hard, quick blow on the skull using one hand (to render the rabbit unconscious) before cutting the jugular vein to allow for free flow of blood. The head was later removed. The next step was to cut the fur around the hock joints of the hind shank to enhance proper skinning. Shortly, after skinning evisceration took place by making a sharp clean incision down the abdomen, with care to ensure that the internal visceral were not punctured. Then the visceral organs were pulled out leaving the liver, kidneys and heart in place. Dressing percentage was calculated as the ratio of dressing weight to live weight. The eviscerated carcasses were weighed and divided into the following primal cuts.

_ Fore shank (including thoracic insertion muscle)

_Thoracic cage (including first seven ribs without the insertion muscles of the forelegs)

_Hind shank (including the sacral bone and the lumbar vertebrate after the 6^{th} lumber vertebra)

The organs (kidneys, heart liver and fat) weights were taken individually and calculated as % of live weight.

Cost Benefit Analysis: Cost of feed was calculated based on prevailing cost of ingredients per kg as at the time the experiment was conducted; maize N50, soya bean N220 wheat offal N54, salt N30, fishmeal N100, bone meal N100, vitamins/mineral premix,N1500. The economic analysis was based on the method by Akinwumi (1979). The costs of dietary ingredient (N/kg) were used to calculate the feed cost per kg of each diet. Cost of total feed consumed was calculated by multiplying feed intake by cost per kg feed. While cost per kg body weight gain was calculated by multiplying cost per kg feed by feed conversion ratio.

Data Analysis The completely randomized design (CRD) was used. Data collected were subjected to one way analysis of variance as outlined by Zar (1984). Where ANOVA indicated significant treatment effect, means were separated using Duncan new multiple range test as described by Obi, (1990.)

RESULT AND DISCUSSION

Table 2: Chemical and Proximate composition of Pumpkin Stem Waste

Parameters	
Dry matter	91.10
Crude protein (%)	14.03
Ether extract (%)	2.05
Crude fibre (%)	26.65
Ash (%)	13.01
NFE (%)	44.26
D. Energy (kcal/kg)	2520.00
Vitamin A (mg)	6.75
Vitamin B (ug)	26.75
Vitamin C (mg)	78.58
Phosphorus (mg)	116.5
Magnesium (mg)	1.67
Potassium (mg)	21.11
Sodium (mg)	6.75
Flavonoids (mg)	1.31
Glycoside (mg)	0.023
Tannins (mg)	0.46
Saponins (mg)	0.92

D. Energy=Digestible Energy. NFE=Nitrogen free Extract

Table 3: Proximate Composition of experimental diets

	Dietary inclusion level of Pumpkin Stem Waste			
Parameters	0.00 (T_1)	5.00 (T_2)	10.00 (T_3)	15.00(T_4)
Dry matter	90.91	91.83	92.05	92.10
Crude protein	16.85	17.99	17.00	17.28
Ether extract	4.50	3.00	3.08	3.07
Ash	5.87	6.05	6.67	6.77
Crude fibre	5.98	11.72	13.15	15.00
NFE	66.80	61.24	60.10	57.88
D.Energy (kcal/kg)	375.80	3439.50	3361.20	3282.70

D. Energy=Digestible Energy. NFE=Nitrogen free Extract

Table 4: Effect of Pumpkin Stem Waste on Performance Characteristics of the Rabbits.

Parameters (g)	T_1 (0.00)	T_2 (5.00)	T_3 (10.00)	T_4 (15.00)	SEM
Daily feed intake	72.39^{cd}	77.24^{c}	86.21^{b}	93.14^{a}	2.20
Initial body weight	637.8	777.23	719.06	655.76	139.8
Final body weight	1475	1512.5	1425	1550	126
Daily weight gain	14.95	13.88	12.84	11.71	3.25
FCR	4.87	5.56	6.71	7.95	3.28

a, b, c Means within the same rows having different superscript are significantly different ($P < 0.05$)

From the statistical analysis, there was significant difference (P< 0.05) in daily feed intake. The highest daily feed intake was obtained from rabbits fed diet T_4 followed by diet T_3 and diet T_2 while the lowest daily feed intake was obtained from rabbits fed the control diet, T_1. The significant increase in daily feed consumption for rabbit as the level of PSW increased could be attributed to their increase in dietary crude fibre content (Table 3).This agrees with Ekpo *et al* (2008) who reported that increase in dietary crude fibre stimulated voluntary feed intake in rabbits fed cassava peel meal. Similar observation by Aregheore, (2007) indicated that goat fed fluted pumpkin foliage increased in feed intake compared to those without pumpkin foliage .It is also possible that the effect of low dietary energy content of PSW based diets (Table 3) reflected in the increased feed intake by the rabbits towards reaching their energy requirement compared to their counterparts fed control diet, T_1. Thirdly, in this hot humid tropics, the Vitamin C present in pumpkin stem (Table 2) might have enhanced the rabbits feed intake due to its anti- stress effect. Weight gain result obtained however showed no significant difference (P>0.05) among the treatments. This implies that supplementing rabbit diets with Pumpkin stem at 5, 10 and 15% levels caused no adverse effect on weight gain .This further indicate the efficient fibre digesting ability of rabbits. Feed conversion ratio (FCR) result as shown in table 4 revealed no significant difference (P> 0.05) among dietary treatments. This means that the different diets might have been utilized probably the same degree. It is also an indication that dietary inclusion of Pumpkin Stem Waste did not impair nutrient utilization in the growing rabbits. The FCR values obtained agrees with Akinfala *et al.,* (2003) who fed rabbits with whole cassava plant meal.

The result of carcass characteristics is shown in table 5. Mean values obtained for dressed weight and dressing percentage were not significantly different (P>0.05) and were within normal range expected of normally reared rabbits. This indicate that the high fibre in pumpkin based diets did not impair nutrient utilization, hence no adverse effect on dressed weight and dressing percentage. This supports the feed conversion ratio result earlier observed. Similarly, the organs (heart, lungs and kidney) values did not show significant differences (P>0.05) among the treatments exception of liver and fat weights. The significant decrease (P< 0.05) observed in the liver weights of rabbits fed higher levels of pumpkin stem waste (PSW) diets, T_3 and T_4 suggest that the increasing concentration of antioxidant, vitamin C as level of PSW increased could have contributed to reduction in metabolic activities in the liver hence reduction in liver weight. On the contrast, increase in weights of liver and kidney suggest higher metabolic activities in combating adverse or toxic elements in the feed (Bone,1979). Fat content indicate significant (P< 0.05) reduction at higher level of dietary pumpkin stem supplementation. This suggests beneficial role of the antioxidants, vitamin C present in pumpkin stem waste (Table2) which can effectively control the excessive generation of oxidants in live rabbits and latter improve muscle lipostability (Giovannangelo *et al.*, 2001).Previous work on similar antioxidant, vitamin E (Dal Bosco *et al.*2004) reported that it reduce abdominal fat. Besides, the high fibre content of Pumpkin stem strongly contributed to the reduction in abdominal fat content. This agrees with Pla (2004) who reported that feeding rabbits with high fibre diets resulted in less fattened carcass. Similar report by Nworgu *et al.,* (2007) indicate that dietary fibre have binding effect on lipids thereby easing their excretion from circulation.

Table 5: Effect of Pumpkin Stem Waste on Carcass Characteristics of Rabbit

Parameters (g)	T1 (g)	T2 (g)	T3 (g)	T4 (g)	SEM
Pre-slaughter weight	1475	1512.5	1425	1550	48.62
Dressed weight	768	795.5	722.5	639	27.79
Dressing percentage	52.40	52.88	50.68	41.38	2.16
Liver (% of lw)	3.56^{a}	3.60^{a}	2.79^{b}	2.35^{bc}	0.21
Heart (% of lw)	0.24	0.23	0.21	0.19	0.01
Lungs(% of lw)	0.89	0.55	0.49	0.64	0.08
Kidney (% of lw)	0.97	0.71	0.59	0.71	0.07
Fat	1.04^{a}	0.96^{b}	0.49^{b}	0.26^{c}	0.15
Forelimb	117.5	58.7	117.5	109.5	9.80
Thoracic cage	153.5	135.5	114.5	89.0	12.21
Lion	177.00	98.05	200.5	184.50	17.19
Hind limb	221.00	254.50	224.50	203.00	10.30

a,b,c Means within the same rows having different superscript are significantly different ($P < 0.05$). L.w - live weight

Table 6. Effect of Pumpkin Stem Waste on Economy of Production

Parameters	T1	T2	T3	T4	SEM
Cost/kg feed	8.18	7.94	7.50	7.14	7.70
Cost of feed consumed	592.15	613.28	646.57	665.01	132.2
Cost per kg weight gain	41.96	49.06	55.72	56.90	51.25

$^{a, b,c}$ Means within the same rows having different superscript are significantly different ($p<0.05$).

Result of cost analysis presented in table 6 shows that cost/kg feed was not significantly different ($P>0.05$). This means that inclusion of PSW in rabbit's diet at 5 – 15% level did not cause any significant increase in feed cost. Similarly, cost of feed consumed and cost/kg weight gain obtained indicated no significant difference ($P>0.05$). This implies that inclusion of PSW in rabbit diet did not attract any additional cost.

CONCLUSION

From the findings, it is revealed that supplementation of rabbit diets with pumpkin stem waste (5 – 15% levels) significantly increase feed intake without adverse effect on weight gain, feed conversion ratio, economy of production and carcass characteristics. Abdominal fat however decreased with increase in dietary pumpkin stem waste. Therefore pumpkin stem waste is recommended as supplement up to 15% level in rabbit diets for enhancement of feed intake and reduction in fat content demonstrating its beneficial role of reducing fat in people who are mindful of fatty meat as well as people suffering from heart problem and obesity.

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