

## Effect of sweet potato (*Ipomoea batatas* lam.) Peel meal as replacement for maize on growth performance and cost of feeding weaner rabbits

Ibrahim, H. and Olaniyi, O. J.

Department of Animal Production, Faculty of Agriculture,

Ibrahim Badamasi Babangida

University, Lapai, Niger State, Nigeria



**Abstract** Correspondence author: ihadiza080@gmail.com. 08036101761

The experiment was carried out to determine the effect of replacement of maize with sweet potato (*Ipomoea batatas* lam.) on growth performance and cost of feeding weaner rabbits (*Oryctolagus cuniculus*). A total number of thirty-six (36) weaned rabbit of mixed sexes were used for the experiment. The rabbits were allotted randomly into four dietary treatments and replicated thrice with three rabbits per replicate and were designated: control ( $T_1$ ): normal compounded diet without sweet potato peel meal,  $T_2$  had the compounded feed which 5% sweet potato peel meal,  $T_3$  had compounded diet with 10% sweet potato peel meal and treatment four ( $T_4$ ) had the compounded diet with 15% sweet potato peel meal. The experiment lasted eight weeks and data were obtained on growth performance and cost benefit. The parameters considered on growth performance include initial weight, final weight, total body weight gain, daily weight gain, weekly weight gain, daily feed intake, total feed intake and feed conversion ratio while that of cost benefit include cost of purchasing different experimental feed stuff. The results obtained on growth performance showed that there were no significant differences ( $p>0.05$ ) in the parameters monitored. Cost of feeding was also not significantly different ( $p>0.05$ ). However, higher profit index (174.64) was recorded in  $T_1$  and lower benefit cost ratio (166.68) was recorded in  $T_4$  for total cost of feed intake per rabbit. In conclusion, sweet potato peel meal can be uses as a good replacement for maize in rabbit production without any adverse effect on the performance of rabbit.

**Keywords:** Replacement, sweet potato, rabbits, weaner, maize

### Introduction

There are numerous potential advantages that may be realized from rabbit production. Rabbits are docile, odorless and quiet animals that are often unnoticed by neighbour even residential areas. General advantages from a rabbit enterprise include, potential income generation, rich manure for flower bed and gardening, enjoyable occupational activities, educational experience for youth and nutritious and wholesome meat. Educational opportunities for youth, is a magnificent learning experience in the science of biology such as digestive anatomy and functions of children, genetic growth development, animal behavior and reproduction.

Rabbit production likewise teaches responsibility, return care, budgeting cost, and concern of animals and the acceptance of livestock as a good source of food for man. Meat from rabbit is an all white meat product that is high in protein, low in cholesterol and relatively rich in indispensable amino acids (Iraqi, 2003). Rabbit farming compliments the effort of the flowering plant enthusiast and gardener. The manure from rabbit' makes an excellent compost, rich in nutrients and organic matter thus produces a good flowering result in the garden (Mikled, 2005). Rabbit production requires little capital and operational cost. It requires minimal cash and time to expand the size of the operation; labour is usually shared among family

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members. These feature connect the rabbit enterprise with minimum economic risk.

The expanding interest in rabbit products due to quick development in the world economics and stinking area, subsequent hope for protecting their security will rely upon the better usage of non-conventional feed resources that does not compete with human food (Ayoola and Akinban, 2011).

In many nations, replacement of conventional feeds which appears to be expensive with the non-conventional ones seems to occupy the interest of animal nutritionist. There has been a continuous increase in the cost of producing poultry, cattle and sheep which has implored researchers to investigate other less common alternative animal protein to man (Ayinde and Aromolana 1998). Taiwo *et al.* (2005) reported a few points of interest of rabbit over other domesticated animals and upheld for it expanded generation in Nigeria.

Also, Ayinde and aromolaran (1998) demonstrated that cost of feeding represented as much as 65.7% of aggregate cost of producing rabbit in Nigeria and suggested that researchers should make use of available and cheap source of rabbit feed. Emphasis has been laid on the utilization of potato peel meal in animal feed as a conceivable means to decrease the cost of producing animal (Baiagi *et al.*, 2004, Adewolu, 2008). Sweet potato is a herbaceous creeper plant, has short generation interval (4 months), resist drought, and can be planted twice in a year. Hence, it is always available throughout the year (Hong 2003). Sweet potato peel appears to be a cheap alternative energy source in the tropic in feeding ruminant probably because of its high energy content (Ekenyem and Madubike 2006).

Literature on rabbit feed and feeding have shown that rabbits fed on a wide range of natural forages, crop residues, and kitchen

waste were not deleteriously affected. The use of non-conventional feed and kitchen waste like yam peel, potato peel, plantain peel in evaluating growth performance of rabbit are imperative in order to lower the cost of meat animal production in Nigeria.

The main reason for finding an alternative to the conventional feeding stuffs is to reduce the cost of production thereby leading to a reduction in price of animal protein making it affordable by most people (Ojebiye *et al.*, 2006). Yam, sweet potato, and Irish potato peel have been distinguished as good alternative energy source feedstuffs that can be utilized in both poultry and livestock feed (Adeyemo and Borries, 2002). These alternative feeding stuffs described as non-conventional feeds are essential to farming systems that produces both livestock and crops (Henning *et al.*, 2006). Crop by-product are abundant in Nigeria but are not effectively utilized by livestock producers as a potential feeding stuffs (Ayuk *et al.*, 2011). The experiment was carried out to assess the effect of replacing maize with sweet potato peel meal on growth performance and cost of feeding weaner rabbits.

### **Materials and methods**

#### ***Location of the experiment***

The research work was carried out at the Rabbit Section of the Teaching and Research Farm of Ibrahim Badamasi Babangida, Lapai, Niger state. Lapai is very close to Minna which is the state capital and lies between latitude east of the equator (Usman, 2011).

#### ***Source of rabbits***

The thirty six weaned rabbits of mixed sexes and breeds were obtained from Sultan Veterinary Consult farm Samaru Zaria, Kaduna state. The sweet potato peels were collected from the surrounding environment in Lapai metropolis in Lapai Local Government Area of Niger state,

Nigeria.

**Experimental animals and management**

Thirty six weaned mixed breeds and sexes rabbits, aged between 5-6 weeks were randomly allotted to four treatment groups with nine rabbits per treatment. Each treatment had three replicates of three rabbits per replicate. Four experimental diets (Table 1) were formulated with crude protein of 18% for each diet designated as T1, T2, T3 and T4 with sweet potato peel meal inclusion at 0, 5, 10 and 15%, respectively. The rabbits were giving Ivomecatin injection against parasites. Vitacox-plus and Neo-furaseryl-plus were adequately given as well. The cages were well clean, disinfected with Dettol and

equipped with drinkers and feeders. Prior to the experiment, the animals were feed the control diet and allowed the adjustment period of one week to enable the animals get used to their various cages and diets. Fresh clean water was provided ad-libitum. The experiment lasted eight weeks. The following parameters were measured on the feeding trial: Daily feed intake, Feed conversion ratio. The prevailing market prices of ingredients used during the period of the experiment were used for the economic appraisal of the feed. Economic production was based on the feed cost per kg diet, to confirm if the use of the test ingredient (sweet potato peel meal) has any economics benefit to the end users.

**Table 1: Composition of experimental diets**

	<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>
Ingredients (%)	0%	5%	10%	15%
Maize	42.00	38.00	36.00	34.00
Sweet potatoes peel	0.00	4.00	6.00	8.00
Maize offal	25.00	25.00	25.00	25.00
Soybeans meal	2.00	2.00	2.00	2.00
Fish meal	1.20	1.20	1.20	1.20
Groundnut cake	10.00	10.00	10.00	10.00
Limestone	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.20	0.20	0.20	0.20
Premix	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10
Total	100	100	100	100

**Table 2 Proximate Analysis of Sweet Potatoes peels (Test ingredient)**

Parameters	Composition
Moisture %	69
Ash%	1.00
Crude Fibre%	1.00
Crude Protein%	0.46
Fat%	1.70
Carbohydrate%	26.84
Beta carotene mg/100g	7.68
Vitamin C mg/100g	0.46

**Processing of the test ingredient**

The sweet potato peels were collected and sundried, pounded to reduce it size and later taken to milling machine to obtain a product referred to as dry sweet potato peel meal (SPPM) which was stored in sacks until when needed.

The soybean used for the experiment was roasted in order to remove the pericarp of the soybean and taken to the milling machine for grinding. The maize was also grinded to small particle to obtain the final product for feed formulation.

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### **Experimental design**

The four treatment groups were assigned to the four experimental diets in a completely randomized design (CRD). Each treatment was replicated three times and there were three rabbits per replicate.

### **Data collection**

#### **Performance parameters**

The following parameters were measured on the feeding traits: feed intake, body weight gain and feed conversion ratio. The following formula was used for growth performance parameters computation.

Daily feed intake (g) =

$\frac{\text{quantity of feed given-leftover (g)}}{\text{Number of rabbits} \times \text{No of days}}$

Weight gain (g) =

$\frac{\text{final weight} - \text{initial weight (g)}}{\text{Weight of the rabbits (g)}}$

Feed conversion ratio =

$\frac{\text{quantity of feed consumed (g)}}{\text{Weight of the rabbits (g)}}$

Weight of the rabbits (g)

### **Economic production**

The prevailing market prices of ingredient used during the period of the experiment were used for the economics appraised of the feed. Economics production was based on the feed cost per kg diet. This is to confirm if the use of the test ingredient (sweet potato peel meal) has any economics benefit to the end users.

### **Data analysis**

The experiment was carried out in a complete randomized design. The data generated were subjected to Analysis of Variance (ANOVA) using statistical package (SAS, 1998). The means were separated using Duncan's Multiple Range Test (DMRT) as described by Duncan (1955).

### **Results and discussion**

The result of proximate composition of the experimental diet as presented in Table 3 showed highest crude protein (29.75 %) in T4 and lowest in T1 (21.87%). Fat content was higher in T2 treatment than other

treatments and the least percentage of fat was obtained in T4 (12.64 %). Highest percentage of crude fiber was obtained on T4 (4.05 %) and the least on T1 (3.20). The results for crude protein obtained in this study were within the range of 16-20 % reported by Johnson-Delaney (2006) in rabbit for growth, maintenance, gestation and other production purposes while Obinne (2008) suggested 18 % crude protein.

Result of growth performance (Table 4) shows that there were no significant differences ( $p > 0.05$ ) across the treatment groups. This could be as a result of the acceptability of the diets to the animals. This was however in contrast with the findings of Taiwo *et al.* (2005) and Akinmutimi and Anakebe (2008) where significant differences were observed in the initial weight, total weight, final weight, daily feed intake, weekly feed intake, daily weight gain, total feed intake and feed conversion ratio of weaner rabbits fed sweet potato and yam peel meal.

The costs of feeding of rabbits with graded level of sweet potato peel meal as a replacement of maize are presented in Table 5. Treatment one had the highest cost of feed per kg (16.01) while treatment three had the lowest value (15.03). The total cost of feed intake / rabbit tend to be lower in treatment three while treatment one had the highest cost of feed per rabbit. Cost of feed per gram tend to be lower in treatment four (51.00) and higher in treatment one, two and three. This shows an indication of favourable cost analysis which could be translated to mean a positive response of rabbits to the diet and agreed with several reports of Ayoade *et al.* (2000), Adeniji and Ehinmidu (2007). Adama *et al.* (2007), Amaefule *et al.* (2008) and Igwebuikwe *et al.* (2013), all recorded higher cost of the control diet when rabbits were fed graded levels of dried bovine rumen ingesta

(DBRI) and when rabbits were fed industrially produced brewers dried grains at various levels of inclusion (Ibrahim *et al.*, 2017).

**Table 3: Proximate composition of experimental diets.**

Parameters	T1	T2	T3	T4
Dry matter	93.12	93.70	93.36	93.19
Ether extract	12.90	13.68	13.40	12.64
Ash	11.91	14.50	14.75	14.87
Crude fiber	3.20	3.86	3.94	4.05
Crude Protein	21.87	23.62	26.25	29.75
Nitrogen Free extract	43.24	38.04	35.02	31.02

**Table 4: Growth performance of rabbit fed with graded level of sweet potato peel meal**

Parameters	T1	T2	T3	T4	SEM	LS
Initial weight	667.78	744.44	700.00	761.11	127.16	NS
Final weight	877.20	965.60	902.80	1085.60	311.08	NS
Total weight	209.45	221.11	202.78	324.45	208.14	NS
Daily weight gain	98.12	3.95	3.62	5.79	153.22	NS
Weekly weight gain	29.94	31.60	28.96	46.35	29.72	NS
Daily feed intake	194.76	196.00	196.13	195.94	5.16	NS
Total feed intake	10906.40	10808.00	10983.10	10972.50	305.54	NS
Feed conversion ratio	12.62	11.33	12.53	10.35	3.96	NS

a, b: Means with different superscripts on the same row differ significantly (P<0.05), NS=not significant, S.E.M: Standard error of mean, LS= level of significance; T1= treatment one, T2= treatment two, T3= treatment three, T4=treatment four, NS= not significant, LSD= least significant difference, LS Level of significant,

**Table 5: Cost of feeding rabbit with graded levels of sweet potato peel meal**

Parameters	T1	T2	T3	T4
Cost of feed/kg	16.01	15.86	15.03	15.21
Total feed intake/rabbit	10906.40	10808.00	10933.10	10972.50
Total cost of feed intake/ rabbit	174.61	171.41	165.02	166.88
Total weight gain	209.45	221.11	202.78	166.88
Cost of feed per (kg)	83.00	77.00	81.00	51.00

### Conclusion and recommendation

It could be concluded that inclusion of sweet potato peel meal in rabbit's diet up to 15 % had no deleterious effect on performance of rabbits. The use of sweet potato peel meal as a replacement for maize in the diet of rabbit is recommended at 15 % inclusion level.

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