

Growth performance and feeding cost of weaned rabbits (*Oryctolagus cuniculus*) fed graded levels of oven dried poultry droppings based diet

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Abstract

Thirty six weaned mixed breed rabbits aged between 5-6 weeks were used to investigate the growth performance and feeding cost of rabbits fed graded levels of oven dried poultry droppings. The rabbits were randomly assigned to four dietary treatments with three replicates and three rabbits per replicate in the ratio of 2:1 (2 females and 1 male) in a completely randomized design. Poultry droppings were oven dried at 100°C, 80°C, 60°C, 40°C and incorporated at 0, 20, 40 and 60% levels of inclusion to replace ground nut in the compounded feed or experimental diets and designated as T1, T2, T3 and T4 respectively excluding treatment one (T1). Data collected were subjected to Analysis of Variance (ANOVA). Growth performance of rabbits showed no significant ($P > 0.05$) differences across the treatment groups. However highest average feed intake was recorded in T3 (40% inclusion level) 473.60 g and the lowest in T3 (40%) of 458.80 g. The result of cost of feeding revealed that as the inclusion level of oven dried poultry increased the cost of feeding rabbits reduces. The trial revealed that oven dried poultry dropping can be used at 40% level of inclusion in the rabbit diet without posing any threat to the animal.

Keywords: Rabbit farmers, livestock feed millers, Animal scientists. Poultry droppings

Introduction

The inclusion of alternative feedstuffs in animal diets might be interesting in some circumstances (relative price, feed quality), but it is limited because of the non-conventional feedstuffs are not commonly utilized as common feed stuffs due to inadequate data on their nutritive values and accessibility of feedstuffs (Atteh, 2012). The advantage of rabbits in Nigeria as source of animal protein has been identified (Amaefule *et al.*, 2004). The domestic rabbit is raised as a cheap source of meat for reasons of economy of feeding, high prolificacy (Cheeke, 1986) and small body size that makes it suitable for backyard rearing and easy consumption by a family. Rabbits could be produced using inexpensive and renewable resources such as garden "wastes" and by-products of grains (Lukefahr, 2009). Rabbits are able to thrive on non-conventional feedstuffs

(Omole, 1982; 1988) with their utilization of large forage diets limited as a result of post gastric fibre digestion in the caecum (Belenguer *et al.*, 2008). Caecal microorganisms are able to convert nutrients leaving the small intestine to volatile fatty acids (VFAs), gases (CH₄, CO₂, H₂, ammonia), and compounds incorporated into microbial cells. As such, rabbits require concentrate feed, although they could manage high crude fibre levels (14-25%) in the diet (Adegbola *et al.*, 1985).

Rabbits (*Oryctolagus cuniculus*) are small mammals/pseudo ruminant in the family Leporidae of the order Lagomorpha. They have large powerful hind legs and each foot has five toes, rabbits are hindgut digesters with a caecum that digests fibre. They are reared in cages/hutches or deep litter for source of meat and wool, classified as a monogastric herbivore or pseudo-ruminant

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because of its ability to eat and digest forage but do not possess four stomach compartments and do not chew the food or regurgitate but also does what is known as coprophagy (Yusuf *et al.*, 2009).

The meat of rabbit is pearly white, palatable and delicious. Their meat tastes better and contains less cholesterol, fats than conventional livestock and so good for hypertensive patients and old people. About 20% of the dressed carcass is bone so that the meat yields about 74% or more, rabbit meat is highly nutritious and of good quality (Adegbola and Osuji, 1981).

The pelts also have some commercial value. They may be dressed, dyed and made into fur garments and slippers. Other advantage of keeping rabbits is low capital intensive and space requirement which makes it suitable for urban and rural dwellers (backyard farming). Rabbits are easy to manage and are very prolific with a short gestation period of 31 days and an average of 6 kits per litter with about 5-6 litters in a year.

Rabbit has higher meat to bone ratio when compared with cattle, sheep and goats. With increase in population and subsequent increased demand for grains as food for human consumption which brings about keen competition between livestock and humans, there is need for scientists to look inwards to other sources of feed ingredients (non-conventional feed) for animal production (FAO, 2000). This is the case with oven dried poultry droppings, a waste product of poultry as a supplement feed in the diet. Poultry dropping is a mixture which contains phosphorus and urea (uric) that is non-protein nitrogen (NPN) and can be used to substitute groundnut cake (GNC) in the diet of weaned rabbits which will aimed at evaluating its effect on growth

performance and cost of feeding of weaned rabbits.

Materials and methods

Location of experimental site

The research was conducted at the Teaching and Research Farm, Ibrahim Badamasi Babangida University, Lapai, Niger state, Nigeria. Lapai lies between latitude 9°31' and 9°45', each of equator (Usman, 2013). The area falls within the Southern Guinea Savannah Vegetation Zone of Nigeria with mean rainfall ranges between 1100-1600mm and a mean temperature 21°C and 36.5°C (Usman, 2013).

Source of test ingredient

Poultry droppings were collected from the Animal Section of Ibrahim Badamasi Babangida University Teaching and Research Farm Lapai, Niger State, Nigeria. Poultry droppings were oven dried at 100 °C, 80 °C, 60 °C and 40 °C respectively and incorporated at 0, 20, 40 and 60% levels of inclusion in to the compounded feed or experimental diets and designated as T1, T2, T3 and T4 excluding treatment one (T1), maize, groundnut cake (GNC), maize bran, fish meal, bone meal, salt, vitamin premix. Experimental diets were compounded using the following percentage:

T 100 °C : 0% = Oven dried poultry droppings at 100 °C and non inclusion

T2 80 °C : 20 % = Oven dried poultry droppings at 80 °C and 20% inclusion

T3 60 °C : 40% = Oven dried poultry droppings at 60 °C and 40% inclusion

T4 40 °C : 60% = Oven dried poultry droppings at 40 °C and 60 % inclusion

Source of rabbits

The thirty six weaned rabbits of mixed sexes and breeds were obtained from Sultan Veterinary Consult Farm No 2, Kauru Street, Layin dogo Samaru Zaria, Kaduna state.

Experimental Animals and Their Management

Thirty six weaned composite rabbits aged between 5 -6 weeks were used and of both sexes (twenty four females and twelve males), were randomly allotted to four treatments groups. Each treatment had three replicates with three rabbits per replicate (one males and two females) The rabbits were housed intensively in a well constructed hutches that were made of wire and woods with trays to collect the faeces as well as for easy cleaning of the hutches. The hutches were equipped with feeders and drinkers. The hutches were cleaned twice daily throughout the study period. Which lasted six weeks after one week of adjustment period. The rabbits on all the treatments were kept under close observation for proper monitoring indication of ill-health. The rabbits were dewormed against endoparasite using ivermectin, Coccidiosis was treated once using sulphadimidine and multivitamin soluble powder (Vitalyte) was given as an anti-stress.

Experimental Diets

The diets formulated were designated T1 – T4 and had the test ingredients oven dried poultry droppings incorporated into the diets at the level of 0, 20, 40 and 60 % inclusion for the experiment. The feed ingredients in the formulated diets consisted of maize, groundnut cake, bone meal, salt and vitamin/mineral (premmx) All the feed ingredients were ground in an Hammer mill, mixed and pelleted before being fed to the rabbits. The diets were supplemented with 100 g of *Amaranthus hybridus* as a source of forage in the evenings. The diets were formulated to give 20 % crude protein needed for rabbits growth. Prior to the start of the experiment, the animals were fed normal diet and allowed an adjustment

period of one week to enable the animals get acclimatized to their cages and diets. The diets and fresh water were provided *ad-libitum* throughout the duration of the experiment

Proximate Analysis

Chemical composition of the compounded experimental diets were determined using the AOAC (2002) method. The parameters determined were dry matter, crude protein, crude fibre, ash content and nitrogen free extract

Data Collection

Data on growth (initial growth, final weight, daily weight gain, total concentrate intake, total feed intake, feed conversion ratio) and other performance parameters were collected over a period of six (6) weeks using a Camry weighing scale for weekly weighing of the animals. Feed intake was determined on daily basis by weighing the feed offered to the animals and the quantity of feed left unconsumed by the following morning. The difference in weight between the two gave the quantity of feed consumed per day. Mean daily weight gain and feed conversion ratio were also determined

Economic efficiency of Feeding Rabbit

The current market price of the feed ingredients within the duration of the study was used for the calculation of cost of economic efficiency of feeding rabbits. The cost of feeding was evaluated on cost per kg weight gain. The cost of feed per kg weight gain was provided from the amount of feed taken in for the experimental period for each unit weight gain in the cost per kg of the diet. In evaluating the feed cost per kg weight gain, the total cost of feeding the rabbits was divided by the total body weight gain. The cost of feeding was the difference of the cost/kg weight gain of the control diet and those of other treatment diets as described by Obun *et al.* (2010).

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Data Analysis

Data generated from the study were subjected to analysis of variance (ANOVA) using statistical package (SAS, 2002). The variations in means were separated using the Duncans Multiple Range Test (Duncan, 1955).

Results

Results obtained for growth performance parameters (final body weight gain, initial weight, average feed intake, feed conversion ratio) in Table 2 revealed that there were no significant ($P>0.05$) differences. However, there were slight differences in the numerical values of most of the parameters. T4 (60 %) recorded highest final body weight (1054.00 g), Total body weight gain and weekly body weight

were observed to be higher in T3(40 %) levels of inclusion 313.00 and 39.10 g . T2 (20 %) recorded a higher weekly feed intake and feed conversion ratio of 473.60g and of 14.33g This could be due to low level of inclusion of oven dried poultry droppings. This contradicts the report of Cheeke and Patton (1986), which stated that, when dietary fiber levels were increased, rabbits consumed greater quantity of feed in order to compensate for the loss of endogenous protein. and lower and better at T3 (30 %) with 11.98 g in this trial

The highest cost of feeding rabbit per kilogram was obtained in control diet (T1) ₦ 152.43 while the lowest cost of feed per rabbit per kilogram was in diet 5 (T5) N 138.73 of oven dried poultry diets.

Table 1: Composition of the experimental diets containing oven dried poultry droppings (%)

Ingredients (%)	T1	T2	T3	T4
	100:0	80:20	60: 40	40:60
Maize	64.50	64.50	64.50	64.50
Groundnut cake	21.50	17.20	12.90	8.60
Oven D P D	0.00	4.30	8.60	12.90
Wheat offal	10.00	10.00	10.00	10.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25
*Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated values				
Crude Protein (%)	17.31	17.81	18.74	18.95
Crude Fibre (%)	3.60	6.96	12.30	14.14
ME (Kcal/kg)	2314.30	2453.38	2487.75	2535.18

*Provided per kilogram of diet: vitamin A, 10000IU (retinyl acetate); cholecalciferol, 3000IU; vitamin E, 8.0IU (DL-a-tocopheryl acetate); K, 2.0mg; thiamine, 2.0mg; pyridoxine, 1.2mg; cyanocobalamin, 0.12mg; niacin, 1.0mg; pantothenic acid, 7.0mg; folic acid, 0.6mg; choline chloride, 500mg; Fe, 60mg; Cu, 8.0mg; Zn, 50mg; Co 0.45mg; I, 2.0mg; Se, 0.1mg. 0.00 % = TRT1 (control); 10.00 % = TRT; 20.00 % = TRT; 30.00 % = TRT; 40.00 % = TRT5 BDG. ME= Metabolisable energy
Oven D P D –Oven dried poultry droppings

Table 2: Effect of varying dietary inclusion Levels of oven dried poultry droppings on the growth performance (g) of rabbits (*Oryctolagus cuniculus*) 8 weeks

Parameters	Levels (%) of oven dried poultry droppings				SEM	LSD	L.S
	T1 100:0	T2 80:20	T3 60:40	T4 40:60			
Initial weight (g)	678.00	683.00	711.00	722.00	44.00	107.80	NS
Final weight (g)	968.00	955.00	1024.00	1054.00	66.71	63.20	NS
Total body weight gain (g)	281.00	272.00	313.00	282.00	48.70	119.20	NS
weekly body weight gain (g)	35.10	34.00	39.10	35.20	6.09	14.80	NS
Total feed intake (g)	3730.00	3789.00	3670.00	3748.00	96.96	237.10	NS
Weekly feed intake (g)	466.30	437.60	458.80	468.50	12.11	29.64	NS
Feed Conversion Ratio	13.77	14.33	11.98	13.53	2.52	6.17	NS

^{a,b,c}Means with the same superscript (s) in the same row are not significantly ($P>0.05$) different

SEM = Standard Error Mean

CV = Coefficient Of Variation

L.S = Level of Significance

NS = Not Significant

Key

T1=(0% inclusion of oven dried poultry droppings at 100°C)

T2=(20% inclusion of oven dried poultry droppings at 80°C)

T3=(40% inclusion of oven dried poultry droppings at 60°C)

T4=(60% inclusion of oven dried poultry droppings at 40°C)

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Table 3: Effect of different dietary inclusion levels of oven dried poultry droppings meal on cost of feeding rabbits (*Oryctolagus cuniculus*)

Parameters	Levels of oven dried poultry droppings (%)			
	T1	T2	T3	T4
Cost of feed/kg /N)	152.28	147.76	143.25	138.73
Total feed intake per rabbit (g)	3730.00	3789.00	3670.00	3748.00
Total cost of feed intake/rabbit (N/g)	568.00	559.86	525.73	519.96
Total weight gain (g)	281.00	272.00	313.00	282.00
Cost of feed intake(N)/weight gain(g)	2.02	2.06	1.68	1.84

Key

T1=(0% inclusion of oven dried poultry droppings at 100 °c)

T2=(20% inclusion of oven dried poultry droppings at 80°c)

T3=(40% inclusion of oven dried poultry droppings at 60°c)

T4=(60% inclusion of oven dried poultry droppings at 40°c)

Discussion

The no significant ($P>0.05$) difference observed in this trial is similar to the result of Adegbola and Osuji (1985) with a value of 466.55g when rabbits were fed diet containing 60 % maize and varying levels of cassava leaves and higher than range of 5.7 – 9.44 obtained by Abu and Ekpenyong (1993) when rabbits were fed palm oil seed meal. This may be attributed to the fact that rabbits were not able to enhanced feed intake for better utilization of the diets. The result of cost of feeding revealed that as the inclusion level of oven dried poultry increased the cost of feeding rabbits reduces..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 Igwebuike et al. (2013), who recorded highest feed cost on the control diet when rabbits were fed graded levels of dried bovine rumen ingesta (DBRI), Adekojo (2015) when rabbits were fed *Leucaena leucocephala* leaf meal processed different with methods and Ibrahim et al . (2017). When rabbits (*Oryctolagus cuniculus*) were fed

industrially produced brewers dried grains at various levels of inclusion . The cost of feed intake per weight gain was highest on the same control diet and lowest in diet 5 (N2.02 and N1.84).

Conclusion

The result obtained from this study indicated that oven dried poultry dropping meal could serve as a source of plant protein in rabbit diets. It also showed that oven dried poultry dropping meal can be used to replace 40% groundnut cake without any harmful effect. Moreso, cost efficient and effective in rabbit diets.

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