

Growth Performance of Male Grower Rabbits Fed Diets with Iburu offal Replacing maize as energy Source

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Abstract

A six week experiment was conducted to determine the growth performance of male grower rabbits fed diets with iburu offal replacing maize as energy source. Five diets were formulated with iburu offal (IO) replacing maize by 0%, 15%, 30%, 45% and 60%, respectively. Fifty (50) male grower rabbits were allotted to the 5 diets, 10 rabbits per diets replicated 10 times, and each replicate had one rabbit. The design used was a completely randomized design. The results showed that rabbits fed 30% and 45% IO had higher ($p < 0.05$) total weight gain (2.10 ± 0.12 and 2.08 ± 0.08 kg, respectively) and better ($p < 0.05$) FCR (2.20 ± 0.18 and 2.16 ± 0.10 , respectively) similar to those fed 0% IO (2.18 ± 0.27) while rabbits fed 15% and 60% IO had lower total weight gain (1.68 ± 0.12 and 1.68 ± 0.09 kg, respectively) and poor FCR (2.33 ± 0.13 and 2.66 ± 0.13 , respectively). It can be concluded that IO can replace maize in male grower rabbit's diets at 30-45% without negative effect on performance.

KEYWORDS: Rabbits, Iburu offal, Maize, Performance

Introduction

In a quest to reduce the high cost of feed with the resultant high cost of livestock production, many agro-by-products have been used to substitute the conventional ingredients in the diets of rabbits (Safwat *et al.*, 2014). Sudik *et al.* (2019) tested soybean curd residue up to 15%, Lounaouci-Oyed *et al.* (2008) used brewer's dried grains up to 30%, Onakpa *et al.* (2006) used maize bran up to 35% and Bhatt *et al.* (2005) used rice bran was used at 5%, without negative effect on performance of rabbits. However, many more alternative ingredients have not been identified as animal feed resources. One of such is iburu offal (IO), a by-product obtained from the milling of iburu gains. Iburu (black fonio) belongs to the family *Poaceae* and genus *Digitaria*. It is a popular staple food grown across West Africa and in Nigeria it is grown in the central zone and dominantly in Plateau and Bauchi States (Gyang and Wuyep, 2005). Iburu offal has been reported to be is rich in nutrients such that for 100g it contains 6.52% DM total ash, 12.49% DM crude protein, 4.15% DM ether extract, 10.54% DM crude fibre, 66.30% DM nitrogen free extract, 0.05% calcium, 0.09% phosphorus, 3.25g/16gN lysine and 3.60g/16gN methionine (Sudik, 2016). Despite its high nutrient content, it is usually thrown as waste untapped. Incorporating IO into animal feeds will not only provide alternative feed resources or increase value-added-chain but also, help cleaning the environment. The objective of this paper was to determine the performance of male grower rabbits fed diets with IO replacing maize as energy source.

Materials and Methods

Location of the study

The experiment was conducted at the Rabbitry Unit of the Livestock Farm Complex, College of Agriculture, Garkawa, Plateau State, Nigeria. Garkawa lies within latitude 8.8955°N and longitude 9.4537°E. The annual average temperature is usually about 27.7°C and annual average precipitation is usually about 1178mm (Wikipedia, 2019).

Formulation of experimental diets

A basal diet (D1) with 16.54% crude protein meeting the nutrient requirements of male grower rabbits as described by Szendro and Dalle Zotte (2011) was formulated. Thereafter, 4 other diets (D2, D3, D4 and D5) were formulated replacing maize with IO by 15%, 30%, 45% and 60%, respectively (Table 1).

Table 1: Gross composition and calculated values of the experimental diets

Ingredients	D1 0% IO	D2 15% IO	D3 30% IO	D4 45% IO	D5 60% IO
Maize	13.06	11.10	9.14	7.18	5.22
Iburu offal	0.00	1.96	3.92	5.88	7.84
Rice offal	3.73	3.73	3.73	3.73	3.73
Palm kernel meal	2.5	2.5	2.5	2.5	2.5
Soybean meal (42)	2.5	2.5	2.5	2.5	2.5
Groundnut cake	1.38	1.38	1.38	1.38	1.38
Fish meal	0.5	0.5	0.5	0.5	0.5
Bone meal	0.63	0.63	0.63	0.63	0.63
Oyster shell	0.25	0.25	0.25	0.25	0.25
Premix	0.06	0.06	0.06	0.06	0.06
Methionine	0.03	0.03	0.03	0.03	0.03
Lysine	0.03	0.03	0.03	0.03	0.03
Salt	0.08	0.08	0.08	0.08	0.08
Soy oil	0.25	0.25	0.25	0.25	0.25
Total	25.00	25.00	25.00	25.00	25.00
Crude protein	16.54	16.89	16.94	17.08	17.31
Energy (kcal/kg)	2830.12	2824.24	2800.1	2790.11	2776.01
Calcium	1.03	1.04	1.04	1.05	1.05
Average phosphorus	0.66	0.66	0.67	0.67	0.69
Lysine	1.27	1.29	1.3	1.35	1.35
Methionine	0.74	0.74	0.75	0.75	0.75
Crude fibre	5.02	7.11	8.45	9.19	9.76

IO = iburu offal

Experimental design

The design used was a completely randomized design (CRD).

Source and management of experimental rabbits

Fifty (50) male grower rabbits about 5 weeks of age were purchased from a reputable Farm in Jos, Plateau state. Immediately the rabbits arrived at the farm glucose was added to their drinking water and a plain food mainly of maize and fresh leaves of *Moringa oleifera* and *Tridax procumbent* were given to them for three days to reduce the stress incurred from transportation and to acclimatize them to the environment. Thereafter, they were randomly allotted into 5 dietary treatments, group weight were balanced to ensure similar weight between treatments. Each dietary treatment had 10 rabbits and each served as replicate unit. They were individually kept in a hutch equipped with feeder and drinker. Feed and water were provided *ad libitum*. Antibiotics, coccidiostats and anti-stress were occasionally administered as prophylactic measures. The experiment lasted for 6 weeks.

Data collection

At the beginning of the experiment, each rabbit was weighed to determine the initial weight and thereafter, they were weighed weekly to monitor weight changes. Total weight gain (TWG) was calculated by subtracting the initial weight from the final weight. Average daily weight gain (DWG) was calculated by dividing the TWG by 42 days (experimental period). Feed consumption was determined daily by subtracting feed leftover from feed supplied. Total feed intake (TFI) was the

cumulative of daily feed consumed. Average daily feed intake was calculated dividing TFI by 42 days. Feed conversion ratio (FCR) was calculated by dividing feed consumed by weight gain.

Data analysis

Data generated were subjected to Analysis of Variance (ANOVA) using SAS (1999) Statistical Package Version 9 and significant means were separated using Duncan's Multiple Range Test (Duncan, 1955) at 5% level of probability.

Results

Table 2 shows the growth performance of male grower rabbits fed diets with iburu offal. Rabbits fed 30% and 45% IO significantly ($p < 0.05$) had higher total weight gain (2.10 ± 0.12 and 2.08 ± 0.08 kg, respectively) and better FCR (2.20 ± 0.18 and 2.16 ± 0.10 , respectively) compared with those fed 0% IO (2.10 ± 0.18 kg and 2.18 ± 0.27 , respectively) while rabbits fed 15% and 60% IO significantly ($p < 0.05$) had lower total weight gain (1.68 ± 0.12 and 1.68 ± 0.09 kg, respectively) and poor FCR (2.33 ± 0.13 and 2.66 ± 0.13 , respectively). Other parameters were not significantly ($P > 0.05$) affected.

Table 2: Performance of male grower rabbits fed diets with soybean curd residue

Parameters	D ₁ 0% IO	D ₂ 15% IO	D ₃ 30% IO	D ₄ 45% IO	D ₇ 60% IO
initial weight (kg)	0.73 ± 0.02	0.78 ± 0.02	0.75 ± 0.02	0.76 ± 0.02	0.74 ± 0.02
Total weight gain (kg)	2.10 ± 0.18^a	1.68 ± 0.12^b	2.10 ± 0.12^a	2.08 ± 0.08^a	1.68 ± 0.09^b
Daily weight gain (kg)	0.05 ± 0.00	0.04 ± 0.00	0.05 ± 0.00	0.05 ± 0.00	0.04 ± 0.00
Total feed intake (kg)	4.58 ± 0.70	4.61 ± 0.30	4.62 ± 0.04	4.60 ± 0.04	5.00 ± 0.03
Daily feed intake (kg)	0.11 ± 0.00	0.11 ± 0.00	0.11 ± 0.00	0.11 ± 0.00	0.13 ± 0.00
Feed conversion ratio	2.18 ± 0.27^b	2.33 ± 0.13^{ab}	2.20 ± 0.18^b	2.16 ± 0.10^b	2.66 ± 0.13^a
% Mortality	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00

Values are average of 10 male grower rabbits. IO = iburu offal

Column with difference superscripts are significance difference ($P < 0.05$).

Discussion

The higher growth weights and better FCR observed between rabbits fed 30%-45% IO and those of control (0% IO) indicates that both rabbits were exposed to similar dietary nutrient composition while the poor FCR observed in rabbits fed 15% and 60% may probably means the diets were not well equipped to support proper growth rate. In the case of the rabbits fed 60% IO the poor FCR may be attributed to the higher fibre content (Table 1). Even though there was no significant difference in feed intake, however, the rabbits fed 60% IO were probably eating more feed to gain weight. This result agrees with Aduku (1993) who reported that higher fibre content in diets reduces nutrients availability to animals thereby animals tend to eat more feed to meet up energy requirements.

Conclusion

In this study maize was replaced with IO in male grower rabbits' diets up to 60% and the rabbits fed 30-45% IO had similar total weight gain and feed conversion ratio with those fed control (0% IO), therefore 30-45% IO is recommended for male grower rabbits.

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