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ORIGINAL RESEARCH ARTICLE

Performance and economy of production indices of broiler finishers fed cassava grits based diets

***Mosobalaje, M.A[1]., [3]Adedoyin A.A. [1]Raji, M. O. [2]Tewe, O.O., [2]Adeogun, J.B., [4]Adebayo, B.F. [1]Oloko, A.B. and [1]Bello, K.**

[1] Department of Animal Health and Production, Oyo State College of Agriculture and Technology, Igboora,
[2] Department of Animal Science, University of Ibadan
[3] Department of Agriculture, The College of Education, Lanlate, Oyo State
[4] Nigerian Institute of Animal Science Zonal office, Ibadan.
*mosobahs@yahoo.com; jamademosobalaje@gmail.com 08034780805; 08057340189

ABSTRACT

A 6 week feeding trial was conducted to assess the performance and economy of production of broilers fed cassava grit based diets. Cassava grit was used to replace maize at 0, 25, 50, 75 and 100% constituting diets 1, 2, 3, 4 and 5, respectively. A total of 180, 18 day old broiler chicks, were randomly allotted to the five (5) experimental diets, each treatment had three replicates of twelve birds each. Diet 1 was 100% maize based and served as the control diet (CD). Parameters considered included initial weight, final weight, feed intake, Feed Conversion Ratio (FCR); and economy of production. The results of the study showed that there were significant (P<0.05) differences in the feed intake of broilers fed graded level of cassava grit. While the highest feed intake (139.06g/bird/day) was obtained in broilers fed CD, the least feed intake was recorded in diet 5 (80.92g/bird/day). The values obtained for final weight and weight gain were significant (P<0.05). The highest final weight and weight gain were recorded in birds fed CD (2430g/bird and 50.68/g/bird/day, respectively) while the lowest values (1705g/bird and 33.84g g/bird/day) were recorded in treatment 5. The best FCR 2.39 was noticed in broilers fed diet 5 that was lower (P<0.05) than diet 2 (2.95). Economy of production result revealed that cost per kg of feed increased with increase in the levels of cassava in the diets. While cost of feed per kg of weight gain reduced with increase in the levels of cassava. However, birds fed 75% and 100% grit based diets recorded similar (P<0.05) values and lower than values recorded by birds fed diets 1, 2 and 3. Conclusively, cassava grit could successfully replace maize at 75% in the diet of broiler finishers

Keywords: Cassava grit, Feed intake, Feed conversion ratio and Maize

INTRODUCTION

The shortage of animal protein is prevalent in all parts of West Africa countries (Shaib *et al*., 1997). Poultry has the potential of contributing to animal protein supply towards meeting the protein consumption needs of Nigerians. Poultry has a short generation interval and can be multiplied quickly (Longe, 2006) and there is neither taboo nor a cultural belief against their production and consumption (Rafiu *et al.,* 2015). However, dietary energy supply for poultry feeding is a major problem facing the industry in Nigeria (Tewe, 2004).

The high cost of poultry feed has been traced to increasing costs of maize, soyabean and groundnut which are the main conventional sources of energy and protein respectively (Longe, 2006). Feed represents the major cost of poultry production. Cost of ingredients could be as high as 80% of the total cost of production of the finished feed (Olugbemi *et al*., 2010). Inadequate production of feeds has been found to be one of the major factors limiting the development and expansion of poultry business (Bamigbose, *et al.,* 2010). Since, the energy component of a feed is usually high; a reduction in the cost of energy would translate to reduced cost of feeding livestock (Ayuk *et al*., 2009). To combat this challenge, the use of alternative feed ingredients has been canvassed (Egbewande, 2009) and, cassava a tuberous root could be an alternative ingredient for maize.

Cassava (*Manihot esculenta* Crantz) is a staple food that is widely grown in Africa. Cassava is efficient in production of cheap energy, tolerance to extreme ecological stress, and is available all year round. Nigeria is the highest producer in the world with the

capacity of 52 million metric tonnes annually (FAOSTAT, 2013).

The reason given for limited use of cassava flour or chips in poultry ration includes the dustiness of the feedstuff which causes irritation of the respiratory tract of the chickens unless the feed is pelletized or some oil are added (Balagopalan *et al.,* 1988). Processing cassava into grit will solve this problem (Mosobalaje and Tewe, 2009). Cassava grit is a gelatinized cassava product processed like *garri* except that it is not peeled and fermented (Mosobalaje, 2012). True metabolizable, energy, some chemical and proximate composition of cassava grit as compared to maize have been reported (Mosobalaje and Tewe, 2009). This study aimed at accessing the performance and economy of production of broilers fed cassava grits.

MATERIALS AND METHODS

The study was conducted at Teaching and Research Farm of Oyo State College of Agriculture and

Technology Igbo-ora. Cassava used for the study was obtained from the cassava farm of the College, while cassava grit processing was carried out at *garri* processing unit of the College. The steps involved in the processing of cassava grit included the following, detailing, washing, grating, dehydration (Dewatering), frying, cooling and bagging as described by Mosobalaje and Tewe (2009).

One hundred and eighty broiler chicks were purchased from a hatchery at Ibadan. They were brooded together and raised at Poultry Unit of Oyo State College of Agriculture, Igboora for 18 days. At the end of the brooding, the birds were randomly allotted into five different dietary treatments and each treatment contained three (3) replicates of twelve birds each. A Completely Randomized Design (CRD) was adopted for this experiment.

Diets were formulated to replace maize at 0, 25, 50, 75, and 100% with cassava grit constituting diets 1, 2, 3, 4, and 5, respectively. The diet without cassava grit (0%) served as the Control Diet (CD). Gross composition of the treatment diets is presented in Table 1.

Table1: Gross composition of the treatment diets for broiler finishers

Composition (%)	Diet 1 0% CG[a]	Diet 2 25% CG	Diet 3 50% CG	Diet 4 75% CG	Diet 5 100% CG
Maize	50	37.5	25	12.5	-
Cassava	-	12.5	25	37.5	50
Full fat soya bean meal	11	13.25	15.5	17.75	20
Corn bran	9	6.75	4.5	2.25	-
Soya bean meal	20	20	20	20	20
Fish meal (72%)	4	4	4	4	4
Bone meal	3	3	3	3	3
Limestone	1.9	1.9	1.9	1.9	1.9
*Broiler Min-vitamin	0.3	0.3	0.3	0.3	0.3
Table Salt	0.3	0.3	0.3	0.3	0.3
DL-Methionine	0.2	0.2	0.2	0.2	0.2
L-Lysine	0.2	0.2	0.2	0.2	0.2
Mycofix	0.1	0.1	0.1	0.1	0.1
TOTAL	**100**	**100**	**100**	**100**	**100**
Calculate energy ME Kcal/Kg	2961.40	2953.15	2944.90	2936.65	2928.40
Calculated crude protein	21.35	21.21	21.07	20.90	20.78

* Vitamin A 8000000 I.U, vitamin $D_3$1600000 I.U, vitamin E 5000 I.U, vitamin K 2000 mgr, Thiamine 1500 mgr ,Riboflavin B_2 4000 mgr, Pyridoxine B_6 150\ mgr,Niacin 15000 mgr vitamin B_{12} 10 mgr, Pantothenic Acid 5000 mgr, Folic Acid 500 mgr, Biotin 20 mgr, Choline chloride 200 gr, Antioxidant 125 gr, Manganese 80 gr, Zinc 50 gr, Iron 20 gr, Copper 5 gr, Iodine 1.2 gr, Selenium, 200 mgr Cobalt 200 mgr. [a] **CG = Cassava Grit**

The parameters measured were feed intake, weight gain, feed conversion ratio and mortality. Known quantity of feed was supplied per day, the remnant weighed at end of the day and the difference was the feed intake. The birds were weighed at the beginning of the experiment, the average per replicate represented initial weight. While the weight taken at end of the experiment was the final weight and the difference between final weight and initial weight gave weight gain. Mortality value was obtained by dividing the number of birds that died by number housed in percentage. Data were subjected to Analysis of Variance (ANOVA) and means were separated using Duncan's Multiple Range Test.

RESULTS

The performance response of broilers fed graded level of cassava grit based diet is presented in Table 2. The final weight and weight gain were significantly ($P<0.05$) different across the treatments. Birds fed 100% maize based diet recorded the highest final weight and weight gain (2430g/bird and 50.23g/bird/day respectively) while the least final weight and weight gain (1705g/bird and 33.84g/bird/day) were noticed in treatment 5. Values for treatments 2, 3 and 4 were similar (2295 and 437.27; 2262 and 46.64; 2275g/bird and 46.50g/bird/day, respectively).

The result of feed intake revealed that there were significant ($p<0.05$) differences in the feed intake of broilers fed graded level of cassava grit. The least feed intake (80.92g/bird/day) was recorded in broilers fed 100% cassava grit based diet (treatment 5), while the highest feed intake (139.06g/bird/day) was obtained in broilers fed 100% maize based diet (treatment 1). The best feed conversion ratio (2.39) was recorded in broilers fed 100% cassava grit based diet that was significantly lower ($p<0.05$) than value recorded by birds fed 25% cassava grit (2.95).

The result of this research showed that the mortality recorded was not due to treatment effect. Values recorded for treatment 1-5 were 8.75, 5.00, 10.00, 10.00 and 11.25%, respectively.

Economy of production result showed that cost per kg of feed increased with increase in the levels of cassava in the diets while cost of feed per kg of weight gain was vice versa. However, diets containing 75% and 100% cassava recorded similar ($p<0.05$) values (₦259.31/Kg live weight and ₦251.41/Kg live weight, respectively), and were lower than values recorded by those fed diets 1, 2 and 3 (₦284.3/Kg live weight, ₦304.70/Kg live weight and ₦283.70/Kg live weight, respectively).

Table 2: Performance characteristics of broilers fed experimental finisher diets

PARAMETERS	Diet 1 0% CG[a]	Diet 2 25% CG	Diet 3 50% CG	Diet 4 75% CG	Diet 5 100% CG	SEM
Initial weight (g/bird)	220	215	210	229	216	9.96
Final weight (g/bird)	2430[a]	2295[ab]	2262[b]	2275[b]	1705[c]	87.76
Weight gain (g/bird/day)	50.23[a]	47.27[a]	46.64[a]	46.50[a]	33.84[b]	2.54
Feed intake (g/bird/day)	139.06[a]	139.58[a]	127.4[ab]	115. 28[b]	80.92[c]	8.33
Feed conversion ratio	2.77[ab]	2.95[a]	2.73[ab]	2.48[b]	2.39[b]	0.09
Mortality (%)	8.75	5.00	10.00	10.00	11.25	4.18
Cost of feed (₦/Kg)	102.65	103.29	103.93	104.56	105.20	
Cost of gain (₦/Kg Live wt)	284.3 [a]	304.70 [a]	283.70 [a]	259.31[b]	251.41[b]	6.88

[abc] means on the same row with different subscripts are significantly different. [a] **CG = Cassava Grit**

DISCUSSION

Cassava grit used for this study cost ₦41.00 compared with ₦53.00 price of maize. The value obtained for final weight and weight gain were significantly ($p<0.05$) affected across the treatments. It was discovered that treatment 1 (100% maize) recorded the highest final and weight gain while the least values were recorded for treatment 5. This might be due to significant differences in the feed intake of broiler fed graded level of cassava grit based diets. The reduced feed intake of broilers fed 100% cassava grits based

diet (treatment 5) might be due to anti-nutrition factor in cassava (Balagopalan *et al.,* 1988). These results confirmed the report of Mosobalaje (2012) who reported lower weight gain and FCR for pullet chicks fed 100% cassava products based diets.

All the experimental treatments recorded similar mortality values. Kanto and Juttaporpong (2002) stated that no cassava sample were found to be contaminated with aflatoxins or other mycotoxins in a study on occurrence of mycotoxin in 339 samples of raw ingredients used for animal feeding. Hydrogen cyanide, the only anti-nutritional factor in cassava samples was reduced to levels that were non-toxic to animal after sun drying for 3-4 days. Heat involved in production of cassava grits was perhaps sufficient to eliminate any risk of cyanide toxicity in the animals. This confirmed Kanto and Juttupurpong (2002) that heat greatly reduce cyanide content of cassava.

Cost of feed increased with increase in the levels of cassava in the diets due to price of cassava that was higher than 60% price of maize. Tewe (2004) stated that cassava should not be more than 60% price of maize.

CONCLUSION

It is concluded that 75% replacement of maize with cassava grit is possible in broiler production without any adverse effect on the performance. However, broilers fed 100% replacement recorded the best feed conversion ratio and greater economic returns.

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