GROWTH PERFORMANCE OF BROILER CHICKENS FED DIETS WITH GRADED LEVELS OF *KINGZYME*-SUPPLEMENTED SORGHUM BREWERS DRIED GRAINS

[1]Jimoh, A.* and [1]Innocent, J.
[1]Department of Animal Nutrition, Joseph Sarwuan Tarka University, Makurdi
***Correspondence: abdulhameedjimoh@gmail.com**

Abstract
A feeding trial was conducted to determine the effects of replacing maize with enzyme-supplemented Sorghum Brewers Dried Grains (SBDG) on the performance of broiler chickens. SBDG replaced maize at 0%, 25%, 50%, 75% and 100% in a single-phase diet for broiler chickens to make five dietary treatments (TI to T5) using Completely Randomized Design. Treatments T2 to T5 were supplemented with 0.02% Kingzyme enzyme. Each treatment was replicated thrice with eight birds per replicate. Data were collected on feed intake, final weight, weight gain and feed conversion ratio (FCR) and were subjected to Analysis of Variance using Statistical Analysis System (SAS). Treatments' means were separated using Duncan Multiple Range Test. There were no significant differences **(**($P \geq 0.05$) among the treatments in their effects on feed intake. Final weight and weight gained were significantly higher for treatments T1 and T2. FCR was significantly lowest for treatments T1, T2 and T3. It was concluded that Kingzyme-supplemented SBDG can replace 50% of maize in broiler diets.

Key words: Broiler, Enzyme, Kingzyme, Sorghum, Supplementation

INTRODUCTION

Nigeria human population is estimated at about 200 million (NPC, 2010). This population is continuously on the increase annually. This increase has led to more demand for livestock products to meet up with the per capita animal protein requirement. The protein intake of the average Nigerian is estimated at 45.5g per head per day and this is lower compared with FAO's recommended minimum intake of 70g per head per day, of which 50% (35g) should be of animal origin (Leser, 2013). One of the good sources of animal protein is poultry. The inadequate supply of poultry products in Nigeria can be attributed to increasing cost of feed as feed accounts for about 70% of the cost of poultry production. Reducing feed cost is one of the important targets in poultry production. Therefore, to drastically reduce this problem, several researchers have suggested the utilization of alternative feedstuffs in poultry nutrition (Agiang *et al.,* 2004; Aletor, 2007).

Brewers dried grain (BDG) is a brewery by-product. The residue is obtained from cereals like guinea corn, barley, wheat, maize, rice and oat. BDG is high in crud protein and Metabolisable Energy and consequently could be used to reduce energy feedstuff like maize (Noll *et al.,* 2001; Odunukan *et al.,* 2016). However, BDG use is limited in poultry diets because of its high fiber content. Exogenous enzymes are being used in poultry nutrition to aid in the utilization of fibrous feedstuffs. Thus, this study was designed to assess growth performance of broiler chickens fed graded levels of sorghum brewers dried grains supplemented with *kingzyme* enzyme**.**

MATERIALS AND METHODS

The study was carried out at the poultry unit of the Livestock Teaching and Research Farm, Joseph Sarwuan Tarka University, Makurdi. Sorghum brewers dried grains (SBDG) were obtained from 72 battalion military barracks, Makurdi. They were sundried and subjected to proximate analyses. *Kingzyme* enzyme was obtained from a reputable distributor in Kaduna and it is composed of Endo-1, 4-¬β-xylanase, Endo-1, 3(4)β-glucanase, Endo-1, 4-β-mannase, Pectinase, Amylase, and Cellulase. A total of 120 Ross 308 day-old chicks were used for the experiment in a completely randomized design. They were randomly allocated to five dietary treatments each with three replicates with eight birds per replicate. The dietary treatments were formulated such that SBDG replaced 0%, 25%, 50%, 75% and 100% of maize in the control. They were labelled T1, T2, T3, T4 and T5 respectively where T1 is the control. Each dietary treatment except treatment T1 was supplemented with 0.02% Kingzyme enzyme. The diets were formulated to be isonitrogenous but with different levels of metabolisable energy as shown in table 1. Feed and water were provided *ad libitum* throughout the 56 days experimental period. All routine husbandry practices were observed. Single phase feeding system was adopted.

Table 1: Composition of Experimental Diets

Feedstuffs, %	T1	T2	T3	T4	T5
Maize	55	41.25	27.5	13.75	0
SBDG	0	13.75	27.5	41.25	55
Maize Offal	0	0	4.1	8.5	12.4
Soya bean meal	38	24.6	20	17.1	11.1
Toasted Soya	3.1	16.5	17	15.5	17.6
Bone meal	2	2	2	2	2
Lime stone	1	1	1	1	1
Lysine	0.2	0.2	0.2	0.2	0.2
Methionine	0.2	0.2	0.2	0.2	0.2
Salt	0.25	0.25	0.25	0.25	0.25
Broiler Premix[1]	0.25	0.25	0.25	0.25	0.25
Kingzyme[2]	0	0.02	0.02	0.02	0.02
Total	100	100.02	100.02	100.02	100.02
Calculated Analysis					
CP, %	21.95	22.09	22.15	22.17	22.16
ME, Kcal/Kg	3010.4	2935.98	2801.35	2658.15	2530.3
EE,%	4.07	6.04	6.1	5.86	6.16
CF,%	4.29	4.7	5.52	6.35	7.11
Lysine, %	1.3	1.3	1.32	1.33	1.3
Methionine, %	0.5	0.5	0.49	0.51	0.51
Calcium, %	1.09	1.1	1.12	1.12	1.13
Av. Phos., %	0.6	0.59	0.61	0.6	0.6

T1: Control, T2: (13.75% SBDG + 0.02% Kingzyme), T3: (27.5% SBDG + 0.02% Kingzyme), T4: (41.25% SBDG + 0.02% Kingzyme), T5: (55% SBDG + 0.02% Kingzyme)

SBDG=Sorghum Brewers Dried Grains; CP= Crude protein, ME=Metabolizable Energy; CF= Crude fibre; EE= Ether Extract, Av. Pho=Available phosphorus

[1]Broiler premix supplied the following per kg of diet: 10000 i.u of Vit.A., 2000 i.u of Vit.D3, 23mg of Vit. E, 1.8mg of Vit. B1 (Thiamine), 5.5mg of Vit. B2 (Riboflavin, 3 mg of Vit. B6 (pyridoxine), 0.015mg of Vit. B12, 7.5mg of Pantothenic acid, 0.75mg of Folic acid, 27.5mg of Niacin, 0.6mg of Biotin, 300 mg of Choline chloride, 0.2mg of Cobalt, 3mg of Copper, 1mg of Iodine, 20mg of Iron, 40mg of Mangannesse, 0.2mg of Selenium, 30mg of Znc and 1.25mg of Antioxidant

.[2]Kingzyme supplied: Endo-1, 4-β-xylanase, Endo-1, 3(4)β-glucanase, Endo-1, 4-β-mannase, Pectinase, Amylase, and Cellulase.

Data Collection and Analysis

Data were collected on feed intake, final weight and weight gained. Feed Conversion ratio was calculated. All data collected were subjected to one way ANOVA using Statistical Analysis System (SAS, 2002). Significant difference between treatments' means was determined using Duncan Multiple Range Test (Duncan, 1955) at 5% level of probability.

RESULTS AND DISCUSSION

The growth performance of broiler chickens fed graded levels of SBDG supplemented with Kingzyme enzyme is presented in table 2. There were no significant differences ($P>0.05$) among the treatments in their effects on total feed intake and the values range from 3541.33g for treatment T3 to 4195.33g for treatment T1. There was no significant difference ($P>0.05$) among treatments T1, T2, T4 and T5 in term of daily feed intake and they were significantly higher than treatment T3. The final weight significantly decreased ($P<0.05$) with an increase in the inclusion level of the SBDG. Similar trend was also observed for the total weight gained. Treatments T5 and T4 were significantly higher than

others in their effects on Feed Conversion Ratio (FCR) while there were no significant differences between treatments T1, T2 and T3 in their effects on FCR. Poultry species eat to satisfy energy requirement (Atteh, 2003). The similarity observed in feed intake in this study may be attributed to the fact that enzymes have been added to the feed. This is because as the SBDG increases the energy content reduces. The Kingzyme enzyme added may have contributed to the energy content through its activity in aiding the digestion of the fibrous SBDG. Several authors (McDonald *et al*., 2010; Jimoh, 2017) have reported that addition of exogenous enzymes to feedstuffs improve digestibility of such feedstuff thereby increasing the metabolizable energy value. However, the significant difference in the treatments in their effects on final weight and weight gained where treatments T1and T2 are significantly better than others may be due to the fact that enzymes have fixed active sites and an increase in substrate amount without a corresponding increase in the active sites may lead to a reduction in the effects of the enzyme. The significantly higher FCR obtained in treatment T5 may be attributed to a reduction in the enzymatic capacity of the enzyme as the number of substrates increase despite a constant active sites of the enzyme. This result corroborates the findings of Cadogan *et al.* (2005) and Avila *et al.* (2012) who reported that multi-enzymes containing xylanase, phytase and protease reduced the negative effect of anti-nutritional factors in sorghum, thus enhancing nutrient digestibility and bird performance.

Table 2: Growth Performance of Broiler Chickens Fed Diets with Graded Levels of Sorghum Brewers Dried Grains Supplemented with Kingzyme Enzyme

a,b, c: Means in the same row with similar superscripts are not significantly different (P≥0.05), **SEM:**

Parameters	T_1	T_2	T_3	T_4	T_5	SEM
Initial Weight (g)	38.52	40.23	35.54	40.37	42.94	0.01
Total feed intake (g)	4195.33	4148.33	3541.33	3655.33	3835.00	0.191
Daily feed intake (g)	74.92^{b}	74.08^{b}	68.10^{a}	76.14^{b}	91.25^{ab}	0.17
Final weight (g)	2139^{a}	2057^{a}	1659^{b}	1393^{c}	1299^{c}	0.000
Total weight gained (g)	2100^{a}	2017^{a}	1624^{b}	1353^{c}	1256^{c}	0.000
FCR	2.00^{b}	2.06^{b}	2.18^{b}	2.73^{ab}	3.06^{a}	0.04

Standard Error of Mean, **FCR:** Feed conversion ratio, T1: Control, T2: (13.75% SBDG + 0.02% Kingzyme), T3: (27.5% SBDG + 0.02% Kingzyme), T4: (41.25% SBDG + 0.02% Kingzyme), T5: (55% SBDG + 0.02% Kingzyme)

Conclusion

The use of SBDG in the diet of broiler chickens has no adverse effect on the performance of broiler chicken. The Kingzyme supplementation at 0.02% improved the utilization of the SBDG. However, higher replacement level beyond 50% of maize indicates that the effect of the enzyme becomes reduced.

Recommendation

Based on the results of the study, SBDG supplemented with 0.02% kingzyme can be used to replace 50% of maize in the diets of broiler chickens without any adverse effects on growth performance.

References

Agiang, E. A, Ayuk, A. A., Nwelle, J. B. and Uzegbu, H. O. (2004): Performance of broilers diets with graded levels of cassava waste meal as energy source. *Journal of Agriculture and Food Science* 2(1): 13-19.

Aletor, V. A. (2007): Plant and animal protein alternatives for poultry production in Nigeria. Paper presented at the Department of Animal Science, University of Ibadan. Poultry Association of Nigeria, Oyo State collaborative workshop on alternative feedstuffs for the Nigeria poultry industry.

Atteh J. O. (2003): Romancing the chicken. The sixty-eight Inaugural lecture of the University of Ilorin, Ilorin, Nigeria

Avila, E. Arce, J. Soto, C. Rosas, F. Ceccantini, M. and D. R. McIntyre (2012): Evaluation of an enzyme complex containing non starch polysaccharide enzymes and phytase on the

performance of broilers fed a sorghum and soybean meal diet. *Journal of Applied Poultry Research,* 21: 281–284.

Cadogan, D. J., Selle, P. H., Creswell, D., Partridge, G. (2005): Phytate limits broiler performance and nutrient digestibility in sorghum-based diets. *Proceedings of Australian Poultry Science Symposium,* 17: 39–43.

Duncan, D. B. (1995): Multiple range and Multiple F test. Biometrics. 11:1-42.

Jimoh A. (2017): Effects of Enzymes and Combination of Enzymes on Apparent Metabolisable Energy Value of Wheat Offal with Chicken. Asian Research Journal of Agriculture, 3: 1-9.

Leser, S. (2013): The 2013 FAO report on dietary protein quality evaluation in human nutrition: Recommendations and implications. 2013 British Nutrition Foundation, *Nutrition Bulletin* 2013, 38: 421–442

McDonald P., Edwards R. A., Greenhalgh J. F. D., Morgan C. A., Sinclair L. A., Wilkinson R. G.(2010): Animal Nutrition, Seventh edition. Pearson Education limited, Edinburgh Gate Harlow, Essex CM 20 2JE. United Kingdom; 2010

National Population Commission (2010): National Population Commission. Report on the 2006 Census Result. Federal Republic of Nigeria Official Gazette, Abuja, B24

Noll, S., Stangeland, V., Speers, G. and Brannon, J. (2001): Minnesota nutrition conference and Minnesota corn growers' association technical symposium, Bloomington, MN.

Odunukan, R. O., Akinyemi, D. O., Tanimola, O. A, and Bankole, Y. O. (2016): Design, construction and performance analysis of brewery waste dryer. Asian J. Basic Appl. Sci. 3 (2): 27-42.

Statistical Analysis System (2002): Statistical analysis system SAS user's guide statistics, Version 8, SAS Institute Inc. Cary, NC, USA