RESPONSE OF BROILER STARTER CHICKENS FED KAURA BASED DIETS SUPPLEMENTED WITH ENZYMES

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ABSTRACT

A study was conducted to evaluate the response of broiler chickens fed Kaura based diets supplemented with Ronozyme® phytase, Ronozyme® protease and Roxazyme® G2 G and a combination of protease and G2 G. Four hundred broiler chicks were allotted in a completely randomized design to five (5) dietary treatments each replicated thrice, with25 chicks per replicate. Treatment 1 was maize based diet; T2, Kaura based diet with phytase; T3, Kaura based diet with protease; T4, Kaura based diet withG2 G; and T5, Kaura based diet with a combination of protease and G2 G. The diets were formulated to meet standard requirements. Water and feed were offered to the birds *ad libitum* for the four-week period of the experiment. Data collected included the initial and final weight, weight gain and feed consumption were recorded on weekly basis. Feed/gain ratio was computed for each treatment. Blood samples were also taken from the birds for blood haematology. Data collected were subjected to Analysis of Variance and significant differences among treatment means were compared using the Duncan Multiple Range Test. There were significant ($P<0.05$) differences in the final body weight, weight gain, feed intake and feed/gain ratio. Birds fed Kaura with protease and G2 G inclusion had significantly ($P<0.05$) highest final body weight and weight gain. Feed/gain ratio, feed cost and feed cost/Kg gain were not significantly ($P>0.05$) different. All the parameters measured for blood quality were not significantly ($P>0.05$) different for all the treatments. It may be concluded that G2 G and the combination with Protease in Kaura based diets improved growth performance optimally for broiler starter chicks. Blood quality was not compromised with Kaura diets supplemented with enzymes.

Key words: Enzymes, Broiler chicks, Growth performance, Haematology.

INTRODUCTION

Maize, compared to other cereal crops have been widely use in production of feed for man and farm animals in general. Its enormous use and demand has now made farmers look for alternate sources of grain with virtually the same nutritive value and availability such as Sorghum (*Sorghum bicolor*), Millet (*Pennisetum glaucum*) and Wheat. Sorghum contains some anti-nutritional factors which inhibit the use of important nutrient like protein, energy and minerals like phosphorus, calcium, zinc and magnesium in diets. To improve the utilization of sorghum in poultry diet, addition of enzymes is put into consideration. The benefits of using enzymes in poultry diets include not only enhanced performance and feed conversion but also less environmental problems due to reduced output of excreta. Feed enzymes have the potential to reduce effects of anti-nutritional factors, render nutrients more available for digestion and absorption, increase energy value of feed ingredients and allow for greater flexibility in feed formulation, thus reducing formulation costs and modulating or stabilising gut microflora. Some of the enzymes that have been used over the past several years and have potential for use in the feed industry include cellulase (β-glucanases), xylanases and associated enzymes, phytases, proteases, lipases, and galactosidases (Khusheeba and Sajid, 2013). One area that has received relatively little attention in the literature is the use of combinations of enzymes such as carbohydrases and proteases to improve nutrient retention and performance of growing chickens. Logic would suggest that if the use of one enzyme can improve body weight gain (BWG) and feed conversion ratio (FCR) of chickens compared with birds that have been fed a diet containing no enzyme, the use of 2 enzymes might improve the scale and consistency of the response. The reality however is somewhat different. Antagonistic (Saleh *et al.*, 2004), sub-additive (Zyla *et al.*, 2000; Wu *et al.*, 2004; Kim *et al.*, 2005; Leslie *et al.*, 2005); additive (Mulyantini *et al.*, 2005), and synergistic effects of enzyme combinations have been reported. Clearly, this variety of responses to enzymes and combinations of enzymes is unacceptable for producers of poultry products. Therefore, it is critical that more information is generated that will allow tools to be developed, based on whole analysis of animal data, to show when enzyme combinations can offer an additive, sub-additive, or synergistic effect on

performance parameters. The objectives of this study are to compare the effect of single enzymes and combinations in Kaura based diet on growth performance of broiler chickens and to evaluate the effect of including enzymes in Kaura based diets on the haematology of broiler chickens.

MATERIALS AND METHODS

Experimental site

The experiment was carried out at the Poultry Unit of Animal Science Departmental Teaching and Research farm, Ahmadu Bello University, Zaria, Kaduna State in the Northern Guinea Savannah zone located on longitude 11° 09□ 01.78□□ N and 7°39□14.79□□E 671m above sea level. The climate is characterized by a well-defined dry and wet seasons. The climate is relatively dry with a mean annual rainfall of 700-1400mm (Ovimaps, 2014)

Experimental Design and management of birds

Four hundred broiler chickens were allotted to five dietary treatments with 3 replicates and each having 25birds in a completely randomized design (CRD). The birds were housed in deep litter pens and managed with all necessary routine management practices with feed and water provided *ad libitum*. Five diets were formulated which were: Diet 1: (Control) Maize based diet; Diet 2: Kaura based diet with phytase; Diet 3: Kaura based diet with protease; Diet 4: Kaura based diet with G2 G; Diet 5: Kaura based diet with protease and G2 G. Initial and final weights of birds were taken at the beginning and at the end of the experiment. Weight gain and feed intake were measured weekly while feed/gain ratio and cost per Kg gain were computed. Mortality was recorded as they occurred.

Blood Haematology

At the end of the finisher phase, 2 mls blood samples were taken from three birds per treatment over EDTA and taken to the laboratory for haematological study. The samples were analysed for packed cell volume (PCV), Haemoglobin (Hb) count and total proteins (TP) and cell differential count.

Statistical Analysis

Data obtained in the experiment were statistically analysed using the General Linear Model Procedure of Statistical Analysis (SAS, 2002) software package. Significant difference between treatments means were separated by Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Performance of Broiler Chicks Fed Kaura based diets

The performance of broiler chicks fed different enzymes in Kaura based diet is shown on Table 1. The result showed that birds on the Kaura based diet with combination of protease and G2 G performed significantly ($P < 0.05$) better compared to birds fed Kaura based diet with protease alone but similar to the G2 G supplemented diet. This could be due to the Synergy of the two enzymes releasing more protein and energy for muscle accumulation. Birds fed Kaura with phytase inclusion showed the least performance which may be explained by earlier reports by researchers that phytic acid is not but that tannin is the major issue that limits sorghum utilisation (Etuk *et al.*, 2012). Consequently, diets supplemented with protease and G2 G performed better by releasing the protein and energy bound by tannin. Feed conversion was similar for all treatments. Birds fed Kaura diets compared favourably with maize diets in converting feed nutrients to muscle. Feed cost and the cost of feed for Kg weight gain were not significantly different for all the treatments. The addition of enzymes to Kaura diets neither increased feed cost nor increased cost of producing broiler meat significantly.

Haematological indices of Broiler Starter chickens Fed Kaura based diets

Table 2 shows the haematological parameters of broiler chickens. There were no significant ($P>0.05$) differences across treatment diets. This indicates that blood quality and health of birds was not compromised by the feeding of Kaura.

Conclusion: It may be concluded that G2 G and the combination with Protease in Kaura based diets improved growth performance optimally for broiler starter chicks. Blood quality and the health of chickens were not compromised with the feeding of Kaura diets supplemented with enzymes.

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Table 1: Performance of Broiler Chickens Fed Kaura with Enzymes(0-4 weeks)

Parameters	Maize	Kaura+ phytase	Kaura+ protease	Kaura+ G2G	Kaura+ Protease+ G2G	SEM	LOS
Initial wt (g/bird)	87.88	87.42	87.88	87.88	88.33	0.68	NS
Final wt (g/bird)	1166.7^{a}	948.0^{c}	1065.3^{b}	1118.7^{a}	1135.3^{a}	21.23	*
Wt gain (g/bird)	1078.8^{a}	891.4^{c}	977.5^{b}	1030.8^{ba}	1047.0^{a}	18.00	*
Feed intake (g/bird)	1900.5^{b}	1874.3^{b}	1990.0^{ab}	2038.8^{a}	2100.9^{a}	39.45	*
Feed/gain ratio	1.96	2.10	2.04	1.98	2.01	0.14	NS
Feed cost (₦/Kg)	77.89	77.60	78.30	78.10	79.30	2.89	NS
Feed cost/Kg gain (₦/Kg)	152.66	162.96	159.73	154.64	159.39	8.41	NS

a,b,c, Means with different superscripts on the same row are significantly different (P<0.05); LOS: Level of significance. NS: Non-significant difference (P>0.05) *: Significant difference (P<0.05); SEM: Standard error of means

Table 2: Haematological Parameters of Broiler Chickens Fed Kaura with Enzymes

Parameters	T1 Maize	T2 Kaura+ phytase	T3 Kaura+ protease	T4 Kaura+ G2G	T5 Kaura+ Protease+ G2G	SEM	LOS
PCV (%)	29.00	29.67	28.69	30.00	27.67	0.97	NS
Hb (g/dl)	9.73	9.87	9.63	9.97	9.17	0.31	NS
WBC Count ($\times 10^{9}$/l)	5.67	3.70	3.10	3.13	5.27	1.21	NS
RBC($\times 10^{6}$/l)	4.70	4.23	4.67	5.03	4.57	0.42	NS
Total Protein (g/dl)	3.07	3.60	3.40	3.13	3.20	0.25	NS
Differential Counts							
Neutrophils (%)	3.67	5.00	8.67	4.00	9.67	2.02	NS
Lymphocytes (%)	95.00	94.33	0.33	94.00	88.00	2.90	NS
Monocytes (%)	0.00	0.00	1.00	0.33	0.67	0.56	NS
Basophils (%)	1.33	0.67	0.00	0.33	1.67	0.98	NS

LOS: Level of significance. NS: Non-significant difference (P>0.05)SEM: Standard error of means