RESPONSE OF BROILER FINISHER CHICKS FED ENZYME (Yemzin B ® Xylanase) SUPPLEMENTED PALM KERNEL MEAL AND WHEAT OFFAL BASED DIETS.

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ABSTRACT
A 28–day feeding trial involving ninety (90), four-week old Anak broiler chicks was conducted to evaluate the effect of enzyme supplementation on the performance of broiler finisher chicks fed palm kernel meal and wheat offal based diets. The broiler chicks were divided into 3 groups of thirty birds each. Each group was subdivided into 3 replicates of ten birds each and the birds were randomly assigned to treatments in a Completely Randomized Design. Three diets (diet 1-Basal, maize based with no enzyme, diet 2- wheat offal + Yemzim xylanase enzyme based and diet 3- palm kernel meal + Yemzim B ® xylanase enzyme based) were formulated and randomly offered to any of the three groups. The data collected were subjected to analysis of variance. Results of the study showed that weight gain, feed conversion ratio, final live weight, drumstick, shank, revenue and gross margin of birds fed the control diet were significantly ($P<0.05$) higher than birds fed the enzyme supplemented diets 2 and 3. Carcass cut parts and organs (as percentage of live weight) such as thigh, breast, back, wings, heart and abdominal fat were similar ($P>0.05$) in birds fed the basal control diet and enzyme supplemented diets. The cost per kilogramme weight gain was not significantly affected ($P>0.05$) by enzyme supplementation. Xylanase based enzyme supplementation was not profitable for broiler finishers fed 30% level of palm kernel meal and wheat offal based diets.

Keywords: Enzyme supplementation, broiler, palm kernel meal, wheat offal.

INTRODUCTION
The use of agro-industrial by-products such as wheat offal and palm kernel meal (PKM) as energy diluents, fillers or as sources of protein in broiler diets (Ezieshi and Olomu, 2004; Sundu *et al.*, 2006) is limited by the high fibre and anti-nutritional factors (ANFs) content. This affects their use in diets of poultry which lack the appropriate enzymes capable of degrading fibre (Danicke *et al.*, 1999).

Alawa and Umunna (1993) suggested that levels of about 15% wheat offal may be more appropriate for poultry. Palm kernel meal has been incorporated at between 30.0 – 40.0% inclusion levels in broiler diets (Onwudike, 1986; Okeudo *et al.*, 2005; Sundu *et al.*, 2006). The highest growth of broilers was reached when fed 20% and 30% palm kernel meal based diets supplemented with enzymes, compared to the growth of broilers fed a corn-soy diet (Soltan, 2009; Iyayi and Davies, 2005). Enzymes supplementation however, have failed to significantly enhance the performance and profit of hens fed wheat offal diet (Ademola *et al*., 2012).

Palm kernel meal and wheat offal are high fibre feed stuffs that are commonly incorporated in broiler diets but the level of utilization is low partly due to high fibre and the presence of Non Starch Polysaccharides (NSPs) (Sundu *et al.*, 2006). Negative effects of these NSPs can be overcome by supplementation of diets with suitable exogenous enzyme preparations (Zanella *et al*. 1999; Gracia *et al.*, 2003). Hajati (2010) reported that endogenous enzymes of broilers cannot adequately digest NSPs and subsequently the ingestion of high levels of soluble NSPs leads to increased digesta viscosity and reduced nutrient digestibility and absorption. Enzyme supplementation in the feed play an important role in increasing the availability of nutrients and retarding the adverse effect of anti-nutritional factors present in the feed components (Munir and Maqsood, 2013). Enzyme supplementation of brewers dried grain (BDG) and palm kernel meal (PKM) caused an enhanced performance in broilers and layers (Iyayi and Tewe, 1998; Iyayi and Adegboyega, 2004; Shakouri and Kermanshahi, 2004). This was achieved by reducing the digesta viscosity (Gunal and Yasar, 2004). The supplementary addition of enzymes would degrade the cellulose and other NSPs which are mainly found in the cell wall and are bound together in a complex matrix. In this process, the encapsulated starch molecules are unlocked by solubilizing the cell wall structure and increasing accessibility to digestive enzymes. This process will further enhance nutrient availability for growth (Pack *et al.*, 1998; Fasuyi and Akindahunsi, 2009). The supplementation of diets with exogenous enzymes has been applied as a means of enhancing production efficiency and increasing the effectiveness of nutrient utilization (Acamovic and Stewart, 2000).

As yet, there is dearth of information on enzyme supplementation of palm kernel meal and wheat offal based diets; two agro-industrial by-products commonly incorporated in broiler diet in Nigeria. The aim of the present study was to compare the performance of birds fed enzyme supplemented high fibre palm kernel meal and wheat offal based diets with those on the maize based diet without enzyme supplementation.

MATERIALS AND METHODS

Experimental site

The study was carried out at the Poultry Unit, Teaching and Research Farm, Michael Okpara University of Agriculture, Umudike, Abia State, Southeastern Nigeria. The experimental site is located on latitude 05° 28´ North and longitude 07° 31´ East and altitude of 122 meters above sea level. It lies within the tropical rainforest zone characterized by 9 months of rainfall and 3 months of dry season with average annual rainfall of 2,177mm in 148-155 rain days. Average ambient temperature is 25.5°C, with minimum and maximum temperatures of 22 and 29 °C respectively. Relative humidity ranges from 76 - 87% (NRCRI, 2013).

Test materials and Experimental diets

Day-old broiler chicks (Anak broiler chicks) were procured from Zion Farms, Owerri, Imo State, Nigeria while feedstuffs, drugs and enzyme preparation (YEMZIM B ® xylanase) were procured from Jocan Agro limited, Umuahia, Abia State, Nigeria. The enzyme preparation (YEMZIM B ® xylanase) produced by the micro organism *Tricoderma* species and contains endo 1,4 –beta xylanase activity, made in Turkey, was added to the diets at 100g/ tonne (1,000 U/g).Three diets were formulated. A basal diet containing no wheat offal and palm kernel meal, without enzyme served as the control (Diet 1). Diets 2 and 3 contained 30.0% each of wheat offal and palm kernel meal, respectively and the enzyme (Table 1).

Experimental birds/ Management of birds

One hundred and ten (110) day- old broiler chicks were brooded for four weeks on deep litter floor. During this period water and a broiler starter diet were provided *ad-libitum*. At 28th day of age, the ninety (90) chicks were weighed in groups of thirty and assigned to three experimental diets. The birds were vaccinated routinely during and after brooding. Routine management practices were carried out during the experimental period. The experiment lasted four weeks.

Experimental design and data collection

At 28th day of age, ninety (90) birds were weighed and divided into 3 groups of 30 birds each. Each group was subdivided into 3 replicates of 10 birds each and the birds were randomly assigned to treatments in a Completely Randomized Design. The birds were weighed weekly thereafter. Experimental diets and water were provided *ad-libitum* while feed intake and mortality were recorded. Data were collected on the initial, final body live weight of the birds, mortality, quantity of feed given, the refusal and from where feed intake, feed conversion ratio and body weight gain of the birds were calculated. The cost of each experimental feed ingredient in the market at the time of the study was used to calculate the cost of feed per kilogramme of the diet. Feed cost/kg weight gain was calculated as feed conversion ratio x cost /kg feed while revenue/bird was obtained as price/ kg live weight x weight of bird. Gross margin/bird was calculated as revenue /bird – cost/kg weight gain x mean weight gain. This was calculated using the method of Sonaiya *et al.* (1986). At the 56th day of age, two birds which were closest to the mean

Table 1: Composition of experimental diets

	Diets(%)		
Ingredients	**T_1(Basal)**	**T_2(WO +Enzyme)**	**T_3(PKM +Enzyme)**
Maize	53.0	38.0	38.0
Maize offal	10.0	-	-
Wheat offal	-	30.00	-
Palm kernel meal	-	-	30.0
Ground nut cake	15.0	15.0	15.0
Soyabean meal	14.0	8.99	8.99
Fish meal	4.0	4.0	4.0
Bone meal	3.0	3.0	3.0
Premix*	0.25	0.25	0.25
Common salt	0.25	0.25	0.25
Lysine	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Yemzin B ®	-	0.001	0.001
Total	100.00	100.0	100.0
Calculated	Analysis		
Crude protein	20.27	20.31	20.17
Crude fibre	4.10	5.09	6.29
ME (kcal/kg)	2943	2807	2817

*Vitamin-mineral premix supplied Vitamin A-2,000,000IU; Vitamin D3-400,000IU; Vitamin E-8.00g; VitaminK3-0.40g; VitaminB1-0.32g; Vitamin B2-0.96g; Vitamin B6-0.56g; Vitamin C-2400mg; Vitamin B12-400mg; Folic acid-0.16g; Biotin-8.00mg; Zinc-7.20g; Copper-0.32g; Iodine-0.25mg; Cobalt-36mg; Selenium-16.00mg; BHT-125g. WO =Wheat offal, PKM =Palm kernel meal, ME = Metabolisable energy

weight per replicate were selected from each replicate, making a total of 6 birds per treatment for carcass evaluation. The selected birds were then fasted for 12 hours, weighed and slaughtered. Dressed carcass (cut parts) and relative organ weights (expressed as percentage of live weight) were recorded.

Statistical analysis

The data obtained were subjected to analysis of variance appropriate for a Completely Randomized Design (Steel and Torrie, 1980). Significant differences among treatment means were separated using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

The performance of broilers fed PKM and wheat offal based diets supplemented with enzyme is as shown in Table 2. Average daily feed intake differed significantly (P<0.05) among the birds fed the diets. Feed intake was highest (P<0.05) for birds fed the PKM based enzyme supplemented diet (144.09g) and least for birds fed the wheat offal based diet (141.55g). However, the feed intake of birds fed wheat offal based enzyme supplemented diet compared favourably (P>0.05) to birds fed the control diet (142.38g). The increased feed consumption of birds on the PKM based diet could be attributed to the enzyme supplementation, lower energy and high fibre content of this diet. Enzymes have been reported to significantly increase feed intake in broilers, partly due to increased

Table 2: Growth performance of broiler finishers fed enzyme supplemented wheat offal and palm kernel meal based diets

Parameters	Basal(Diet 1)	WO+E (Diet 2)	PKM+E(Diet 3)	SEM
Av. Initial weight (kg)	0.575	0.575	0.570	0.002
Av. Final weight (kg)	2.26^{a}	1.85^{c}	2.10^{b}	0.02
Total weight gain (kg)	1.69^{a}	1.28^{c}	1.53^{b}	0.02
Av. Daily feed intake (kg)	0.142^{ab}	0.144^{a}	0.141^{b}	0.05
Av. Daily gain (kg)	0.06^{a}	0.045^{c}	0.054^{b}	0.02
Feed conversion ratio	2.35^{c}	3.14^{a}	2.58^{b}	0.12
Mortality (%)	0	0	0	

^{a,b,c} = Means in a row with different superscripts are statistically different (P<0.05).
SEM= Standard error of the means. WO= Wheat offal, PKM=Palm kernel meal. E=enzyme.

digestibility of nutrients and partial degrading of cell wall of feed (Leeson *et al*., 1996; Daveby *et al*., 1998; Alam *et al*., 2003). Action of enzymes is in the breakdown of the fibre contents such as cell wall, cellulose and lignin of the feed ingredients thereby reducing fibre level (Han, 1997).On the other hand, the decreased feed intake in wheat offal based enzyme supplemented diet agree with the findings of Samarassinghe *et al.* (2000) and Kadam *et al.* (1991), that feed intake decreased on addition of enzymes due to birds fulfilling their nutrient requirement by taking less amount of feed.

In this study, the average final body live weight of the birds fed diet 1 (control diet) without any enzyme supplementation, had significantly (P<0.05) higher live weight (2.26 kg) than birds fed the enzyme supplemented wheat offal (1.85 kg) and palm kernel meal (2.10 kg) based diets. Enzyme supplementation of wheat offal and palm kernel meal based diets did not enhance performance or induce any significant increase in the live weights of the birds. Ojewola *et al.* (2006) reported significant depression in final live weight and feed efficiency of birds fed African yam bean meal-based diets supplemented with Nutra-xyla enzyme. This could be an indication of the superiority of the control diet over the enzyme supplemented wheat offal and palm kernel meal based diets. The result obtained in the present study is contrary to results of significant improvement in live weight of broilers fed enzyme supplemented diets reported by several researchers (Alam *et al*., 2003; Iyayi and Davies, 2005; Iyayi and Adegboyega, 2004; Bawa *et al.*, 2010).

The birds fed enzyme supplemented diets showed significantly (P<0.05) poorer average daily gain. The birds fed the control diet (diet 1) gained significantly (P<0.05) higher average daily gain (60.56g) compared to broilers fed wheat offal (45.93g) and palm kernel meal (54.79g) based diets (Table 2). This agrees with the report of Omojola and Adesehinwa (2007) that enzyme supplementation did not significantly improve weight gain. It may well be that at higher levels of fibre occurrence in the diets; more enzymes are required to bring about the desirable viscosity that will enhance optimum nutrient absorption (Iyayi and Davies, 2005). Reduced viscosity of the digesta with a resultant increase in feed intake and weight gain is one of the ways enzyme supplementation results in improved performance in birds (Bedford, 1997; Gunal and Yasar, 2004; Taibipour and Kermanshahi, 2004). Marquardt (1997) reported that anti-nutrients like viscous NSPs reduce the digestion and absorption of nutrients, which feed enzymes supplementation, reduce or eliminate. Probably, it could be that the enzyme which was used in the present study, a xylanase did not exert its lowering of viscosity of intestinal content well and as well as improve

digestibility of starch, protein, fat and energy in the broilers (Annison and Choct, 1991). In this study, it could be that a composite enzyme mixture, with a combined action from proteolytic and pentosanase enzymes would probably lead to a higher reduction of intestinal viscosity than from a pentosanase alone, such as xylanase would achieve.

Finfeeds (1991) had confirmed in his intestinal digesta studies that protein was linked to the viscous gel and a combined action from proteolytic and pentosanase enzymes would lead to a higher reduction of intestinal viscosity than that from a pentosanase alone. Cheeson (1993) concluded that multi-enzyme preparations are more effective than mono-enzyme preparations in the improvement of performance and digestibility of nutrients in animals. The lack of response due to supplementation of only xylanase in a corn-soya diet is expected because, the monomers released by the action of the enzyme on arabinoxylan i.e. arabinose and xylose are poorly metabolized by poultry and therefore of little value to animal performance. The addition of a mixture of enzymes considering the composition of NSP in a given diet may yield better response compared to supplementation of individual exogenous enzyme (Johri, 2002). This may explain partly, the poorer performance of birds fed the Yemzin xylanase, a mono-enzyme preparation, as it seemed to be less effective in the improvement of performance of birds. In this study, it could also be that the enzyme preparation may not have matched the substrates in the diets or there could be loss of potency of the enzyme to degrade fibre or that the enzyme had a very low activity. However, the activity of the commercial enzyme preparation (YEMZIM B ® xylanase) used was not determined.

In this study, feed conversion of broilers fed the control diet was significantly (P<0.05) higher than birds fed the enzyme supplemented diets. Birds fed the basal control diet had a feed conversion ratio value of 2.35 which was better than the values of 3.14 and 2.58 obtained for birds fed wheat offal and palm kernel meal enzyme supplemented diets. Results obtained by Gao *et al.* (2007) support the present result, that enzyme supplementation significantly increased feed conversion ratio value. The poorer feed conversion ratio due to enzyme supplementation in the present study is however, contrary to earlier findings of better feed conversion on the enzyme supplemented diets than the control diet (Scot *et al.*, 1997; Alam *et al*., 2003; Classen *et al*., 2003; Jackson *et al*., 2004; Onu *et al*., 2011). Anyaehie and Irole (2008) reported poorer but similar feed conversion ratios for birds fed enzyme supplemented diets compared to birds fed the control diet. It was observed in the present study that feed conversion ratio which is the most sensitive factor in assessing performance, significantly (P<0.05) increased in birds fed the enzyme supplemented diets: an indication of poor utilization of the enzyme supplemented diets. This is probably partly due to the higher crude fibre level of the enzyme supplemented diets compared to the basal diet without enzyme supplementation (Table 1).

In the present study, a reduction in cost per kg of feed and an increase in feed cost per kilogramme weight gain were recorded with enzyme supplementation (Table 3). This implies that it is cheaper to produce a kilogramme of enzyme supplemented feed but

Table 3: Economics of production of broiler finishers fed enzyme supplemented Wheat offal and Palm kernel meal based diets

Parameters	Basal(Diet 1)	WO+E (Diet 2)	PKM+E(Diet 3)	SEM
Cost of feed (₦/kg)	73.50	66.24	60.24	
Cost of a kg weight gain (₦)	175.35	177.66	183.61	8.05
Revenue (₦)	1017.4[a]	771.4[c]	924.4[b]	37.04
Gross margin (₦)	844.41[a]	563.17[b]	768.96[a]	43.57
Total gross margin (₦)	5910.84[a]	3956.16[b]	5394.08[a]	302.96

[a,b,c]= Means in a row with different superscripts are statistically different (P<0.05).
SEM = Standard error of the means. WO= Wheat offal, PKM=Palm kernel meal. E=enzyme. ₦ = Naira

costlier to produce one kilogramme of broiler meat when enzyme was incorporated up to 100g/tonne of feed in broiler finisher diets. The results obtained in the present study is contrary to reports by Iyayi and Davies (2005) where the cost of a kilogramme of feed increased and cost of feed/kg weight gain decreased with enzyme supplementation.

Similarly, a decrease in the cost /kg of feed and feed cost per kilogramme weight gain when birds were fed enzyme supplemented diets have been reported (Scot *et al.*, 1997; Alam *et al*., 2003; Classen *et al*., 2003). Anyaehie and Irole (2008) reported decreased cost per kg of feed and feed cost/kg weight gain with enzyme supplementation. In the present study, the higher feed cost per kilogramme of meat produced on the enzyme supplemented diets suggests that this enzyme, xylanase is not economically viable alternative feed additive to incorporate in broiler finisher feed.

Revenue generated by the birds fed the basal control diet (N1017.4) was significantly higher (P<0.05) than the revenue obtained from birds fed the enzyme supplemented wheat offal (N771.4) and palm kernel meal based diets (N924.4) (Table 2).

Evaluation of the gross margin reveals that the control diet was significantly higher (P<0.05) than the enzyme supplemented diets. Gross margin and total gross margin are indicators of the profitability of using a feed. The total gross margin followed the same trend as the gross margin. This tend to suggests that basal diet without enzyme supplementation could be a more profitable feed to feed broiler birds than wheat offal and palm kernel meal enzyme supplemented diets.

In this study, there was no mortality among the birds during the experiment. Hence, mortality could not be attributed to treatment effects. In other words, enzyme supplementation did not influence mortality, cost of feed/kg or cost of a kg weight gain of the broilers. This result agrees with the findings of Pillai *et al.* (1995) and Alam *et al.* (2003) who found that survivability was similar in control and enzyme supplemented groups. It was evident that feed cost/kg broiler was increased (P>0.05) by the addition of enzyme, decreasing profitability of broiler rearing. The present study is contrary to the findings of Alam *et al.* (2003) and Augelovicova and Michalik (1997). The discrepancies in the results obtained in the present study may be due age of the birds. According to Maiorka *et al*. (2002), enzyme complex usually exert a significant effect on broilers only during the starter phase possibly due to the immature digestive system of broilers at this age. In this study the birds were in their finisher phase.

Organ weights as percentage of body weight were affected by the treatment (Table 4). Organ weight is an index of nutrient retained by the broilers. The liver weights were similar in the basal and wheat offal based diet but higher (P<0.05) than birds fed the palm kernel meal (PKM) based diet. This is an indication that all the treatment diets did not contain toxic substances. It is a common practice in feeding trials to use weight of some internal organs like liver and kidney as indicators of toxicity of feed (Ahamefule *et al.,* 2005). Abnormalities in weights of these organs indicate the presence of toxic elements in the diets (Bone, 1979).The abnormalities will arise because of increased metabolic rate of these organs in an attempt to reduce these toxic elements or anti nutritional factors to non toxic elements (Ahamefule *et al.,* 2005).

The gizzard of birds fed the palm kernel meal based enzyme supplemented diet (2.66%) was significantly (P<0.05) heavier than the gizzard of the control diet (2.08%) and wheat offal enzyme supplemented based diet (2.11%) (Table 4). The result obtained in the percentage gizzard weight is inconsistent with reports of some researchers that fed birds high fibre diets. The gizzard which often has been reported to increase in size when birds were fed fibrous feed materials (Fafiolu *et al.,* 2010) was observed in the present study. This indicates that the level of fibre in the diets was relatively high for the birds' gizzard to deal with, without much stress, especially for the PKM enzyme supplemented diets. This would have contributed to its increase in weight. The birds were trying to cope with elevated crude fibre of the resultant diets due to wheat offal and palm kernel meal inclusion. Heavier gizzard weight is expected in basal diet as the enzyme is expected to have acted on the fibre in the enzyme supplemented diets. In this study, this was not the case indicating that the enzyme incorporated was probably not effective in reducing the high fibre contained in the enzyme supplemented diets. This disagrees with

Table 4: Carcass characteristics of broiler finisher birds fed enzyme supplemented wheat offal and palm kernel meal based diets

Parameters	Basal diet (Diet 1)	Wheat offal + enzyme (Diet 2)	Palm kernel meal + enzyme (Diet 3)	SEM
Live weight (kg) [a]	2.30 [a]	1.68 [b]	1.88[ab]	0.10
Dressed wt (kg) [b]	2.11[a]	1.54 [b]	1.74[ab]	0.09
Dressing % [c]	67.43	65.51	69.44	1.05
Cut parts (%) [d]				
Drumstick	9.63 [b]	10.18 [b]	10.92 [a]	0.17
Wings	8.97	9.00	9.42	0.22
Back	15.69 [a]	13.52 [b]	14.16 [b]	0.36
Breast	17.86	17.02	18.58	0.41
Thigh	9.97	10.40	10.86	0.22
Shank	3.57 [b]	4.43 [a]	4.46 [a]	0.16
Organs (%) [d]				
Gizzard	2.08 [b]	2.11[b]	2.66 [a]	0.09
Liver	2.71[a]	2.71[a]	2.24[b]	2.56
Heart	0.48	0.51	0.57	0.02
Abdominal fat	0.29	0.35	0.31	0.02

[a,b,] = Means in a row with different superscripts are statistically different (P<0.05). [a] New york dressed chicken (only blood and feather were removed) [b] =Dressed weight [c] Dressing percentage (%)
[d] =Organs/ cut parts as percentage of live weight
SEM = Standard error of the means. WO= Wheat offal, PKM=Palm kernel meal. E=enzyme, Wt =weight.

Soltan (2009) who reported that inclusion of exogenous enzyme did not affect relative gizzard weight of broilers. Alam *et al.* (2003) had obtained similar gizzard weights when they fed various enzyme preparations to birds. The results on the carcass characteristics (Table 4) showed that the dressing percentage was similar (P>0.05) and ranged from 65.51% to 69.44%. The highest value of 69.44% was recorded in birds fed enzyme supplemented palm kernel meal based diet.

The dressing percentage obtained in this study disagrees with the findings of Anyaehie and Irole (2008) and Adeyemi *et al.* (2013) who reported values of over 90.0% and 70.0 - 76.60 %, respectively but falls within the range of 63 - 71% reported by Odunsi *et al*. (1999) for broilers. Soltan (2009) reported that enzyme supplementation non-significantly improved dressing percent in broilers. Birds fed the control diet had significantly (P<0.05) heavier live weight at slaughter, shanks and back of birds than fed birds fed the enzyme supplemented diets. The birds fed the enzyme supplemented palm kernel meal based diet had significantly (P<0.05) improved drumstick (10.92%) but non-significantly (P>0.05) improved dressing percentage (69.44%) compared to the other diets. In other words, in this study, addition of enzyme did not significantly (P>0.05) improve meat yield. This result is inconsistent with the reports of Leeson *et al*. (1996), Anyaehie and Irole (2008) and Alam *et al.* (2003), that addition of enzyme significantly increased meat yield. This study revealed a poorer performance of birds fed enzyme supplemented based diets than birds fed the basal control diet. Hence, incorporation of enzyme (YEMZIM B ® xylanase) resulted in a poor performance and a decreased carcass yield of broilers.

However, in this study dietary enzymes had no effect on weight of wings, thigh, breast, abdominal fat and heart. Similar results were reported by Iyayi and Davies (2005) and Anyaehie and Irole (2008). The authors reported similar (P>0.05) percentage weight of thigh, breast and wings while Alam *et al.* (2003) reported similar percentage heart weight for control and enzyme supplemented diets. Similarly, Iyayi and Davies (2005) reported comparable percentage weights for heart, gizzards, liver, spleen, small and large intestine of broilers. Alam *et al.* (2003) reported that dietary enzymes had no significant effect on shank length and gizzard weight. This is contrary to result obtained in the present study. Similarly Anyaehie and Irole (2008) reported similar relative organ weights for birds fed the basal control diet and enzyme supplemented diets.

In conclusion, the results of this trial suggests that palm kernel meal and wheat offal at 30% dietary level supplemented with exogenous enzyme YEMZIM B ® xylanase at 0.01% of the diet could not improve performance, economic and carcass characteristics of broiler finishers and it may not be necessary to supplement YEMZIM B ® xylanase to these diets at the present levels of inclusion of these feed ingredients.

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