



## Enzyme Supplemented Wheat Offal Diet Improves Performance of Broilers

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**Target Audience:** Poultry producers, feed millers and poultry nutritionist.

**Abstract** – This study was carried out to determine the effect of enzyme supplementation on the performance of broilers fed a high wheat offal content diet. A total of one hundred (100) ANAK 2000 broiler chicks were purchased, brooded for seven days and randomly distributed to two dietary treatments having five replicates of ten birds per replicate. The two diets were maize – soy bean meal based but had just 350gm/kg of maize and 200gm/kg of wheat offal. The diet not supplemented with enzyme served as the control while the second diet was supplemented with Roxazyme G 2G<sup>®</sup> at an inclusion rate of 200gm/tonne of complete feed. The experiment was designed as a complete randomized design and lasted thirty five days.

Feed and water was supplied ad libitum for the entire period of the experiment. Feed intake and weight gain was determined on a weekly basis. Feed conversion ratio (FCR) was calculated from values obtained for weight gain and feed intake. Data collected were subjected to general linear model analysis using SPSS package volume 17 and significant means separated by LSD.

Birds fed the enzyme supplemented diet had better weight gain; less feed consumption and improved FCR. Feed intake was significantly ( $p < 0.05$ ) lowered in birds fed the enzyme supplemented diet. Weight gain was significantly enhanced ( $p < 0.05$ ) by enzyme supplementation. Values recorded for FCR were significantly better ( $p < 0.01$ ) in enzyme supplemented diet. The FCR values recorded were 1.84 for enzyme supplemented diet and 2.12 for the diet not supplemented with enzyme.

Findings in the current study indicated that enzyme supplemented wheat offal diet improved performance of broilers by improving weight gain, reduce feed intake and enhance FCR.

**Keywords** – Broilers, Enzyme, Performance, Wheat Offal.

### I. INTRODUCTION

Efficiency in feeding has been the major concern of raising poultry birds. In Nigeria, poultry feed is based primarily on maize and soybean meal as energy and protein source. These ingredients constitute the most expensive in periods of scarcity. This can be a significant limiting factor in sustainability and development of the poultry industry due to inadequate financial resources available to farmers. This has led to increasing cost of poultry production since 70 – 80% of production cost is attributed to feed [1]. Least cost formulation of feed is one of the benefits of enzyme supplemented poultry diets. This gives room for inclusion of unconventional feed ingredients in poultry diets due to their low prices and

availability. Incorporation of agro – industrial by – products (AIB) in poultry feed is aimed at reducing cost of production and maximize profit but they have the limiting problem of high concentration of non–starch polysaccharides (NSP). Wheat offal, cassava peel, sorghum, rye and oat are typical examples of unconventional feed stuff. Wheat offal is the by – product of milling wheat and is commonly used in poultry diet [2].

Wheat offal contains considerable amount of energy and protein which may be present as intra cellular compounds [3]-[4]. Its fibre is largely in form of NSP that are not readily digested by endogenous digestive enzymes synthesized by monogastric animals. These NSP include cellulose, pentosans (arabinoxylans and xylans),  $\beta$ -glucans, pectins, mannans, arabinans, galactans and xyloglucans [5]. Negative impact of NSP are elicited via viscosity and physiological changes exerted on the gut which may depend on their solubility and molecular weight [6]. Enzymes tailored at hydrolyzing NSP alleviate their negative effect and improve nutrient digestion enabling enhanced nutrient digestion and absorption [7]. According to earlier report [8], the end result is improved nutrient utilization and performance. Not only do enzymes increase digestibility of fibrous ingredients by cell wall disruption but they improve the feeding value of fibrous feed stuff and reduce the depressing effect of such diets [8]. The efficiency of enzyme supplemented diet can be assessed by evaluating the performance of birds fed with diets containing the enzyme compared to those that are not. Decreased feed intake, increased weight gain and feed conversion ratio (FCR) are some of the benefits of enzyme supplemented diets. The current study was designed to evaluate the performance of broilers wheat offal diet with or without enzyme (Roxazyme G2G<sup>®</sup>) supplementation.

### II. MATERIALS AND METHOD

This research was carried out at the poultry unit of Niger Delta University Teaching and Research farm. Roxazyme G 2G<sup>®</sup>, a non starch polysaccharide (NSP) degrading enzyme was supplemented to one of the treatment diets. It is an odorless granulates which is soluble in water. It contains an enzyme complex derived from *Trichoderma longibrachiatum*. It has an effective pH range of 3.5 - 5.5 and a temperature range of 30 - 55°C. The dosage range was 200gm per ton of complete feed. A hundred (100) day old unsexed broiler chicks (ANAK 2000) were purchased from Elohim Farm in Yenagoa, Bayelsa state. The chicks were brooded for a week. The chicks were weighed and randomly distributed to two treatments having five

replicates and ten birds per replicate at the end of the brooding period. Distribution of birds to replicates was done without regards to sex. The duration of the experiment was 35 days. Feed and water was supplied *ad libitum*. Feed intake and weight gain was determined on a weekly basis.

Two experimental diets were formulated. Both diets contained 350gm/kg of maize and 200gm/kg of wheat offal respectively. The first diet which served as control was not supplemented with enzyme while the second was supplemented with enzyme (Roxazyme G 2G<sup>®</sup>) at an inclusion rate of 200gm/tonne of complete feed.

A hundred gram each of experimental diet was collected and set aside for proximate analysis. Proximate analysis of experimental diets was carried out according to [9]. Gross and nutrient composition of the experimental diets is as indicated in Table 1. The experiment was arranged as a complete randomized design. Data collected on to general linear model analysis in SPSS 17 and significant means separated with LSD (least significant difference).

### III. RESULTS AND DISCUSSION

Calculated Crude protein and energy concentration of the experimental diets were acceptable values as indicated in Table 1. Crude protein content of enzyme supplemented diet was high on analysis which can be attributed to hydrolysis of proteoglycan present in wheat offal to release protein molecules attached to this carbohydrate (Table 1).

The findings of the current study indicated that enzyme supplementation improved weight gain, reduced feed intake and enhanced FCR as shown in Table 2. Increased weight gain [10]-[11]-[12], reduced feed intake [13] and enhanced FCR have been marked as some of the benefits of enzyme supplemented diets.

Weight gain was significantly ( $p < 0.05$ ) higher in birds fed enzyme supplemented diet recording a value of 19946.10gm/bird compared to the value recorded in birds (1777.80) fed WO without enzyme supplementation. One of the strategies earlier reported [14] - [15] to improve nutritive value of wheat bran is dietary supplementation with appropriate enzyme which elicits a positive effect on performance of broilers and even layers. As reported in previous studies [16]-[17]-[18], enzyme can partially hydrolyze NSP, reduce viscosity of gut contents, and result in improvement in nutrient absorption. The important role of breaking down cell wall and releasing nutrients thereby making a uniform mixture in the gut leads to increased digestibility of nutrients especially carbohydrates. Improved gain, feed efficiency intestinal viscosity, digesta dry matter and digestibility are associated with enzyme supplementation [19]. Improved feed efficiency ( $p < 0.01$ ) was recorded in birds fed enzyme supplemented diet in the current study. An improvement of 13.2% was recorded for FCR in broilers fed enzyme supplemented WO diet. Significant improvements ( $p < 0.05$ ) in performance variables considered in the current study further buttress that previously recorded [20]. Dietary inclusion of enzyme enables better utilization

of low quality feeds, resulting in up graded live weight gain, better feed conversion ratio resulting from breakdown of cell wall fibre which the birds cannot hydrolyze on their own. The digestive capacity of the bird is improved and the resultant effect is improved weight gain as recorded in the current study [21]-[22]-[23]. Increased digestive capacity improves feed efficiency and digestibility of the individual feed components [24]. Another means is better gut pH that elicits improved gut health by stabilizing gut microflora populations and increased nutrient bioavailability in the enzyme supplemented diet [25]-[26]-[23].

Although performance variables were significantly ( $p < 0.05$ ) improved in this study, however reports from other studies have indicated variability in performance variables recorded. According to [27], enzyme (xylanase) supplementation had no effect on body weight gain in broilers fed supplemented wheat and wheat middlings diet. An earlier study reported by [28] showed that xylanase, amylase and protease supplemented wheat middlings fed to pullets had no effect on growth but improved feed conversion. As reported earlier [29], the responses to enzyme supplementation are feedstuff-, diet-, and enzyme dependent. In essence, the feedstuffs with greater amount of NSP, intuitively respond to a greater extent to carbohydrase supplementation [29].

In the light of this, it can be said that the enzyme used in the current which had an enzyme complex consisting of xylanase, glucanases might have been effective to hydrolyse the cell wall NSP present in the wheat offal used. The better crude protein and less crude fibre (Table 1) concentration recorded in the experimental diets after enzyme supplementation suggests better availability in diets supplemented with enzyme making such available for digestion and absorption in the intestinal lumen of birds fed the enzyme supplemented diet. So, it is pertinent to mention that, it seems that as the nutrient density of the control diet or the antinutritive effect of the control diet is more expressed, then there is a greater growth performance improvement with enzyme supplementation which may be the case in results recorded in the current study. This further emphasizes the report of [29].

### IV. CONCLUSION AND APPLICATION

It can be concluded from the findings of the present study that:

1. Enzyme supplementation can significantly ( $p < 0.05$ ) enhance body weight gain, reduce feed intake and improve FCR.
2. Wheat offal (200gm) can be conveniently added to broiler diet in the presence of an appropriate enzyme without any deleterious effect on performance and health of the birds
3. Poultry farmers can reduce feed cost by adding enzyme supplemented WO in broiler diet.

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**Table 1. Gross and nutrient composition of experimental diets**

Ingredients	WO - enzyme	WO + enzyme
Maize	350	350
Soybean meal	330	330
Fish meal	40	40
Cassava starch	42	42
Wheat offal	200	200
*Constant ingredients	38	38
Total (1000gm)	1000	1000
M.E. (Kcal/kgDM)	3036.03	3036.03
C.P gm/kgDM	218	218
Analyzed composition		
Dry matter (gm)	693.5	698.5
Ash (gm/kgDM)	194.7	142.3
Crude protein	223	248
Ether extract	49.0	54.4
Crude fibre	71.9	64.2

\*: mineral vitamin premix (2.5gm), DL Methionine (1.5gm), bone meal (21gm), oyster shell (10gm) salt (3gm). M.E.: metabolisable energy, C.P.: crude protein, M: maize, SBM: soybean meal, WO: wheat offa

**Table 2. Performance characteristics of broilers fed enzyme supplemented wheat offal diets**

Parameter	WO - enzyme	WO + enzyme	SEM	<i>P</i> value
Initial live weight (gm/bird)	150.00	148.00	-	-
Final live weight (gm/bird)	1927.80	2094.10	137.98	0.055
Weight gain (gm/bird)	1777.80 <sup>a</sup>	1946.10 <sup>b</sup>	11.16	0.044
Feed intake (gm/bird)	3618.3 <sup>b</sup>	3543.80 <sup>a</sup>	11.22	0.039
FCR	2.12 <sup>b</sup>	1.84 <sup>a</sup>	0.013	0.010

ab: means along the same row with different superscripts are significantly different ( $p < 0.05$ )