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## EFFECT OF FULL FAT PALM KERNEL MEAL BASED DIETS SUPPLEMENTED WITH FULLZYME® ON PERFORMANCE OF BROILER CHICKENS

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### ABSTRACT

Performance of broiler birds was evaluated in an 8-week feeding trial in which full fat palm kernel meal (FFPKM) supplemented with Fullzyme® was fed at graded levels (0, 5, 10 and 15%) during the starter and finisher phases. Four (4) iso-nitrogenous diets were formulated, containing 23% CP for broiler starter (22-24 %CP) and 21% CP for finisher (18-21 %CP) in which FFPKM was supplemented with Fullzyme®. One hundred and twenty (120) 7-day-old broiler chicks were randomly allotted to 12 pens (10 birds in each pen). Each of the four (4) diet groups was replicated 3 times and randomly allotted to the broiler pens. Each pen represented a replicate. The respective groups of birds were fed the starter diets for 4-weeks during the finisher phase the birds were reduced to 8 birds per pen (96 birds in total). The dietary treatments for the birds in the finishing phase were replicated thrice and fed for four weeks. The daily feed intake, daily weight gains (g/bird) as well as feed to gain ratio of birds on diet 5% FFPKM were significantly ( $P < 0.05$ ) better than those for birds on the control (0%), 10 and 15% FFPKM diets. The feed cost/kg gain for broiler birds on control diet was notably ( $P < 0.05$ ) inferior to those for birds on 5, 10 and 15% FFPKM diets. The outcomes indicate that the 5% FFPKM dietary treatment supplemented with Fullzyme® gave higher overall growth performance and can be fed to broiler chickens from starter to finishing without any detrimental impact.

**Keywords:** Full Fat Palm Kernel Meal; Fullzyme®; Performance; Broiler Chickens; Starter and Finisher Rations

### INTRODUCTION

The growing population, monetary instability, climate change and insecurity particularly in Nigeria, has made food security a pressing undertaking. A 2009 document through the Food Policy Research Institute estimated that in the absence of resolute government action, food availability within the Sub-Saharan Africa region will average 500 calories by 2050. A 21 percentage decline (Ishibashi and Ohta, 2000). There is a drastic drop in the daily family consumption of meat/eggs as animal protein is being replaced by with vegetable protein (Ndams, 2015). Broiler production has been stated to offer the most rapid and cost-effective approach of making available, high quality animal protein to man (Ndams, 2015).

One of the reasons of national meat shortage is the drastic drop in broiler chicken production because of high cost of feed materials (Ndams, 2022). Broiler chickens are fast growing birds requiring high proteins and energy in their diets. According to FAO (2002), even as feed assets are constrained, the best method is to utilize crop residues and agro-industrial by-products more efficiently. Groundnut cake and maize were normally used as protein and energy dietary supplements but their costs have continued to increase to an alarming peak in our markets.

Full Fat Palm Kernel Meal (FFPKM) is the by-product obtained from palm oil production, without the extraction of oil from the kernel. When milled for animal feeding, it contains approximately 45-46% of oil (fats) with excessive gross energy content of 28.9 MJ/Kg DM and has been observed to be a valuable

alternative feedstuff for increasing the metabolizable energy of broiler diets in the place of maize (Oruwari *et al.*, 1996; Vargas and Zumbado, 2003, and Salma *et al.*, 2007).

The use of FFPKM will decrease feed dustiness and help lubricate devices in feed mills (Firman *et al.*, 2008). In Nigeria, FFPKM is cheap as compared to cereal grains and most oilseed products, coupled with its potential as a source of dietary protein. Sese *et al.* (2014) indicated that high nutritional energy concomitant with growing levels of FFPKM substantially increased the live body weight gain of broiler chickens. While Okeodo *et al.* (2006) and Sundu *et al.* (2005) reported that body weight gains of birds fed 30% palm kernel meal (PKM) diets were 2% higher compared to birds that consumed maize-soya diets. The use of exogenous enzyme in chicken diets to enhance feed intake, nutrients digestion, absorption, weight gain and feed to gain ratio have been advocated (Sale *et al.*, 2003).

The targets of this test were to determine the impact of full fat palm kernel meal-based diets supplemented with Fullzyme® on the overall performance of broiler chickens.

### MATERIALS AND METHODS

#### Experimental Site

The feeding trial was conducted on the Students' Project Site of the Poultry Production Unit, College of Agriculture and Animal Science, Ahmadu Bello University, Mando Road Kaduna (11° 10' N, 07° 38'E), with elevation of 632m above sea level. The area

receives an annual rainfall of 1200mm, with 95% falling between April and October. The temperature varies between 26-35°C. The humidity at harmattan season is 21 to 27%. Mando is located on the Northern Guinea Savannah Zone of Nigeria.

### **Experimental design and diets**

The usual overall performance of broiler birds was determined in an 8-week feeding trial in which full fat palm kernel meal (FFPKM) supplemented with Fullzyme® was fed at graded levels (0, 5, 10 and 15%) at the starter and finisher phases. There were 4 iso-nitrogenous diets formulated to meet the NRC (2000) requirement, containing 23% CP for broiler starter (22-24 %CP) and 21% CP for finisher (18-21 %CP). All diets contained FFPKM supplemented with Fullzyme®. In each of the starter and finisher diets, the composition was formulated as follows;

Diet 1 (0%), the control, was without Fullzyme® and FFPKM

Diet 2 (5%), contained FFPKM at 5% plus 0.1% Fullzyme® supplementation

Diet 3 (10%), contained FFPKM at 10% plus 0.1% Fullzyme® supplementation

Diet 4 (15%), contained FFPKM at 15% plus 0.1% Fullzyme® supplementation

### **Broiler starter phase (1-5weeks)**

One hundred and twenty (120) day-old broiler chicks were acquired used for the experiment. The birds were randomly assigned to four treatment groups replicated three times with 10 birds per replicate at seven (7) days of age. The birds were raised on deep litter with wood shavings as bedding. The respective groups of birds were fed the starter diets (Table 1) for 4 weeks. The birds were furnished with feed and water *ad libitum*. A

known quantity of feed was weighed and given each day, while leftover feed was removed and weighed. The birds were weighed at the commencement of the trial to determine the initial weight and at weekly durations thereafter. Records of feed consumption and mortality were preserved.

### **Broiler finisher segment (5-9 weeks)**

At the end of the starter phase, the same birds were administered the respective finisher diets appropriate to them as when they were on starter diets. The finisher diets were formulated to contain 0, 5, 10 and 15% FFPKM with Fullzyme® supplementation. (Table 1). The finisher diets were fed for 4 weeks. At the finisher phase, the total number of birds were 96, with 8 birds per replicate and 24 birds per treatment group. The birds were provided with feed and water *ad libitum*. Quantity of feed was weighed and given every day, at the same time, leftover feed was collected and weighed also in order to determine feed intake. The birds were weighed at weekly intervals. Record of feed consumption and mortality were kept, even as feed conversion, average daily gain and feed cost in line with kg gain were calculated for the period of the experiment.

### **Data Analysis**

Data collected from this experiment were subjected to analysis of variance (ANOVA-Single factor) using “Analyze –it” for Microsoft Excel (3.03) Standard Edition. Significant means were compared using the Duncan Multiple Range Test (Duncan, 1995) at 5% probability level.

The ingredient composition of the broiler starter and finisher diets are shown in Table 1.

Table 1. Ingredient composition (%) of broiler starter and finisher diets containing Full Fat Palm Kernel Meal based diets supplemented with Fullzyme® (1-9weeks)

Ingredients (%)	Starter Test Diets				Finisher Test Diets			
	T <sub>1</sub> (0%)	T <sub>2</sub> (5%)	T <sub>3</sub> (10%)	T <sub>4</sub> (15%)	T <sub>1</sub> (0%)	T <sub>2</sub> (5%)	T <sub>3</sub> (10%)	T <sub>4</sub> (15%)
Maize	57.40	52.40	47.40	42.40	63.90	58.35	53.35	48.70
FFPKM	0.00	5.00	10.00	15.00	0.00	5.00	10.00	15.00
Soya Beans Cake	35.00	35.00	35.00	35.00	29.35	29.35	29.35	29.35
Fish Meal	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Bone Meal	1.00	1.00	1.00	1.00	1.20	1.20	1.20	1.20
Limestone	2.00	2.00	2.00	2.00	1.50	1.50	1.50	1.50
Methionine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
*Vitamin/Mineral Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
Fullzyme	0	0.10	0.10	0.10	0	0.10	0.10	0.10
<u>Calculated Analysis</u>								
Crude Protein (%)	22.46	22.55	22.86	23.01	20.54	20.47	20.47	20.48
ME Kcal/kg	2894.31	301.80	3315.80	3464.30	2947.39	3097.41	3256.60	3426.60
Ether Extract (%)	3.84	3.91	4.11	4.21	3.86	3.95	4.06	4.18
Crude Fibre (%)	4.69	6.99	11.65	13.98	4.56	6.86	9.19	11.52
Calcium (%)	1.30	1.31	1.33	1.34	1.19	1.20	1.20	1.21
Available Phosphorus (%)	0.64	0.63	0.62	0.61	0.65	0.64	0.63	0.63
Lysine (%)	1.34	0.36	1.40	1.42	1.20	1.20	1.21	1.21
Methionine + Cyst (%)	0.79	0.80	0.81	0.81	0.74	0.74	0.74	0.74
Cost/kg (₦)	102.76	100.80	97.80	96.30	98.87	96.85	95.10	93.48

\*Vitamin/Mineral Premix (Agridom Premix) supplied per kg of feed. Vit. A 30,000,000 i.u., Vit.D 60,000,000 i.u., Vit. E 30,000 i.u., Vit. B<sub>12</sub> 3,000.00mg, Vit. C 30.00g, Niacin 40,000.00mg, Pantothenic acid 12,000.00mg, Vit. B<sub>6</sub> 1,500mg, Vit. B<sub>12</sub> 10,000.00mg, Folic acid 1,000.00mg, Biotin 400.00mg, Chloride 3,000,000.00mg, Cobalt 200.00mg, Copper 200.00mg, Iodine 20,000.00mg, Iron 40,000.00mg, Manganese 100,000.00mg, selenium 150.00mg, Zinc 30,000.00mg and antioxidant 1,250.00mg

## RESULTS AND DISCUSSION

The performance of broiler chicks fed full fat palm kernel meal based diets with Fullzyme<sup>®</sup> supplementation at starter and finisher phases is shown in Table 2.

Table 2. Performance of Broiler birds fed Full Fat Palm Kernel Meal based diets supplemented with Fullzyme<sup>®</sup> from starter to finishing (1-9 weeks)

Parameter	Diets				SEM
	0%	5%	10%	15%	
Average initial weight (g/bird)	93.33	93.47	92.67	93.23	0.18
Average final weight (g/bird)	1670.37 <sup>b</sup>	1834.48 <sup>a</sup>	1714.81 <sup>b</sup>	1424.13 <sup>c</sup>	86.21
Weight gain (g/bird)	1577.04 <sup>b</sup>	1741.01 <sup>a</sup>	1622.14 <sup>b</sup>	1330.9 <sup>c</sup>	86.20
Average daily gain (g/bird)	28.16 <sup>b</sup>	31.09 <sup>a</sup>	28.97 <sup>b</sup>	23.77 <sup>c</sup>	1.54
Total feed intake (g/bird)	4545.13 <sup>b</sup>	4906.59 <sup>a</sup>	4683.81 <sup>b</sup>	4024.62 <sup>c</sup>	187.24
Daily feed intake (g/bird)	81.16 <sup>b</sup>	87.62 <sup>a</sup>	83.64 <sup>b</sup>	71.87 <sup>c</sup>	3.34
Feed to gain ratio	2.88 <sup>b</sup>	2.82 <sup>a</sup>	2.89 <sup>b</sup>	3.02 <sup>c</sup>	0.04
Feed Cost (₦)/Kg gain	284.95 <sup>b</sup>	272.95 <sup>a</sup>	274.57 <sup>a</sup>	276.19 <sup>a</sup>	2.95
Mortality (%)	9.99 <sup>b</sup>	3.33 <sup>a</sup>	9.99 <sup>b</sup>	3.33 <sup>a</sup>	1.92

<sup>abc</sup>Means along same row with different superscripts are significantly ( $P < 0.05$ ) different. SEM= Standard Error of Mean. D= diets, g=gram, Kg = kilogram

The values of Metabolisable energy and percent crude protein and crude fibre throughout the Starter and finisher diets fed to the birds showed a trend. The inclusion of FFPKM as replacement for maize in both the starter and finisher experimental diets at increasing levels of 0, 5, 10 and 15% resulted in the corresponding increase in the percentage values of ether extract and crude fibre in addition to the metabolizable energy of the diets. This may be attributed to the inclusion of the un-extracted oil in the full fat palm kernel meal. This agrees with the findings of Sese *et al.* (2014) and Enyenihni *et al.* (2018), who reported improved levels of metabolizable energy, ether extract and crude fibre when FFPKM and full fat palm fruit meal (FFPFM) supplemented with or without enzyme were included at graded tiers of 5, 7 and 9% and 0, 10, 20, 30 and 40% as replacement for maize in the experimental diets fed to broiler chicks at starter phase.

The final and daily weight gains (g/bird) of birds on 5% FFPKM was higher ( $P < 0.05$ ) with reference to those on control (0%), 10 and 15% FFPKM diets. This could be as a result of the high feed consumption and better feed conversion as observed with birds on 5% FFPKM diet compared to those for birds on the 0, 10 and 15% FFPKM diets. This result is in agreement with the findings of Sese *et al.* (2014), who affirmed that broiler birds can be reared on rations containing up to 10% FFPKM as replacement for maize without negative effect on growth performance of birds.

The final and daily weight gains of birds on control (0%) and 10% FFPKM diets were similar ( $P > 0.05$ ) however appreciably ( $P < 0.05$ ) higher than the ones on 15% FFPKM diet. The least daily gains observed with birds on 15% FFPKM diet could be due to its high

crude fibre percent and poor conversion to meat. This is expected because the higher the crude fibre level of the diet, the lesser its digestibility (Ndams *et al.*, 2015).

The same trend was found in terms of daily feed intake (g/bird) and feed conversion of FFPKM diets fed to the birds. The daily feed consumption and feed conversion of birds on 5% FFPKM were significantly higher ( $P < 0.05$ ) with respect to those on the control (0%), 10 and 15% FFPKM diets.

The daily feed intake and feed conversion of birds on the control and 10% FFPKM diets were similar ( $P > 0.05$ ) however, higher than those on 15% FFPKM diet. But that is contrary to the report of Enyenihni *et al.* (2018), who reported least ( $P < 0.05$ ) daily feed intake with broiler chickens on the control (0%) diet compared to those fed on 10, 20, 30, 40 and 50% FFPKM diets supplemented with or without enzyme. The result of feed conversion observed in this study is in conflict with the findings of Lesson *et al.* (1996) and Nahashon *et al.* (2005) who reported significant improvement in feed conversion with increased dietary energy levels for finishing broiler birds.

The feed cost per kg gain of birds on 5, 10 and 15% FFPKM diets were similar ( $P > 0.05$ ) however ( $P < 0.05$ ) higher than that of birds on control diet. This shows that with the high cost of maize, it was cheaper to produce a kilogram of broiler from birds on 5, 10 and 15% FFPKM diets with reference to those on the control diet.

The percentage mortality of birds on 5 and 15% FFPKM diets were similar ( $P > 0.05$ ) however substantially better ( $P < 0.05$ ) to those on the control

(0%) and 15 % FFPKM diets which were similar ( $P>0.05$ ). The mortality of birds on the control, 5, and 10 and 15% FFPKM diets was as a result of inadequate heat supply within the first week of the experiment and not as a result of FFPKM inclusion in the diets.

## CONCLUSION

The results of this study showed that:

- i. The feeding of FFPKM with Fullzyme® supplementation up to 15% level to broiler chickens had no adverse effect on the performance and resulted in better economic benefit than the control.
- ii. The diet which contained 5% FFPKM with Fullzyme® supplementation provided the best formulation required for growth performance and cost effectiveness of broiler birds.

## RECOMMENDATION

The present study suggest that 5% FFPKM diet supplemented with Fullzyme® as replacement for maize can be fed to broiler chickens for growth performance without adverse effect. However, higher levels of enzyme (Fullzyme®) supplementation may be employed at higher FFPKM inclusion.

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