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Growth Performance and Carcass Characteristics of Finisher Broilers Fed Rice Offal Based Diets Supplemented with Exogenous Enzyme

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ABSTRACT

Performance and Carcass characteristics of finisher broilers fed rice offal supplemented with Natuzyme® Enzyme as a replacement for maize was investigated. A total of Seventy-two (72) 4-weeks old broilers were randomly assigned to four (4) dietary treatments with three replicates, each consisting of six (6) birds in a completely randomized design. The dietary treatments were formulated such that diets 1 (Control), 2, 3 and 4 contained 0%, 20%, 30% and 40% enzyme supplemented rice offal as a replacement for dietary maize respectively. The research lasted 28 days. Body weight gain of birds fed 20% and 30% rice offal diets were not significantly different (P>0.05) from those fed the control diet, resulting in a decreasing feed conversion ratio. Birds fed diet containing 40% rice offal consumed significantly (P<0.05) more feed than those fed other diets. Also, carcass characteristics were significantly (P<0.05) different among the treatment groups except wings and liver weight. It was concluded that rice offal contained - diets supplemented with Natuzyme® can be used as an alternative source of energy in the finisher diets for broiler chickens and can replace dietary maize at the levels of 20-30% without adverse effects on growth performance and carcass characteristics.

INTRODUCTION

The rising cost of poultry feeds have continued to be a major problem in developing countries as feed cost accounts for about 65 to 70% (Nworgu *et al*., 1999) and 70 to 75% (Ogundipe and Sanni, 2002) of the total cost of poultry production compared to about 50 to 60% in developed countries (Tackie and Flenscher, 1995). Similarly, there has been a steady increase in the cost of conventional feed ingredients such as maize, groundnut cake, fishmeal etc in the past years as this has led to increase in the prices of animal protein sources (Adejinmi *et al*., 2007). Several researchers have emphasized the need for utilizing alternative feed ingredients removed from human and industrial uses (Duruma *et al*., 1999; Attia *et al*., 2001; Attia *et al*., 2003a; Fanimo *et al*., 2007; Nsa *et al*., 2007).

Rice milling waste (Rice offal) is an agro industrial by-product that could contribute to poultry feeding. It is available in large quantities all year round in many towns in the rice growing areas of Nigeria. The offal makes up about 40% of the per-boiled rice and contains husk, bran polishing and small quantity of broken grains. The use of rice offal to replace cereal in poultry diet has been studied (Obeka, 1985; Attia *et al*., 2001; Attia *et al*., 2003a; El-Ghamry *et al*., 2005). High levels of inclusion of high fibre non conventional feed stuff in poultry diets yielded negative responses because of increased fibre levels which reduce nutrients utilization and precipitate metabolic dysfunction which result in growth depression when ingested by non-ruminants (Makinde *et al*., 2013). In order to balance utilization of these high fibre non-conventional feed stuffs, nutritionists have reported the use of exogenous enzymes for poultry. Acamovic (2001) reported that enzymes increase the digestibility of feed ingredients and reduce the incidence of wet droppings which may result from the presence of fibrous polysaccharides in diets. Similarly, Allen *et al*. (1997) and Attia *et al.* (2003b) observed that enzyme addition to monogastric animal feed reduced viscosity of ingesta in the intestine and showed a marked improvement on the various morphological effects of feeding fibrous materials to non-ruminant animals. Strategies for ensuring adequate nutrition of animals must be based on optimizing overall agricultural and livestock productivity from available resources, improving existing technologies and integrating technology that employs multipurpose crops and animals, and recycling of crop residues and by – products as feeding stuffs for animals (Njwe, 1990).

Natuzyme® enzyme is a multi-enzyme compound of β-glucanase, xylanase, phytase, lipase, cellulose, α-amylase, protease, pectinase and a mixture of other enzymes produced by the Bio-Proton Ltd in Australia. The objective of this study is therefore; to evaluate the Performance and Carcass characteristics of finisher broilers fed rice offal supplemented with Natuzyme® Enzyme as a replacement for dietary maize.

MATERIALS AND METHODS

Experimental site

This project was carried out at the student project site at Poultry Research Unit of Federal College of Agriculture, Ishiagu, Ebonyi State in 2013.

Sources of Experimental Materials

The rice offal was gotten from rice mills around Ishiagu, Ebonyi State while the Natuzyme® was procured from Natuzyme® products Company based in Enugu State. Other feed ingredients such as Maize, Fishmeal etc were bought from Enugu and Eke market in Ishiagu, Ebonyi State.

Experimental Birds and Design

A total of Seventy- two (72) four (4) weeks old Anak (unsexed) broiler chickens were used for this trial. The birds were randomly assigned to the four experimental diets representing treatments 1, 2, 3 and 4 in a completely randomized design (CRD). The diets were formulated based on NRC (1994) and meet nutrient requirements for broiler chickens. Each treatment was replicated three (3) times with 6birds per replicate. The birds were managed intensively (deep litter system). Feed and water were supplied *ad-libitum*.

Experimental Diets

Four diets were formulated such that diets 1(Control, without rice offal and enzyme supplementation), 2, 3 and 4 contained 0%, 20%, 30% and 40% Natuzyme® supplemented rice offal as a replacement for dietary maize. The Percentage composition of experimental diets is shown on Table 1.

Table 1: The percentage composition of experimental diets (5-8 weeks)

	Levels of replacement of Maize with Rice offal			
Ingredients (%)	**0%**	**20%**	**30%**	**40%**
Maize	60.40	48.32	42.28	36.24
Rice Offal	0	12.08	18.12	24.16
Soybean meal	18.00	18.00	18.00	18.00
Fish Meal	2.00	2.00	2.00	2.00
G.N.C	10.00	10.00	10.00	10.00
Maize Offal	5.00	4.75	4.75	4.75
Natuzyme®	-	0.25	0.25	0.25
Bone Meal	4.00	4.00	4.00	4.00
Common salt	0.20	0.20	0.20	0.20
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
*Vit. Premix	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**
Calculated Nutrients (%)				
Crude protein	19.96	20.4	20.4	20.6
ME (kcal/kg)	3006.3	2867.7	2767.7	2698.3
Crude fibre	3.90	3.93	3.98	4.06
Methionine	0.46	0.46	0.47	0.47
Total sulphur amino acids	0.87	0.84	0.84	0.92
Lysine	1.15	1.14	1.14	1.17
Calcium	1.25	1.25	1.25	1.25
Available P.	0.65	0.65	0.67	0.69

*Biomix premix provided the following per kg of diet: Vit. A, 10,000 i.u; Vit.D_3, 2000 i.u; Vit. E 23mg; Vit. K, 2 mg; Vit. B_1 (Thiamine), 1.8mg; Vit B_2 (Riboflavin), 5.5mg; Vit. B_6 (Pyridoxine), 3 mg; Vit. B_{12} 0.015mg; Pantothenic acid 7.5mg; Folic acid 0.75mg; Niacin 27.5mg; Biotin 0.6mg; Choline chloride 300 mg; Cobalt 0.2mg; Copper 3mg; Iodine 1mg; Iron 20mg; Manganese 40mg; Selenium 0.2mg; Zinc 30mg; Antioxidant 1.25mg; ME= Metabolisable Energy.

Table 2: Proximate composition of rice offal (%) based on AOAC (2004)

Nutrient (%)	Composition
Dry matter	89.25
Crude protein	15.71
Crude fiber	12.41
Ash	10.10
Nitrogen free extract	46.89
Ether extract	14.89

Data Collection

During the period of research, data were collected on the following parameters; average initial weight, average final weight, average weight gain, average feed intake, feed conversion ratio and mortality using the replicate as the experimental unit.

Carcass Evaluation

At the end of the trial, two (2) birds per replicate were selected and slaughtered for carcass analysis. The birds were fasted overnight, after which they were bled by severing the jugular vein. They were scalded in a hot water, defeathered, and then eviscerated. All the cut parts including the organs were separated and weighed accordingly.

Statistical Analysis

Data collected were statistically analyzed using the procedure described by Steel and Torrie (1980) and significant means were separated using the Duncan Multiple Range Test (Duncan, 1995) taking $P<0.05$ as significance level.

RESULTS AND DISCUSSION

The proximate composition of the rice bran used in this study is presented in Table 2. All the values obtained for

dry matter, crude protein, crude fibre, ash, ether extract and nitrogen free extract fall within the range reported by Aduku (1993); Attia *et al*., (2001); Attia *et al.,* (2003a); El-Ghamry *et al*., (2005).

Growth performance

The result of the Growth performance of finisher broilers fed rice offal supplemented with Natuzyme® is presented in Table 3. The results showed that all parameters measured were significantly (P<0.05) different except the feed conversion ratio. The weight gain of birds fed the control diet was significantly (P>0.05) similar to those birds fed 20% and 30% rice offal replacement levels. The lower body weight gain recorded among birds fed diet containing 40% rice offal may be attributed to the high fibre content of the diet (Farrel, 1994; Attia *et al*., 2003a) which probably reached a critical level at this replacement level. Similar decline in performance had been reported by Madrigal *et al*. (1995). Also, Makinde *et al*. (2013) had earlier reported that poorer body weight gain observed among birds fed high fibre diets could be as a result of the high fibre content of the diets. Addition of Natuzyme® enzyme generally improved the utilization of the diets. This was obvious in the performance of birds fed diets containing 20% and 30% rice offal which recorded higher body weight gain and lower FCR. Attia *et al*., (2003a); El-Ghamry *et al*., (2005); Oladunjoye and Ojebiyi (2010) reported that broiler chickens can tolerate up to 20% rice bran in their diet at finishing phase when the diet is supplemented with Roxazyme G2G. Adeniji (2010) reported that pullet chicks have a good FCR and the best protein and fat retention when fed 15% dietary rice hull meal.

Feed conversion ratio was not significantly (P>0.05) different across the treatment groups. The observation that birds fed increasing levels of rice offal consumed more feed may be because of the attempt by the birds to obtain enough energy from the diet (Smith, 2001). Hence rice offal is lower in metabolizable energy than maize, and as it replaced maize in the diet, the energy level of the diet decreased. Birds usually eat to satisfy their energy requirements; the birds on the higher levels of dietary offal would consume more feed in an attempt to satisfy their energy requirements (Attia *et al*., 2003a; Makinde *et al*., 2013). The inability of the diet with 40% rice offal to bring about neither highest nor optimal weight gain comparable with the other lower levels of rice offal (0-30%) may also be due to the inability of the birds on the 40% offal to obtain enough energy from the feed they consumed. Even though the birds increased feed intake as the offal level increased, there is a limit to the stomach capacity and to what the stomach can therefore hold. The results show that it is economically advantageous to feed up to 30% rice offal diet supplemented with enzyme to finisher broilers.The present results are similar to those reported by Attia *et al*. (2003a); Attia *et al*. (2003b); El-Ghamry *et al*. (2005).

Table 3: Growth performance of finisher broilers fed rice offal supplemented with Natuzyme®

	Levels of replacement of Maize with Rice offal				
Parameters	**0%**	**20%**	**30%**	**40%**	**SEM**
Av. Initial weight (g/b)	901.21	900.90	901.00	900.50	0.08
Av. Final weight (g/b)	2705.21^{a}	2521.56^{ab}	2610.92^{a}	2333.09^{c}	54.54
Av. weight gain (g/b)	1804.00^{a}	1620.66^{ab}	1709.42^{a}	1432.59^{c}	53.50
Av. Daily weight gain (g/b/d)	64.43^{a}	57.88^{ab}	61.05^{a}	51.16^{c}	2.06
Total feed intake (g/b)	4738.5^{b}	4755.1 ^{b}	4967.6^{a}	4999.9 ^{a}	45.1
Av. Daily feed intake (g/b/d)	169.23 ^{b}	169.83^{b}	177.41^{a}	178.57 ^{a}	1.61
FCR	2.63	2.93	2.91	3.49	0.50

a,b,c means on the same row with different superscripts are significantly (P<0.05) different. SEM=Standard Error of Mean

Carcass Characteristics

The result of the carcass characteristics of finisher broilers fed rice offal diets supplemented with Natuzyme® is presented in Table 4. There were significant (P<0.05) differences in the parameters measured except wings and liver weight. The live weight of birds fed diet containing 30% rice offal was significantly (P<0.05) higher than those fed other diets and this could be attributed to the addition of enzyme to the diets which helps to break down the fibre content of rice offal. Whereas, the lowest live weight recorded by chickens fed 40% rice offal diet, showing poor feed utilization (Attia, 2003; Attia *et al*., 2003a; Uchegbu *et al*., 2004) because of high dietary fiber. Dressing percentage was significantly higher (P<0.05) in the 0 and 20% rice offal groups compared with 30 and 40% rice offal diets. There were no considerable differences in the weight of the wings and liver (P>0.05).This observation contradicts the report of Oloyo (1991) who reported higher liver weights when broilers were fed unsupplemented guinea corn/palm kernel meal based ration. Nevertheless, thigh weight tended to increase with an increasing level of dietary rice offal and was significantly greater (P<0.05) in

the 40% rice offal fed birds compared with those fed other diets.

Table 4: Carcass characteristics of finisher broilers fed rice offal supplemented Enzyme (Natuzyme®)

	Levels of replacement of Maize with Rice offal				
Parameters	**0%**	**20%**	**30%**	**40%**	**SEM**
Live weight (%)	2533.33^{b}	2406.10^{b}	2711.05^{a}	2166.71^{c}	63.37
Dressing Percentage (%)	96.00^{a}	95.65^{a}	92.30^{b}	90.51^{c}	0.69
Thigh (%)	12.00^{c}	13.04^{b}	13.46^{b}	14.31^{a}	0.26
Drumstick (%)	11.30^{b}	13.04^{a}	11.53^{b}	11.90^{b}	0.20
Wings (%)	3.20	3.50	4.61	4.80	0.21
Breast (%)	24.00^{ab}	26.08^{a}	26.92^{a}	21.90^{c}	1.12
Back (%)	16.00^{b}	17.41^{a}	15.38^{b}	11.50^{c}	1.95
Liver (%)	1.60	1.73	1.53	1.90	0.05

a, b, c means in the same row with different superscripts are significantly different (P<0.05). SEM=Standard error of Mean

CONCLUSION

The present findings suggest that diets contained rice offal up to 30% and supplemented with multienzymes can be used as an alternative source of energy for finisher broilers and can replace dietary maize up to 30% without negative effects on the growth performance and carcass characteristics.

REFERENCES

Acamovic, T, (2001). Commercial application of enzyme technology for poultry production. *World's Poult. Sci. J*. 57: 225–243.

Adejinmi, OO, Hamazar, RA and Fapohunda, JB, (2007). Performance and nutrient digestibility of Rabbits. *Nigerian Journal for Animal Production*. 34(1): 63-68.

Adeniji, AA, (2010). Effects of dietary grit inclusion on the utilization of rice husk by pullet chicks. *Tropical Subtropical Agroecosyst*., 12: 175-180.

Aduku, AO, (1993). Tropical Feedstuff- Analysis Table. Department of Animal Science, Faculty of Agriculture. Ahmadu Bello University, Samaru, Zaria, Nigeria. Pp 1-2.

Allen, VM, Fernandez, F. and Hinton, M.H. (1997). Evaluation of the influence of supplementing diet with mannose or palm kernel meal on salmonella colonization in poultry. *British Poultry Science*. 38:485-488.

Association of Official Analytical Chemists (AOAC, 2004). Official Method of Analysis, 17th Edn. Washington D.C., USA.

Attia, YA, Qota EMA, Aggoor FAM and Kies AK, (2003a). Value of rice bran, its maximal utilization and upgrading by phytase and other enzymes and diet- formulation based on available amino acid for broiler chicks. *Archiv Für Geflügelkunde* 67 (4):157-166.

Attia, YA, MA Al-Harthi and AA El-Deek, (2003b). Nutritive value of undehulled sunflower meal as affected by multienzymes supplementation to broiler diets. *Archiv Für Geflügelkunde* 67 (3):97-106.

Attia,YA, Abd El-Rahman SA and Kies AK, (2001). Utilization of vegetable diets containing different levels of rice bran with or without commercial enzymes in Norfa laying hen diets. *Mansoura Univ. J. Agric. Sci., 26:3557-3577.*

Attia, YA, (2003). Performance, carcass characteristics, meat quality and plasma constituents of meat type drakes fed diets containing different levels of lysine with or without a microbial phytase". Archiv of Animal Nutrition 66: 39-48.

Duncan, DB, (1995). New Multiple Range and Multiple Test. *Biometrics* 11: 1-42.

Duruma, CS, Udedibie, ABA and Anyanwu, GA, (1999). Combination of Maize/sorghum dried brewers' grain, cocoyam cob and cassava tuber meal as substitute for maize in the diets of laying hens. *Journal of Agriculture, Biotechnology and Environment*, 2:1-7.

El-Ghamry, AA, MA Al-Harthi and YA Attia, (2005). Possibility to improve rice polishing utilisation in broiler diets by enzymes or dietary formulation based on digestible amino acids. *Archiv Für Geflügelkunde* 69:49-56.

Fanimo, AO, Adebayo, AJ, Oduguwa, OO and Biobaku, WO, (2007). Feeding value of cashew testa for broiler chickens. *Nigerian Journal of Animal production*, 34(1): 83–93.

Farrel, DJ, (1994). Utilization of rice bran in diets of domestic fowl and ducklings. *World's Poultry Science Journal* 50: 115 – 131.

Madrigal, SA, Watkins, SE, Adams, MH and Waldroup, PW, (1995). Defatted rice bran to restrict growth rate in broiler chicken. *J. Appl. Poultry Res*., 4:170-181.

Makinde, OJ, Sekoni, AA, Babajide, S, Samuel, I and Ibe, E, (2013). Comparative response of japanese quails *(Coturnix coturnix japonica)* fed palm kernel meal and brewer's dried grain based diets. *Inter J Agri. Biosci,* 2(5): 217-220. *www.ijagbio.com*

Njwe, RM, (1990). Strategies for matching feed resources to small ruminants needs: A review paper,

Dept. of Animal Science Dschange – University Centre. B. P 222 Dschang Cameroon.

NRC (1994). National Research Council. Nutrient requirements of poultry 9th Rev. Edn. National Academy press, Washington, D. C.

Nsa, EE, Okereke, CO and Okon, B, (2007). Effects of supplementary green feed stuffs on growth performance internal organs development and abdominal fat deposition in finisher broiler chickens. Proceedings of the 32rd Annual conference of Nigerian society for Animal production (NSAP), 18th – 21st March, 2007.

Nworgu, FC, Adebowale, EA, Oredein, OA and Oni, A, (1999). Prospects and economics of broiler chicken production using two plant protein sources. *Tropical Journal of Animal Science*, 2(1):159- 166.

Obeka, EA, (1985). Nutritive Evaluation of Rice offal in the diets of growing pullet and Layers. M. Sc. Thesis, Department of Animal Science, Ahmadu Bello University, Zaria

Ogundipe, SO and Sanni, SA, (2002). Economic of Poultry production in Nigeria. A training workshop manual. National Animal Production Research Institute, ABU, Zaria. Pp: 27-45.

Oladunjoye, IO and Ojebiyi, OO, (2010). Performance Characteristics of Broiler Chicken (*Gallus gallus*) Fed Rice (*Oriza sativa*) Bran with or Without Roxazyme G2G. *International Journal of Animal and Veterinary Advances.* 2(4): 135-140, 2010.

Oloyo, RA, (1991). Responses of broilers fed guinea corn /palm-kernel meal based ration to supplemental biotin. *J. Sci. Food and Agri.*, 55: 539- 550.

Smith, AJ, (2001). Poultry in context In: Poultry CTA Tropical Agriculturist Series. Macmilan, London. Chapter, Pp: 1-9.

Steel, RGD and Torrie. JH, (1980). Principles and Procedures of Statistics. A biochemical approach 2nd edition MCG raw Hill New York.

Tackie, AM and Flenscher, JE, (1995). Nutrient value of wild sorghum fortified with *Leucana leucocepphala* (Wh.ham). Bulletin of Animal for Africa, 47: 223 – 375.

Uchegbu, MC, Okoli, CE, Anyanwu, EB, Etuk, BO, Esonu G and Udedibie, AIB, (2004). Performance, carcass and organ characteristics of finisher broilers fed graded levels of raw *Napoleona imperalis* seed meal. *Livestock Res. Dev.*, 16(6).

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