PERFORMANCE OF GROWING COTURNIX QUAILS (*COTURNIX COTURNIX JAPONICA*) FED ENZYME SUPPLEMENTED RICE OFFAL DIETS.

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Abstract

A feeding trial of 6 weeks was conducted to determine the effect of including rice offal supplemented with natuzyme on the performance of growing Japanese quails. One hundred and eighty 2 –week old quails of mixed sexes were randomly allocated to four diets in a completely randomized design. The quail chicks were allocated one of four diets containing either 0 (Control), 5, 10, and 15% of rice offal. The diets were isonitrogenous (25% CP) but decreased in energy levels from 2,779.32 (Diet A), 2,747.73 (Diet B), 2,715.54 (Diet C) to 2,683.54kcal/kg ME (Diet D). Each diet was replicated thrice with feed and water given *ad libitum*. Feed intake was significantly lower ($p<0.05$) on diet A (20.64g/bird) than on diets C (23.48) and D (24.08g/bird/day). Feed conversion ratio was significantly better ($p<0.05$) on diet A (5.87) than on diets B (7.70), C (8.36) and D (7.95) respectively. Feed cost/kg gain was significantly ($p<0.05$) better on diet A (N532.65) than on diets B (N666.75) and C (N688.92) only. Water intake (34.24, 34.93, 34.77 and 37.71ml/bird/day) and weight gain (3.53, 2.93, 2.83 and 3.05g/bird/day) did not differ significantly ($p>0.05$) across the diets. The diet with 5% rice offal was similar in feed intake and weight gain to the control and is recommended.

Key words: Rice offal, natuzyme, water intake, weight gain, Japanese quails.

Introduction

Erratic changes in price of feed materials constantly force feed manufacturers to change formula used to produce feed in order to maintain reasonable gross margin. Rice is a major staple food in most developing countries. According to FAO (2017), preliminary forecast of global paddy production in 2017 is set at 758.9 million tonnes. The husk (the outer rough covering) produced from this rice is either burnt off or heaped as wastes but more recently is being used sparingly in poultry diets due to the high fibre content. These agro industrial by products ((rice offal, maize offal, wheat offal, brewer's dried grain) have elicited some levels of improvement when fed to broiler chickens at lower levels (Makinde *et al*., 2014). Rice milling waste has been reported to reduce production cost, produce lean meat and supply nutrients like vitamins and minerals and other unidentified factors which improve growth (Ojewola and Ewa, 2005). However, as high as 80% inclusion of these by products may result in low calcification, decreased feed intake, poor digestibility and even mortality (Aruna and Singh, 1999). Therefore, it is necessary to incorporate exogenous enzymes in monogastric animal diets to enhance the breakdown of non-starch polysaccharides (NSP) in rice offal. Allen *et al*. (1997) reported that inclusion of enzyme in monogastric animal diets reduces viscosity of the intestinal ingesta and shows a marked improvement on the various morphological effects of feeding fibrous materials. The objective of this study is to determine the effect of replacing maize with rice offal supplemented with natuzyme on the performance of growing Japanese quails owing to the paucity of information regarding the use of this feed resource in quail nutrition.

Materials and Methods

Birds, housing and management: 180 two-week old Japanese quail birds of mixed sexes obtained from the National Veterinary Research Institute poultry farm were used in this study. They were uniform in size and housed in deep litter house partitioned into several pens with wire mesh to allow for adequate ventilation. The birds occupied 12 pens with 15 birds per pen. The birds were offered one of four diets

containing either 0 (control), 5, 10 or 15% of rice offal at forty five birds per diets in a completely randomized design. The experimental diets were designated A, B, C and D respectively. All birds from each unit were weighed at the beginning and weighed weekly for six weeks. Feed and water were given *ad libitum*.

Rice offal: Rice offal was purchased from feed material shops or sales points in Bukuru, Jos South LGA of Plateau State. They were obtained dry and incorporated into the diets free from mould and weevils.

Experimental diets: Four isonitrogenous (25%CP) diets containing graded levels (0, (control), 5, 10, and 15%) of rice offal (Table 1) were used in this study. The diets containing rice offal were treated with Natuzyme ™ at the rate of 100grams per 100 kilogram of the diet and were mixed homogenously to achieve a complete blend. Natuzyme contains phytase, β-glucanase, α-amylase, cellulase, pectinase, amyloglycosidase, xylanase and protease. The diets were designated A, B, C and D and contained metabolizable energy (ME) levels; 2,779.32, 2,747.73, 2,715.54 and 2,683.54kcal/kg ME respectively.

Table 1. Composition of experimental diets (%)

	Diets			
Ingredients	A	B	C	D
Maize	39.81	34.40	28.98	23.55
Rice offal	0.00	5.00	10.00	15.00
Ground nut cake	41.99	42.40	42.82	43.25
Natuzyme	-	+	+	+
**Others				
Calculated composition%				
CP	24.99	25.00	25.00	25.00
ME (Kcal/kg)	2779.32	2747.73	2715.54	2683.50
Ca	1.38	1.38	1.39	1.40
P	0.44	0.45	0.49	0.50
CF	4.58	5.12	5.65	6.19
Feedcost/kg(₦)	90.74	86.60	82.44	78.29

****Others:** palm kernel cake (13.50%), fish meal (0.50%), bone meal (2.00%), lime stone (1.50%), *premix (0.25%), salt (0.25%), methionine (0.10%), lysine (0.10%).

*** Bio Mix Layer premix supplied the following per 100kg of diet: Vitamin A, 850,000 I.U; Vitamin D3, 150,000 I.U; Vitamin E, 1,000 I.U; Vitamin K, 1000 mg; Thiamin (B1), 150 mg; Riboflavin (B2), 450mg; Pyridoxine (B6), 300mg; Niacin, 1500mg; Vitamin B12, 1.5mg;Pantothenic acid, 450mg; Folic acid, 60mg; Biotin, 50mg; Choline chloride, 17,500mg; Anti-oxidant, 125mg; Manganese, 4000mg;, Zinc, 3000mg; Iron, 2000mg; Copper, 300mg; Iodine, 100mg; Selenium, 20mg; Cobalt, 20mg. Key: C.P, crude protein; M.E, metabolizable energy; Ca, calcium; P, phosphorus; C.F, crude fibre**

Data Collection and analysis: The mean weekly body weights, water intake and feed intake were recorded throughout the experimental period. From the mean body weight and feed intake, feed conversion ratio was calculated. Feed cost/kg gain and feed cost/kg diet were calculated from prevailing local market price of feed materials. Data collection was subjected to analysis of variance; ANOVA (Steel and Torrie, 1980) and where significant differences occurred, means were separated by Duncan's new multiple range test (Obi, 1990). The analysis was carried out using Minitab version 14 (Minitab, 1991).

Results and Discussion

Data on feed intake, weight gain and feed conversion ratio are presented in Table 2. Feed intake increased significantly as the level of rice offal increased in the diet. It was higher on diets C and D than on diet A. This is contrary to the similarity in feed intake reported by Fafiolu *et al*. (2010) for meat-type chicken fed rice offal based diets. However, the significant effect of rice offal diet on feed intake of grower turkeys has been reported by Makinde *et al*. (2015). They reported significant decrease in feed intake with increasing rice offal content in the diet. The significant increase in feed intake noted in this work may be as a result of

solubilizing of cell wall of high fibre rice offal (IFRU, 2003) and also because birds eat to satisfy energy requirement more so the energy level of the diet was decreasing with increased content of rice offal. Feed conversion ratio was significantly better for birds on the control than for those on the rice offal diets. Result similar to this has been reported by Makinde *et al*. (2015). The poorer ability of birds on the rice offal diets to convert the diets to flesh compared to the control maybe due to incomplete break down of non-starch polysaccharides (NSP) in the fibre contained in rice offal.by exogenous enzymes. Timbrell (1992) had observed that there could be instances where enzyme additions or supplementation add little value to particular ingredients or fail to result in improved performance. Feed cost/gain was significantly better on the control than on the rice offal diets following a similar trend to feed conversion ratio and feed intake and it's due to the higher level of intake per unit of gain which understandably translates to higher cost as compared to the control. However, Makinde *et al*. (2015) reported similarity in feed cost/gain between birds on the control and those on the rice offal diet which is different from the result of this study. This difference may be due to different species of birds used. Body weight gain was similar across the diets. The exogenous enzyme might have enhanced a less viscous digesta leading to improved digestion resulting in the similarity in weight gain. Weight gain and water intake did not differ significantly across the diet from the control. This is contrary to increasing weight gain and water intake reported by Abeke *et al*. (2011) with increasing content of ground rice offal. Increased bulk in the feed has been reported to support higher water consumption. However, quails have been reported to adjust feed intake across a wide range of energy levels Weber and Reid (1967) probably due to intrinsic habit developed in the wild. This adjustment may also include water intake. However, values of water intake reported here are close to values reported by Edache *et al*. (2018).

Table 2. Effects of different rice offal levels on parameters measured

Parameters	A	B	C	D	SEM
Feed intake (g/b/d)	20.64^{a}	22.45^{ab}	23.48^{b}	24.08^{b}	1.00*
Water intake (ml/b/d)	34.24	34.93	34.77	37.71	1.84NS
Weight gain (g/b/d)	3.53	2.93	2.83	3.05	0.28NS
Feed/gain ratio	5.87^{a}	7.70^{b}	8.36^{b}	7.95^{b}	0.69*
Feed cost/kg gain (N)	532.65^{a}	666.75^{b}	688.92^{b}	622.41^{ab}	55.77*
Initial weight (g/b)	32.00	35.78	35.33	36.78	2.57NS
Final weight (g/b)	156.33	143.00	145.00	153.00	7.37NS

a,b, means with different superscript letters within rows are significantly different ($p<0.05$)

Conclusion

Rice offal, a byproduct of rice processing factory is obtainable from several rice mills in rice producing communities and at times constitutes a waste disposal burden. The escalating cost of poultry feed could effectively be alleviated by use of cheaper feed resources like this. While feed intake was significantly higher on the rice offal diets, feed conversion ratio and feed cost per gain were better on the control than on the rice offal diets. Therefore, rice offal is recommended for inclusion at 5% in the diet of quail chicks for profitable performance provided the diet is adequately supplemented with exogenous enzyme and the diet with 5% rice offal has a cost saving of 4.60% over the control.

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