THE EFFECTS OF REPLACING MAIZE WITH BAKERY WASTE MEAL ON THE PERFORMANCE OF GROWING JAPANESE QUAILS (*COTURNIX COTURNIX JAPONICA*)

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Abstract
A feeding trial of 6 weeks duration was conducted to determine the effect of replacing maize with bakery waste on the performance of growing Japanese quails. Two hundred two –week old quails of mixed sexes were randomly allocated to five diets in a completely randomized design. Five isonitrogenous diets contained 0, 25, 50, 75 and 100% of bakery waste at the expense of maize. The diets, however, varied in energy levels from 2,706.92 (Diet A) to 2,610.76kcal/kg ME (Diet E). Diets B (2,679.17), C (2,650.57) and D (2,623.75) were lower than diet A. Each diet was replicated three times. Feed intake (21.99, 20.34, 21.25, 23.83 and 22.97g/bird/day), weight gain (3.39, 3.29, 3.46, 3.61, 3.75g/bird/day) and feed conversion ratio (6.32, 6.17, 6.16, 6.62 and 6.31) did not differ significantly from the control. Water intake was significantly higher ($p<0.05$) on diet D (33.78ml/b/day) than on diets A (30.90) and B (30.99) only. Water intake on diets C (31.89) and E (32.91ml/bird/day) were not different. Feed cost/kg gain was significantly higher ($p<0.05$) for birds on diets B (632.00) and A (617.67) than on diets C (542.33) and D (550.67) only. Other differences were not significant. Feed cost per kg diet decreased from 84.62 (diet A) to 78.75 (diet E) and has a cost saving of 6.94% over the control diet. Therefore, bakery waste could completely replace 100% of maize in the diets for Japanese quail chicks without adverse effect on performance.

Key words: Bakery waste meal, water intake, Japanese quails.

Introduction

The major problem of the poultry industries is the escalating price of feed materials resulting in exorbitant products prices (Fafiolu *et al.*, 2004.)
Bakery waste consists mainly of dough, sugar, icing and butter. Since bakeries are found in major towns in this Country, unconventional feed materials like bakery waste are easy to obtain and this can be tapped as a feed resource for poultry having little pressure of competition. Al-Ruquaie *et al.* (2011) and Ayanrinde *et al.* (2014) supported the inclusion of bakery waste and bread waste in broiler diets because of the benefits on performance and feed cost.
Japanese quails are small-sized and early maturing and start laying as early as from the 5th week of life although adult plumage is not attained until the 12th week (Martins, 1987). Persons prone to high blood pressure and related diseases could consume the meat and eggs with less risk of experiencing such conditions. Recommended levels of some nutrients when maintained in the feed is useful in achieving optimal performance in growing Japanese quails, (Edache *et al.*, 2005). The objective of this study is to determine the effect of replacing maize with bakery waste meal on the performance of growing Japanese quails

Materials and Methods

Birds and Management: 200 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 body conformation and housed in deep litter house partitioned into 15 units with wire mesh to allow for adequate ventilation. There were 13 birds per unit although five units had an extra bird each. Each diet was randomly allocated three units of cages in a completely randomized design. All birds from each unit were weighed at the beginning and weighed weekly for six weeks. The experimental diets were designated A, B, C, D and E. Diet A contained no bakery waste meal. Feed and water were given *ad libitum* for six weeks.
Bakery waste: Bakery waste was collected from several bakeries in Bukuru, Jos South LGA of Plateau State. They were dried and crushed into meals and incorporated into the diets free from mould and weevils. They were analyzed for proximate chemical contents (AOAC, 2000).
Experimental diets: Five isonitrogenous (25%CP) diets containing graded levels (0, (control), 8.31, 16.61, 24.92 and 28.69%) of bakery waste meal at the expense of maize were used in this study (Table 1). The diets were designated A, B, C, D and E respectively and contained metabolizable energy (ME) levels; 2706.92, 2679.17, 2650.57, 2623.75 and 2610.76 kcal/kg respectively.

Data Collection: The mean weekly body weights 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 was 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 multiple range test (Duncan's, 1955).

Results and Discussion

Proximate analysis of bakery waste showed that it contained; moisture, 5.15%; crude protein, 3.32%; crude fibre, 0.00%; ether extract, 2.09%; total ash, 1.25%; N.F.E, 87.79% and dry matter, 94.45%. Values reported for bakery waste samples in this study compare closely to values for bakery waste reported by Al-Tulaihan *et al.* (2004) and Al-Ruquaie *et al.* (2011). Values for crude protein and crude fibre were not close. Crude protein was higher (12.22 – 12.93%) in their samples than what was reported in this study probably because of the type of materials used in bakeries in the Middle East. Samples studied in this locality showed zero content for crude fibre as against 0.18 – 0.53% in previous studies (Al-Tulaihan *et al.*, 2004; Al-Ruquaie *et al.*, 2011) possibly due to the same factor observed earlier. Also the energy level of the sample used in this study is lower than that (3,854 – 3,895kcal/kg ME) reported by previous authors (Al-Tulaihan *et al.*, 2004; Al-Ruquaie *et al.*, 2011). Data on feed intake, weight gain and feed conversion ratio are presented in Table 2. Feed intake and weight gain on the bakery waste diets were similar to the control diet. This report and that of Ayanrinde *et al.* (2014) were similar in terms of weight gain of broiler starters. However, Ayanrinde *et al.* (2014) observed significant effect of bread waste on feed intake of starter broilers. This was not observed in this study and may be due to the differences in the type of birds used. The non significant effect of the diets on feed intake, weight gain and feed conversion ratio in this study has been reported earlier (Al-Ruquaie *et al.*, 2011). Feed cost /kg gain was significantly higher on diet B (25%) and A (0%) than on diets C (50%) and D (75%). The value on diet E (100%) did not differ significantly from the control and other diets containing bakery waste showing an inconsistent trend. Similar result has been reported by Adeyemo *et al.* (2013) for broilers fed biscuit waste. Feed cost/kg feed decreased consistently as the levels of bakery waste increased in the diet and have a cost saving of 6.94% over the control diet.

Conclusion

Bakery waste is obtainable from several bakeries around us and at times constitutes a waste disposal burden. The escalating cost of poultry feed could effectively be alleviated by use of cheaper resources like this. Comparison of the mean values of parameters (feed intake, weight gain and feed/gain ratio) showed that the mean values of the parameters were similar ($p>0.05$). However, water intake was significantly higher on diet D than on diets A and B only. Feed cost/kg gain decreased significantly but inconsistently with increasing content of bakery waste. Therefore, maize can completely be replaced by bakery waste for profitable performance in growing Japanese quails.

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References

Adeyemo, G.O., Oni, O.R.and Longe, O.G. (2013). Effect of dietary biscuit waste on performance and carcass characteristics of broilers. *Food Science and Quality Management.* ISSN 2224-6088 (paper) ISSN 2225-0557 (Online) Vol. 12, 2013. www.iiste.org

Al-Ruquaie, I.M., Swillam, S.A., Al-Batshan and Shafey, T.M. (2011). Performance, nutrient utilization and carcass characteristics and economic impact of broiler chickens fed extruded bakery waste. *Journal of Animal and Veterinary Advances.* 10(16):2061-2066.

Al-Tulaihan Abdullatif, A., Huthail Najib and Salah M. Al-Eid (2004). The nutritional evaluation of locally produced dried bakery waste (DBW) in broiler diets. *Pakistani Journal of Nutrition* 3(5): 294-299

AOAC 2000. Official methods of analysis. Association of Official Analytical Chemist Inc. 15TH Ed. Washington.

Ayanrinde, O.J., Owosibo, A.O. and Adeyemo, A.A. (2014). Performance characteristics of broilers fed bread waste based diets. *International Journal of Modern Plant and Animal Sciences.* 2(1):1-11. www.modernscientificpress.com/journals/IJPlant.aspx

Duncans, D.B. (1955). Multiple range and multiple F – test. *Biometrics* 11: 1 - 42

Edache, J.A., Musa, U., Haruna, E.S., Karsin, P.D., Esilonu, J.O. and I.I. Jibrin (2005). Calcium requirement of Japanese quail (Coturnix coturnix japonica) chicks in Plateau State, *Nigeria; Nig. J. Anim. Prod.* 32:246-252

Fafiolu, A.O., Oduguwa, O.O., Ikeobi, C.O.N., Onwuka, C.F.I. and Adebule, M.A. (2004). Performance and egg quality assessment of laying hens fed malted sorghum sprouts based diets. *Proceedings of the 9th Annual Conference of Animal Science Association of Nigeria*; 2004, Abakaliki, Nigeria; Ebonyi State University, 2004, p.33-35

Martins, B. (1987). Guinness World birds, *Guinness superlatives Ltd*, pp. 158

Steel, R. G. D and J. A. Torrie (1980). Principle and procedure of Statistics. A biometrical approach. 2nd ed. McGraw Hill Book Co. New York, USA.

Table 1: Composition of experimental diets (%)

Ingredient	A	B	C	D	E
Maize	33.22	23.62	13.97	4.37	-
Bakery waste	-	8.31	16.61	24.92	28.69
Ground nut cake	39.08	40.38	41.72	43.01	43.61
Palm kernel cake	20.00	20.00	20.00	20.00	20.00
Rice offal	2.00	2.00	2.00	2.00	2.00
Fish meal	1.50	1.50	1.50	1.50	1.50
Bone meal	2.00	2.00	2.00	2.00	2.00
Lime stone	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.20
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Calculated composition					
CP %	25.00	25.00	25.00	25.00	25.00
ME (Kcal/kg)	2706.92	2679.17	2650.57	2623.75	2610.76
Ca (%)	1.63	1.50	1.51	1.53	1.54
P (%)	0.65	0.52	0.53	0.56	0.57
CF (%)	5.25	5.13	5.01	4.88	4.82
Cost/kg (N)	84.62	82.91	81.23	79.52	78.75

*Hi Nutrient premix supplied the following per 100kg of diet: Vitamin A, 1,200,000 I.U; Vitamin D_3 250,000 I.U; Vitamin E, 3,000 I.U; Vitamin K, 200mg; Thiamin, (B_1) 225mg; Riboflavin, (B_2) 600mg; Pyridoxine (B_6), 450mg; Niacin, 4000mg; Vitamin B_{12}, 2mg; Pantothenic acid, 1,500mg; Folic acid, 150mg; Biotin, 8mg; Choline chloride, 30,000mg; Anti oxidant, 12,500mg; Manganese, 8,000mg; Zinc, 5,000mg; Iron, 2,000mg; Copper, 500mg; Iodine, 100mg; Selenium, 20mg; Cobalt, 50mg. Key: C.P, crude protein; M.E, metabolizable energy; Ca, calcium; P, phosphorus; C.F, crude fibre.

Table 2: Effects of various bakery waste meal levels on parameters measured

Parameters	A	B	C	D	E	SEM
Feed intake (g/b/d)	21.44	20.32	21.31	23.93	23.39	1.68N.S
Water intake (ml/b/d)	30.90^{a}	30.99^{a}	31.89^{ab}	33.78^{b}	32.91^{ab}	0.98*
Weight gain (g/b/d)	3.39	3.29	3.46	3.61	3.75	0.20N.S
Feed/gain ratio	6.32	6.17	6.16	6.62	6.31	0.40N.S
Feed cost/kg gain	617.67^{b}	632.00^{b}	542.33^{a}	550.67^{a}	587.00^{ab}	35.47*
Initial weight (g/bird)	22.62^{a}	17.86^{b}	19.05^{ab}	19.05^{ab}	19.05^{ab}	1.84*
Final weight (g/bird)	146.67	158.33	150.00	150.00	150.00	6.95NS

a,b. Means with different superscripts within a row differ significantly (P<0.05). NS, not significant