GROWTH RESPONSE OF BROILER CHICKS FED FRIED COOKIES (CHINCHIN) WASTE MEAL AS REPLACEMENT FOR MAIZE

Onigemo M. A., Agbalaya K. K., Oso Y. A. A., Anjola A.O. J., Tijani L. A., Agunbiade M. A., Agbaye P. F., Osupe D. U., Lawal A. A., Adebayo G. B., Adetilewa O. D. and AbdulAzeez M. S.
Department of Animal Production Technology
Lagos State Polytechnic, Ikorodu, Nigeria.
maonigemo@gmail.com

Abstract
The increasing price and seasonal scarcity of maize, a major conventional livestock feedstuff in Nigeria, has prompted research into the possibility of replacing it with potential feed resources such as chinchin waste, that are of little or importance to humans. The feed intake (FI), weight gain (WG), feed conversion ratio (FCR), protein efficiency ratio (PER), specific growth rate (SGR) of one hundred and fifty-day old broiler chicks fed diets containing chinchin waste meal (CWM) was investigated for thirty-five days in a completely randomized design. CWM was fed at 0%, 12%, 24%, 36% and 48% levels of inclusion as a replacement for maize. Each dietary level of inclusion represented a treatment and replicated three times. Results revealed that CWM significantly (P<0.05) depressed FI, but had no significant (P>0.05) influence on WG, FCR, PER, and SGR of the birds. Hence, CWM can replace maize in the diets of broiler chicken without compromising their growth. Birds fed diets containing 36% CWM had the best performance, therefore, the inclusion of CWM at 36% level is hereby recommended.

Keywords: Chinchin waste meal, broiler chicken, growth response, substitute, maize.

Introduction

Poultry production is a vital and extremely important aspect of livestock production which deals with the raising of domesticated birds such as chicken, turkey, duck and guinea fowl, for their meat and eggs. It is an important subsector in agriculture that accounts for 25% of the agricultural Gross Domestic Product (GDP) of Nigerian economy (FAOSTAT, 2007). Poultry production is one of the major sources of animal protein (meat and eggs) to man; it is also a source of employment and income, source of manure useful for crop production as well as for research purpose (Atteh, 2004).

Broiler production is a fast growing poultry enterprise in the country accounting for about 35% of the meat consumed by man in the world (Esonu *et al.*, 2006; Sharif *et al.*, 2012). Broiler production takes the second position in the worlds volume just after pork (Yang and Jiang, 2005), and due to its short growth interval, has imparted so greatly on the supply of protein (Oluyemi and Robert, 2000). Poultry farmers have been challenged over the years by various production problems, among which are disease outbreak, poor biosecurity measures, resistance of livestock to drugs and many more, but the most challenging problem is high feed cost, as it covers over 70% of the total cost of production, hence it is a major determinant of profit in poultry industry (Lawrence *et al*., 2008).

Maize is the major source of energy in livestock feed but it is expensive due to its seasonal availability and its increasing use as food, feed and industrial raw material (Dairo, 2008). Therefore, extra effort should be made by researchers to source for other feed resources that are of little or no importance for use by man and thereby reducing the feed cost in the process (Onigemo and Anjola, 2013). Chin-chin is a fried snack well known in West Africa. It is a crunchy doughnut like baked or fried dough of wheat flour and other customary baking items such as butter, milk and eggs (Akubor, 2004). It is a traditional snack in Nigeria made mainly of wheat flour and its other ingredients to form a stiff paste thereby attaining the chosen shape (slant cylindrical or crumb) afterwards fried into a golden brown crisp (Adegunwa *et al*., 2014). It is mainly eaten for pleasure instead of nutritive purpose (Matz, 1993).

Chin-chin waste is a waste generated in the process of production and comprises particles that dissociate from dough and/or fried mixture immersed in the oil used for frying the products which is suggestive of high energy value. This project was therefore designed and executed to evaluate the growth performance of broilers fed chin-chin waste in a bid to determine its suitability as alternative feed resource in poultry production.

Materials and Methods

The study was carried out at the teaching and research farm of the Animal Production Technology Department, Lagos State Polytechnic, Ikorodu. Chin-chin wastes were obtained from a major distributor in Ikorodu, Lagos State and mix with other feedstuff in a pre-formulated manner as shown in Table 1. The experimental diets were fed to broiler chicks in a completely randomized design feeding trial with five treatments, T1(Maize Control diet), T2 (12% CMW), T3 (24% CMW), T4 (36% CMW) and T5 (48% CMW). One hundred and fifty (150) day-old broiler chicks of average weight of 37.5±1.06g were randomly assigned to the five dietary treatments replicated three times with ten birds per replicates. Prior to the arrival of the birds, the brooder house was washed, fumigated and sealed with polythene sheet and litter materials (wood shavings) was spread on the floor of the brooder house and pre-heated. The feeders and drinkers were washed with antiseptic, rinsed and shade dried. The birds were brooded intensively in deep litter pens under the same experimental condition and fed *ad-libitum* with the respective experimental diets for five weeks. All necessary management, medication and vaccination practices were strictly observed throughout the five weeks of the study. Data on feed intake and weight gain were collected weekly. Specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) were determined as follows:

i. $$SGR = \frac{\text{Naturaln log of final weight} - \text{Naturaln log of Innitial weight}}{\text{Time}}$$

ii. $$FCR = \frac{Average\ feed\ intake}{Average\ body\ weig\ ht\ gain}$$

iii. $$PER = \frac{\text{Weight gain (g)}}{\text{Protein intake (g)}}$$

Table 1: Composition of experimental diet

Feed Ingredient	Experimental diet				
	T1	T2	T3	T4	T5
Maize	48	36	24	12	0
Chinchin	0	12	24	36	48
Corn offal	18	18	18	18	18
Full fat soya	7	7	7	7	7
Fishmeal	2	2	2	2	2
Groundnut cake	18	18	18	18	18
Blood meal	5	5	5	5	5
Bone meal	1	1	1	1	1
Limestone	0.4	0.4	0.4	0.4	0.4
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Detoxyzme	0.1	0.1	0.1	0.1	0.1
Determined analysis					
Gross energy (Kcal/kg)	3855.44	4526.83	4613.71	4689.60	4828.78
Dry matter	87.50	88.50	89.50	88.00	89.00
Crude protein	22.43	22.68	22.87	23.23	23.58
Ether extract	6.00	16.00	17.00	20.00	21.00
Ash content	4.00	5.00	3.50	5.00	4.00
Crude fibre	3.22	2.89	2.57	2.24	1.92
Nitrogen free extract	41.85	42.43	43.56	38.03	38.50

The proximate analysis of the feed was determined using the methods of AOAC (2010), while the gross energy was determined using IKA® WERKE Calorimeter system, C 2000 control high pressure bomb calorimeter.

All data collected were subjected to analysis of variance (ANOVA) and significantly different means were separated using the multiple range test of Duncan. All statistical analysis was done using Assistat-Statistical Assistance 7.6 Beta software developed by Silva and Azevedo (2016).

Results and Discussion

Table 2 shows the performance of broiler chicks fed with chinchin waste based diet. The statistical analysis revealed that there was significant difference (P<0.05) in the level of feed consumed. Birds fed with experimental diet T2 consumed (59.91g) more than those on other diets while diet T5 consumed the least (50.28g). The significantly lower feed intake by T5 may be due to higher energy content in the feed, since, feed consumption is negatively correlated with metabolizable energy content of the diet (Nahashon, *et al*., 2006; Ball, *et al*., 2013; Zhai, *et al*., 2014). The weight gains of the birds fed with the experimental diets was not significantly (P>0.05) different, birds in T1 (21.07g) having the highest weight gain followed by birds on diets T2, T3, T4 and T5. The lowest weight gain observed in T5 might be due to the lowest feed intake recorded in this group of birds. Reduced feed intake has been reported to reduce weight gain in broilers birds (Leeson *et al*., 1996; Zhai, *et al*., 2014). Statistical analysis shows that there was no significant difference (P >0.05) in the feed conversion ratio among the birds. The feed conversion ratio of birds fed with T2 (2.92) had the highest numerical value followed by T4 (2.88), T5 (2.77), and T1 (2.71) while T3 (2.68) has the lowest. Statistical analysis revealed that there was no significant difference (P>0.05) between the protein efficiency ratio of the birds. The lowest protein efficiency ratio was observed among the birds in T4 (1.49) while the highest was found among birds on T1 (1.66). Statistical analysis revealed that there was no significant difference among the treatments for specific growth rate, the T4 birds (6.78) had the highest growth rate followed by T3, T5 while T1 and T2 has the lowest. Growth has been reported to be a function of feed consumption and increase in weight gain in broiler chicken (Carre and Meda, 2015).

Table 2: Growth Performance of Broilers Fed with Chinchin Waste Meal (0-6 Weeks)

Variables	Experimental diets					SEM
	T1	T2	T3	T4	T5	
Feed intake (g/bird/day)	56.73[a]	59.91[a]	54.52[ab]	57.27[a]	50.28[ab]	1.6
Weight gain(g/bird/day)	21.07	20.62	20.31	20.14	18.61	0.42
Feed Conversion Ratio	2.71	2.92	2.68	2.88	2.77	0.05
Protein Efficiency Ratio	1.652	1.52	1.61	1.49	1.54	0.03
Specific Growth Rate	6.53	6.52	6.59	6.78	6.55	0.05

NB: T1→ Maize Control diet, T2 →12% CMW, T3→24% CMW, T4→36% CMW, T5→ 48% CMW.

Conclusion and Recommendation

Chinchin waste significantly (P < 0.05) depressed the feed consumption of the birds fed with varying levels of chinchin waste, however, the weight gain, feed conversion ratio, protein efficiency ratio, and specific growth rate of the birds were similar to the maize based control diet. Therefore, chinchin waste could completely replace maize in the diets of broiler chicken without compromising their growth and its use in broiler diets is hereby recommended.

References

Adegunwa, M. O., Ganiyu, A. A., Bakare, H. A. and Adebowale, A.A. (2014). Quality evaluation of composite millet-wheat Chinchin. Agriculture and Biology Journal of North America, 5(1): 33-39.

Akubor, P.I. (2004). Protein content Physical and Sensory properties of Nigeria snack foods (cakes, chinchin, puff-puff) prepared from cowpea-wheat flour blend. *International Journal of Food Science and Technology*, 39,419-424. 10.1111/ Ifs. 2004, 39. Issue-4.

AOAC (2010). Official Method of Analysis. 16th Ed. Association of Official Analytical Chemist. Washinton DC, USA.

Atteh, J.O. (2004). Romancing the chicken 68th Inaugural lecture, University of Ilorin. Published by Unilorin press.

Ball, M. E. E., Owens, B., and McCracken, K. J. (2013). Chemical and Physical Predictors of the Nutritive Value of Wheat in Broiler Diets. *Asian-Australasian Journal of Animal Sciences*, 26(1): 97–107.

Carre, B. and Meda, B. (2015). Cross relationships between growth performance, growth composition and feed consumption in broiler chicken, calculated from published data. *Poultry Science* 94:2191-2201.

Dairo F. A. S. (2008). Performance and haematological evaluation of weaner rabbits fed loofah gourd seed meal (*Luffa cylindrica* M.J. Roem). *African Journal of Food, Agriculture, Nutrition and Development*, 8(4): 451 – 463.

Esonu, B. O., Ogbonna, U. D., Anyanwu, G. A., Emenalom, O. O., Uchegbu, M. C., Etuk, E. B. and Udebibie, A. B. I. (2006). Evaluation of performance, organ characteristics and economic analysis of Broiler finisher fed dried rumen digesta. *International Journal of Poultry Science*, 5: 1116-1118.

FAOSTAT, (2007). Food and Agriculture Organization Statistical databases. CDROM.

Lawrence, J. D., Mintert, J., Anderson, J. D. and Anderson, D. P. (2008). Feed Grains and Livestock: Impacts on Meat Supplies and prices. *CHOICES*.23 (2): 11-15.

Leeson, S., Caston, L. and Summer, J. D. E. (1996). Broiler response to diet energy. *Poultry Science Journal*, 75(4): 529-535

Matz, S. A. (1993). Snacks Food Technology (3 Ed). New York. *Van Nostrand Reinhold*.

Nahashon, S. N., Adefope, N., Amenyenu, A. and Wright, D. (2006). Effect of varying metabolizeable energy and crude protein concentration in diets of pearl gray guinea fowl pullets. Growth performance. *Poultry Science Journal*, 85: 1847-1854.

Oluyemi, J. A. and Roberts F. A. (2000). Poultry production in wet climates. 2nd edition. *Spectrum Book limited, Ibadan Nigeria*. Page 244.

Onigemo, M. A. and Anjola, O. A. (2013). Growth and Reproductive Performance of Pigs Fed with Raw and Differently Processed Velvet Beans (*Mucuna pruriens*) as Partial Replacement for Soya Bean Meal. *OIDA International Journal of Sustainable Development,* Vol. 6, pp. 71-76.

Sharif, M., Shahzad, M. A., Rehman, S., Khan, S., Ali, R., Khan, M. L. and Khan, K. (2012), Nutritional Evaluation of distillery sludge and its effect as a substitute of canola meal on Performance of Broiler chickens. *Asia Australasian J. Animal science*, 25: 401-409

Silva, F. A. S. and Azevedo, C. A. V. (2016). The Assistat Software Version 7.7 and its use in the Analysis of experimental data. *Afr. J. Agric. Res*. 11(39): 3733-3740.

Yang, N. and Jiang, R. S. (2005). Recent advances in breeding for quality chickens. *World point Sci J*., 61:373-382.

Zhai, W., Peebles, E. D. Mejia, L., Zumwalt, C. D. and Corzo, A. (2014). Effects of dietary amino acid density and Metabolizable energy level on the growth and meat yield of summer-reared broilers, *The Journal of Applied Poultry Research*, 23 (3): 501–515.