GROWTH PERFORMANCE OF BROILER CHICKENS FED COWPEA (*Vigna unguiculata L*) TESTA DIETS

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ABSTRACT

The growth performance of broiler chickens fed diets containing Cowpea (Vigna unguiculata) Testa Meal (CTM) replacing maize offal at different levels was studied for a period of 8 weeks. One hundred and ninety five (195) day-old Ross 308 broiler chicks were randomly allotted to five dietary treatments with 3 replicates of 13 birds each. A total of 39 birds were in a treatment group. Dietary treatment groups were 0% CTM (T1), 25% CTM (T2), 50% CTM (T3), 75% CTM (T4) and 100% CTM (T5) in a completely randomized design. Data were collected on initial body weight, Final body weight, Average Feed Intake (AFI), Average Weight Gain (AWG) and Feed Conversion Ratio (FCR). The results showed that there were significant differences (P<0.05) in the FBW, AWG and FCR of broiler finishers fed dietary CTM diets. Chickens fed 100% CTM diet (T5) had highest FBW (2555.00g/bird), AWG (2515.00g/bird) and the best FCR (1.26) compared to the control and other treatment groups. Broilers fed 100% CTM diet also had the highest AFI, indicating the palatability and acceptability of the diet. Conclusively, feeding 100% cowpea testa meal diet to broilers enhanced final body weight, average weight gain and feed conversion ratio of the chickens.

Keywords: Broiler, Chickens, Cowpea testa meal, Growth performance

INTRODUCTION

The poultry industry, particularly broiler chicken production, faces significant challenges in maintaining profitability while meeting the increasing global demand for animal protein (FAO, 2022). A primary concern is the rising cost of conventional feed ingredients, which accounts for approximately 70% of total production costs (Tallentire *et al*., 2018). The high price of conventional feedstuffs is as a result of the competition between human and animals for these feed ingredients especially during period of scarcity. There is therefore the need for the integration of some non- conventional feed sources which has no direct human feed value into livestock production (Adeola and Olukosi, 2008). Other available but neglected cheaper novel feed resources have been focused areas of recent research (Mahmud *et al.*, 2015). One of such potential alternatives is cowpea testa which is readily available in Nigeria and can serve as a cheaper source of fibre in poultry diets. Cowpea (*Vigna unguiculata L*) testa, a by-product of cowpea processing, has emerged as a potential feed ingredient for broiler chickens. Cowpea testa contains 18.02% crude protein, 13.45% crude fibre, 6.34% ether extract, 12.45% ash and 2949.05 kcal/kg metabolizable energy (Wafer *et al*., 2018). Onyimonyi and Ugwu (2017) reported no adverse effects on growth performance with up to 15% inclusion, but the upper limits and potential for higher inclusion rates need further investigation. The present study was conducted to evaluate the growth performance of broiler chickens fed cowpea testa meal diets

MATERIALS AND METHODS

Experimental Site

This experiment was conducted at the poultry unit of Teaching and Research Farm Animal Science section, Faculty of Agriculture, University of Abuja, in Gwagwalada Area Council, Federal Capital Territory Abuja.

Source and Processing of Cowpea Testa Meal

Cowpea testa was obtained from food vendor processors who process beans into beans cake and moi moi within Gwagwalada area in Abuja, Nigeria. The cowpea testa was air-dried to constant weight and subsequently milled using hammer mill with sieve size 0.5mm to reduce the particle size to obtain Cowpea Testa Meal (CTM).

Management of Experimental Birds and Diets

One hundred- and ninety-five (195) day-old Ross 308 broiler chicks purchased from a reputable farm were used for the experiment. The birds were randomly allotted to five treatment groups with thirty nine (39) birds per treatment and three replicates containing thirteen (13) birds each in a completely randomized design (CRD). The experimental birds were kept in battery cage designed for broilers for a period of 8weeks of study. Feed and water were offered *ad libitum* to the birds. Routine management practices and vaccination programme were administered as when due. Five (5) experimental diets were formulated for the study. Five broiler starter and finisher diets were formulated, systematically replacing maize offal with cowpea testa meal at 0% (T1), 25% (T2), 50% (T3), 75% (T4) and 100% (T5) as shown on Tables 1 and 2 respectively. Broilers starter and finisher diets were fed from1-4 and 5-8 weeks respectively.

Table 1: Ingredients Composition of Broiler Starter Diets

Ingredients (%)	T1 (0%CTM)	T2 (25%CTM)	T3 (50%CTM)	T4 (75%CTM)	T5 (100%CTM)
Maize	45.00	45.00	45.00	45.00	45.00
Maize offal	10.00	7.50	5.00	2.50	0.00
CTM	0.00	2.50	5.00	7.50	10.00
Groundnut cake	10.00	10.00	10.00	10.00	10.00
Soya bean cake	30.00	30.00	30.00	30.00	30.00
Palm oil	0.60	0.60	0.60	0.60	0.60
*Fixed Ingredients	4.40	4.40	4.40	4.40	4.40
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
**Crude Protein (%)	23.40	23.40	23.30	23.30	23.20
**Crude Fibre (%)	5.13	5.07	5.02	4.96	4.10
**M E (Kcal/kg)	2812.00	2810.00	2807.00	2804.00	2801.00

*Fixed ingredients: 3.5% bone meal, 0.3% salt, 0.15% lysine, 0.2% methionine, 0.25% vitamin premix.
**= calculated analysis, ME= Metabolizable Energy, CTM=Cowpea Testa Meal

Table 2: Ingredients Composition of Broiler Finisher Diets

Ingredients	T1 (0%CTM)	T2 (25%CTM)	T3 (50%CTM)	T4 (75%CTM)	T5 (100%CTM)
Maize	54.45	54.45	54.45	54.45	54.45
Maize offal	10.00	7.50	5.00	2.50	0.00
C T M	0.00	2.50	5.00	7.50	10.00
Groundnut cake	7.00	7.00	7.00	7.00	7.00
Soya bean cake	22.00	22.00	22.00	22.00	22.00
Palm oil	2.00	2.00	2.00	2.00	2.00
*Fixed Ingredients	4.55	4.55	4.55	4.55	4.55
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
**Crude Protein (%)	20.40	20.40	20.30	20.30	20.20
**Crude Fibre (%)	4.36	4.30	4.25	4.19	4.14
**M E (Kcal/kg)	3015.00	3012.00	3010.00	3007.00	3004.00

*Fixed ingredients: 3.5% bone meal, 0.3% salt, 0.3% lysine, 0.2% methionine, 0.25% vitamin-premix.
**= calculated analysis, ME= Metabolizable Energy, CTM=Cowpea Testa Meal

Data collection

Growth Performance

At the beginning of the experiment, the body weight of the chicks were taken, denoted as Initial Body Weight (IBW) and subsequently taken on a weekly basis. The Final Body Weight (FBW) of the birds was taken on the 56th day of the study. The Total Weight Gain (TWG) was obtained as a difference between the IBW and FBW. The TWG was divided by the number of birds in each replicate and by the number of days of the study to get the average weight gain. The feed supplied to the birds was weighed at the beginning of the week and left over of the feed taken at the end of each week to determine the total feed intake. The total feed intake was divided by the number of birds in each replicate to get the average feed intake. Feed Conversion Ratio (FCR) was calculated as average feed intake divided by average weight gain.

Statistical Analysis

All data collected were subjected to one-way Analysis of Variance (ANOVA) using (2004) Software Package, Duncan's option of the same software was used to separate the means. The probability of 5% was considered significant ($P \leq 0.05$).

RESULTS AND DISCUSSION

Growth Performance of Broiler Chickens Fed Cowpea Testa Meal Diets

The growth performance of broiler chickens fed cowpea testa meal diet as presented in Table 3.reveals that there is significant ($p<0.05$) difference in the FBW, AFI, AWG and FCR of the birds. Broilers fed 100 % CTM (T5) diet had significantly ($p<0.05$) higher FBW and AWG than those fed control diet (T1) and other dietary treatments (T2, T3 and T4). Chickens fed 100 % CTM diet (T5) and those fed control diet (T1) had similar and higher average feed intake than those feed other dietary treatments (T2, T3, and T4). The best feed conversion ratio was observed in broilers fed 100 % CTM diet (T5) which was comparable with those fed control diet (T1) however, chickens fed 25% CTM (T2) and 75% CTM (T4) diets had the worst fed conversion ratio.

The higher FBW and AWG in broilers fed 100% CTM diet (T5) than those fed control (T1) and other dietary treatments (T2,T3 and T4) revealed that the birds made the best use of higher inclusion level of CTM (100%) in their diets. It then means that for best growth performance, CTM can completely replace maize offal at 100%

inclusion level in the diet of broiler finishers. This superior growth performance could be attributed to the improved nutrient profile and potential bioactive compounds in cowpea testa. This result is similar to the findings of Igwebuike *et al*. (2016) who observed increased in growth performance of weaner rabbits fed cowpea testa meal diets. The increased AFI recorded in chickens fed 100% CTM diet correlates positively with the observed weight gain, suggesting better feed acceptability, palatability, digestibility and nutrient utilization. The best FCR observed in broilers fed 100 % cowpea testa meal diet (T5) could suggests better feed intake resulting to enhanced nutrient digestibility, utilization and absorption. This study corroborates the findings of Mohammed *et al*. (2020) who observed best feed conversion ratio in broiler finishers fed diets containing cowpea milling waste and plantain peel meal mixture.

Table 3: Growth Performance of Broiler Chickens Fed Cowpea Testa Meal Diets

Parameters	T1 (0%CTM)	T2 (25%CTM)	T3 (50%CTM)	T4 (75%CTM)	T5 (100%CTM)	SEM
Initial BW (g/b)	42.29	42.43	41.67	42.39	40.00	0.65
Final BW (g/bird)	2164.67^{b}	1601.00^{c}	1706.00^{c}	1585.67^{c}	2555.00^{a}	218.35
Average feed intake (g/bird)	3121.15^{a}	3067.32^{ab}	2902.33^{b}	2987.06^{ab}	3169.75^{a}	68.40
Average weight gain (g/bird)	2122.38^{b}	1558.57^{c}	1664.33^{c}	1543.28^{c}	2515.00^{a}	59.34
Feed conversion ratio	1.47^{ab}	1.97^{c}	1.74^{bc}	1.94^{c}	1.26^{a}	0.16

^{a,b,c} Mean within the same rows with different superscripts differed significantly ($p<0.05$);
Note: SEM = Standard Error of Mean, Initial BW= Initial body weight, Final BW= Final body weight

CONCLUSION AND RECOMMENDATIONS

The replacement of maize offal with cowpea testa meal at 100 % resulted to improved feed intake, weight gain and the best feed conversion ratio. This demonstrates significant insights into the nutritional benefits and economic viability of using cowpea testa meal. Based on the result of this study, it is concluded that 100 % of air dried cowpea testa meal optimized growth performance of broiler chickens in terms of weight gain and feed efficiency. It is hereby recommended that further studies should be conducted on other species of poultry using cowpea testa meal to replace maize offal in their diets. Also, further research will be necessary using enzymes to degrade the crude fibre in cowpea testa meal to make more nutrients available to the animals.

REFERENCES

Adeola, O. and Olukosi, O. A. (2008). Opportunities and challenges in the use of alternative feed stuffs in poultry production. *Nigeria Poultry Science Journal*, **5** (4): 147-155.

Food and Agricultural Organisation (FAO) (2022). FAOSTAT Statistical Database. Food and Agriculture Organization of the United Nations, Rome, Italy.

Igwebuike, J.U., Mohammed, G., Kwari, I.D., Abiola, O. L. and Kolo, U.M. (2016). Effect of feeding graded levels of cowpea (*Vigina unguiculata*) testa meal on growth and economic performance of growing rabbits. Trakia Journal of Sciences. 2: 148-152.

Mahmud, A.A., Hossain, M., Kadian, M.S. and Hoque, M.A. (2015). Physiological and biochemical changes in potato under water stress condition. *Indian Journal of Plant Physiology. (India).* ISSN 0019-5502. 20(4):297-303.

Mohammed, A. J. Malik A. A. and Kuduy. S. (2020) Performance of Broiler Chicken Fed Diets Containing Cowpea Milling Waste and Plantain Peel Meal Mixture Nigerian Society for Animal Production (Nsap) 45th Annual Conference - Bauchi 2020 Book of Proceedings

Onyimonyi, A.E., Ugwu, S.O.C. (2017). Performance of broiler chickens fed graded levels of cowpea (*Vigna unguiculata*) testa meal. International Journal of Poultry Science, 16, 427-431.

SAS (2004). SAS Users guide, statics. Releases 9.1. SAS Institute Incorporated, Cary., NC.

Tallentire, C.W., Mackenzie, S.G., Kyriazakis, I. (2018). Can novel ingredients replace soybeans and reduce the environmental burdens of European livestock systems in the future? *Journal of Cleaner Production*, 187, 338-347.

Wafar, R. J. Tarimbuka, L. I. Abdullahi, U. and Hannison, M. I. (2018). Utilization of Enzyme Supplemented Cowpea Testa Meal by Broiler Chickens 1: Effect on Growth Performance and Cost of Production. *Asian Journal of Research in Animal and Veterinary Sciences* 1(1): 13-22.