GROWTH RESPONSE OF BROILER CHICKS FED DIETS CONTAINING PAWPAW (*Carica papaya*) LEAF MEAL AT STARTER PHASE

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ABSTRACT
This study was conducted to evaluate the suitability of pawpaw *(Carica papaya)* leaf meal (PLM) as an alternative protein source in the diets of broiler chicks during the starter phase. A total of ninety-six-day-old broiler chicks were randomly allotted to four dietary treatments in a Completely Randomized Design (CRD). The treatments consisted of a control diet (T1) with 0% PLM and experimental diets containing PLM at inclusion levels of 4.5% (T2), 6.0% (T3), and 7.5% (T4). The experiment lasted for two weeks, with feed and water provided *ad libitum*. Results on growth performance indicated no significant differences ($P > 0.05$) across all treatments for final body weight, total weight gain, daily feed intake, and feed conversion ratio. Notably, the 7.5% inclusion level yielded the highest numerical weight gain (665.67g) and the lowest feed cost per kg gain (₦661.65). The study concludes that pawpaw leaf meal can be incorporated into broiler starter diets at levels up to 7.5% without adversely affecting growth performance, to offer a viable, cost-effective alternative feed ingredient to reduce production costs in poultry farming.

Keywords: Broiler chicks, Pawpaw, Leaf meal, Growth performance, Treatment

Description of Problem

The rearing of poultry birds especially broiler chickens have become a business that has thrived very well over the years and has put food on the tables of many Nigerians. According to (1) Nigerian population is increasing at an alarming rate with poor feeding, which calls for caution and sensitivity by the Animal Scientists to avert malnutrition especially in children. But the high and exorbitant cost of feed and feed ingredients in Nigeria have thrown many poultry farmers out of business. The exorbitant cost of commonly available feedstuffs makes the final feed mixtures to be expensive and unaffordable by poor farmers (2). Globally, there is a serious search for cheaper alternative feed ingredients in terms of energy and protein sources by nutritionists. (3) reported that the interest in search for alternative feed resources is of paramount importance, mainly because of the global demand for maize, which has exceeded production. According to (4) stated that the Nigerian animal industry is hindered by the limited supply and high cost of conventional feed resource and therefore, there is urgent need to search for and exploit other alternative feed resources with appreciable amount of nutrients (energy and protein) which are cheap and available. Studies reported by (5), (6), (7) and (8) had earlier reported the potential and utilization of some non-conventional feed resources in the feed formulation for animals. There are some leaves that can serve as very cheap feed ingredients, notable among them are bitter leaf meal, guava leaf meal, scent leaf meal, pawpaw leaf meal etc among others. Leaf meal is used as growth promoters; which has been adopted for several decades in animal production to enhance the animals' growth performance, increase their prime cuts yield and decrease intramuscular fat deposition (9). *Carica papaya* also known as pawpaw in English and *gwanda* in hausa can be adequately used as cheap alternative non-conventional source of feed ingredient in the poultry industry and livestock at large. Pawpaw leaf meal can be used as energy source because it is rich in carbohydrate and other essential nutrients and is readily available all year round. It is against this background that this study was

designed to evaluate the growth response of chickens fed PLM.

Materials and Method

This experiment was carried out at the poultry house in Livestock Investigation Division of Federal College of Animal Health and Production Technology, Vom, Jos South Local Government Area of Plateau State. Vom is located in Jos South Local Government of Plateau State which is in the Guinea Savannah zone of Nigeria. Its geographical location is on longitude 8^{o} 45$^{'}$ E and latitude 9^{o} 44$^{'}$ N on an altitude of 4200 feet (1280 m) above sea level, relative humidity ranges from 22 % in January to 78 % in July/August (10). Pawpaw leaves were harvested from trees in K-Vom and environments, they were air dried and milled into flour before being added to the diets at different levels of inclusion. A total of 96-day-old broiler chicks were used for this experiment and randomly assigned to four dietary treatments. Each treatment was replicated three times having 8 birds per replicate. The experimental design used was Completely Randomized Design (CRD), PLM was included at 0 %, 4.5%, 6% and 7.5%. The chicks were brooded for 2 weeks because of the cold being experienced at that time on conventional feed bought from the market, and fed experimental diets for 2 weeks. Growth performance data were collected and subjected to analysis of variance using statistical package of SPSS version 25 and means were separated using Duncan Multiple range Test.

Table 1: Composition of Experimental Diets

Ingredients	**T1 (0%)**	**T2 (4.5%)**	**T3 (6%)**	**T4 (7.5%)**
Maize	60.10	57.50	56.63	55.77
Wheat offal	1.00	1.00	1.00	1.00
PLM	0.00	2.60	3.47	4.33
G/cake 44%	30.00	30.00	30.00	30.00
Soyabean cake	9.00	9.00	9.00	9.00
Limestone	0.50	0.50	0.50	0.50
Bone meal	2.60	2.60	2.60	2.60
Common Salt	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
Premix	0.25	0.25	0.25	0.25
Total	**104.10**	**104.10**	**104.10**	**104.10**
Calculated Analysis				
CP %	23.10	23.70	23.80	24.00
MEkCal/kg	2810	2805	2803	2801
EE %	4.71	4.86	4.91	4.95
CF %	3.98	4.00	4.01	4.02
Ca %	0.95	0.96	0.96	0.95
Avail, P %	0.47	0.48	0.48	0.48
Lysine %	1.07	1.08	1.08	1.09
Methionine %	0.52	0.51	0.51	0.51

CP: Crude Protein, ME: Metabolizable Energy, EE: Ether Extract, CF: Crude Fibre, Ca: Calcium
Avail, P: Available Phosphorus

Results and Discussion

The result of growth performance of broiler chicks as shown in Table 1 revealed that all the parameters measured were significantly (P>0.05) affected by the inclusion of papaw leaf meal in their diets across the dietary treatments with the exception of feed intake. This result disagrees with findings of (11) who reported no significant (P>0.05) effects in growth performance of broiler chicks with regards to weight gain when fed PLM. The final weight and weight gain of birds fed 4.5 % PLM diet had the highest figures which

was trailed by birds fed 7.5 % and 6 % respectively. Birds fed PLM did excellently better than birds fed the control diet. The better performance that was put up by the birds fed PLM could be an indication that pawpaw leaf meal has high quantity of energy to compete favourably with maize as chief source of energy in poultry feeds. The results obtained in this study is contrary to the findings of (12) who reported that the birds fed control diet did better than birds fed pawpaw leaf meal diets. And the authors also reported significant (P<0.05) effects in all the parameters measured except feed intake which is in tandem with this result. The inconsistency of increase in the final weight and weight gain across the dietary treatments were probably because the chicks were still small and their digestive systems were not fully developed to assimilate the nutrients appropriately. Another reason for the inconsistency could be the randomization of the birds after brooding whereby the birds did not have enough time to adjust before the end of the starter phase. The same inconsistent increase was noticed in feed intake and feed conversion ratio in this study. This result also agrees with the report of (13) when broiler chicks were fed *Moringa oleifera* leaf meal.

Table 2: Proximate composition of Pawpaw leaf meal

Proximate composite	Composition/Result (%)
Moisture	7.60
Ether extract	9.32
Protein	29.76
Ash	9.21
Crude fibre	3.12
NFE	40.99

Table 3: Growth performance of broiler starter chickens fed diets containing varying levels of pawpaw leaf meal

		Dietary levels of pawpaw leaf meal inclusion (%)				
Parameters	**T1 (0.0)**	**T2 (4.5)**	**T3 (6.0)**	**T4 (7.5)**	**SEM**	**P- value**
Initial weights (g/b)	276.00	276.33	276.67	276.33	0.27	0.921^{NS}
Final weights (g/b)	875.33^{c}	975.33^{a}	900.33^{c}	942.00^{b}	14.33	0.169
Total weight gains (g/b/d)	599.33^{c}	699.00^{a}	623.67^{c}	665.67^{b}	14.23	0.162
Daily weight gains (g/b/d)	42.81^{c}	49.93^{a}	44.55^{c}	47.55^{b}	1.02	0.162
Total feed intake	685.67	685.33	677.00	695.67	6,20	0.686^{NS}
Daily feed intake (g/b/d)	48.98	48.95	48.36	49.69	0.44	0.686^{NS}
Feed Conversion Ratio	1.18^{c}	0.98a	1.09^{b}	1.06^{b}	0.02	0.105
Feed Cost/kg (~~₦/kg~~)	649.00^{d}	635.29^{c}	630.69^{b}	626.14a	1.25	NA
Feed Cost/kg Gain (~~₦/kg~~)	768.46^{c}	623.73a	687.69^{b}	661.65^{b}	14.46	0.055
Mortality (%)	0.00	0.00	0.00	0.00	0.00	0.00

SEM = Standard Error of Mean, N S = Not Significant (P<0.05), NA: Not analyzed.

Conclusion and Application

Based on the results obtained from this study;

- Birds fed diet containing 4.5 % of PLM put up the best performance in terms of final weight and body weight gain.
- Feeding broiler chicks with pawpaw leaf meal proved to be cost effective from the result of the cost/kg gain across the dietary treatments.
- It can also be concluded that pawpaw leaf meal had no deleterious effects on broiler chicks at the starter phase based on the absence of mortality throughout the starter period.

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