EFFECT OF FREQUENCY OF ADMINISTRATION OF NEEM *(Azadirachta india)* LEAF AQUEOUS HEAT TREATED EXTRACT ON GROWTH PERFORMANCE OF BROILER CHICKS

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ABSTRACT
One hundred and fifty one week old broiler chicks (Arbor acres) were weighed and randomly distributed to five dietary treatments A,B,C,D, and E in a completely randomized design and each treatment was replicated three times on deep litter. The birds in treatment A were given vaccination and conventional drugs required for broiler chicks production without neem leaf aqueous extract (NLAE) (control). Birds in treatment B were given vaccination and 10ml of NLAE in 4 days interval without conventional drugs, while birds in treatments C,D and E were given10ml of NLAE at 4,5 and 6 days interval, respectively with required vaccination and conventional drugs. The birds in all the treatments were fed the same broiler starter diet *ad-libitum*. The experiment lasted for five weeks. Data generated were subjected to analysis of variance (ANOVA) and errors were calculated as standard errors of mean and significance accepted at 0.05 level of probability. The results showed that the birds in treatment A had the best final live weight (FLW) of 700.00g/bird, while birds in treatments B and E had the lowest FLW of 655.55 and 658.33g/bird, respectively. The feed conversion ration was best on birds placed on treatment B (3.37), unlike those placed on treatments A (3.54) and E (3.75). Cost of feed per kilogramme live weight gain (CFPKLWG) was best on the birds in treatments B and D (₦349.92 – ₦350.53/kg). The administration of NLAE at 10ml/250ml of water at 4 days interval was not toxic to the birds as only 2 birds died in treatment B at starter phase (6.90% mortality). Broiler chicks can be reared with the administration of 10ml of NLAE in 250ml of water at 4 days interval without the use of conventional drugs, although this resulted to a weight loss of 6.35% with reference to control.

Keywords: Neem leaf, frequency, aqueous, performance, broiler.

INTRODUCTION
Nigeria livestock industry represents an important asset for economic, social and nutritional potentialities of the country. The poor state of the economy in developing countries of the world has made consumption of high quality protenious foods out of reach of more than 60-75% of the population (Nworgu *et al*., 2013). The drive for attainment of self-sufficiency in meat and other animal products in Nigeria calls for total exploitation of the potential sources of animal protein to ensure a satisfactory level of human protein nutrition (Nworgu, 2015). FAO (2015) reported high level of malnutrition in developing countries of the world. Medicinal plants play important roles in treatment of poultry diseases, poultry nutrition and reduction in cost of poultry production (Nworgu *etal*; 2013). Animals in captivity can equally be served aqueous-heated or fresh form of some of the tropical vegetables and medical plants for minerals, hormones, vitamins, protein and energy supplements, especially during the dry period of the year in the humid tropical environment for improved growth rate and blood formulation (Nworgu *et al*; 2013). Improvement in performance and body conformation in poultry had mainly come as a result of genetics selection, but control of nutritional and rearing factors has also played a great part (Berri, 2000). Sirwan *et al.* (2012) reported that smallholder farmers use alternative plant protein sources due to high cost of conventional feed ingredients in the tropics and subtropics. Several poultry seventists all over the world are actively engaged in research into the use of botanicals and plant derived products to fight and reduce the heavy economic losses in poultry industry caused by poultry diseases (Abbas *et al*, 2012). Neem (*Azadirachta indica*) has attracted worldwide

attention in recent years due to its medicinal properties, biological growth promoters activities (Banerjee, 1998) and ability to improve feed efficiency of birds because of its antibacterial properties (Prasannabalaji *et al.*, 2012). Neem plant is among the most commonly used medical plant as growth promoter, antibiotics, a good antimicrobial property and it plays important role in lowering blood cholesterol level (Biovet, 2005). However, Ogunmola and Sanyaolu (2014) reported that neem leaf aqueous extract supplement suppressed growth rate of broiler chicks.. Based on the above, the objective of the study was to assess the effect of frequency of administration of neem (*Azadirachta indica*) leaf aqueous heat-treated extract on growth rate of broiler chicks.

MATERIALS AND METHODS

A 5 –week experiment was carried out in late dry season of 2015 in the Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria.. A hundred and fifty one week old broiler chicks (Arbor acres) were weighed and randomly distributed to five dietary treatment groups A,B,C,D and E in a completely randomized design and each treatment was replicated three times on deep litter with 30 broiler chicks per treatment. The birds in treatment A (control) were given vaccination and conventional drugs required for broiler chicks production without neem leaf aqueous extract (NLAE). The birds in treatment B were given vaccination and 10ml of NLAE in 4 days interval without conventional drugs, while the birds in treatments C, D and E were given 10ml of NLAE at 4,5 and 6 days interval, respectively with required vaccination and conventional drugs. The birds in all the treatments were fed the same broiler starter diet *ad-libitum* (Table 1). Four hundred grammes of neem leaves were used in the preparation of the NLAE and 10ml of the NLAE was added to 250ml of water for the birds in treatments B,C,D and E each, and 250ml of water was served to the birds in control, after which more water was served to all the birds in all the treatments *ad-libitum*. The freshly harvested neem leaves were detached from the stalk, washed, drained and later immensed into 100°C of hot water for 3 minutes. The water was drained from the leaves before pounding with pestle in a mortar. The aqueous extract was obtained by squeezing the pounded neem leaves with hands and sieved to obtain a homogenous extract of the neem leaves. Data on feed and water intake were recorded on daily basis, while weight gain was determined on weekly basis and feed conversion ration was calculated by dividing the average feed intake with average weight gain. Data generated were subjected to analysis of variation (ANOVA) and errors were calculated as standard error of mean. Significant treatment means were compared using Duncan's Multiple Range Test. Significant was accepted at 0.05 level of probability.

RESULTS & DISCUSSION

The results depicted significant ($P<0.05$) difference in terms of final live weight (FLW), mean live weight gain (MLWG), total feed intake (TFI) and total water intake (TWI), unlike feed conversion ratio (FCR). Administration of neem leaf aqueous extract (NLAE) significantly ($P<0.05$) depressed growth rate of the boiler chicks. The highest FLW (700.00g/bird), and MLWG (612.83g/bird) was recorded on the birds placed in control treatment group, while the least of the aforementioned parameters were obtained from the birds placed in treatment B (vaccination plus 10ml of NLAE in 4 days internal without conventional dugs)(Table 2). Similar scenario was observed in the TFI. The least water intake was recorded on the birds placed in treatment A (3854.39ml/bird), compared with those placed in treatment C (4005.06ml/bird). The cost of feed consumed per kilogramme live weight gain (FPKLWG)(₦/bird) varied from 350.54 in treatment B to 390.32 for the birds in treatment group E. The mortality recorded was 3.45% for the birds in treatment A (control) and 20.07% for those birds in treatment group E and 0.00% for the birds in treatment D. The broiler starter diet presented in Table 1 met the recommended requirement for broiler chicks according to NRC (1994). The reduction in both FLW and MLWG for the birds placed on neem leaf treatments with reference to control is an indication that NLAE depressed growth performance of broiler chicks. Similar observation was made by Ogunmola and Sanyaolu (2014) when they served broiler chicks heat treated NLAE. Lewis *et al.* (2003) reported that inclusion of neem leaves in the diets of male broiler chickens resulted to improved growth rate, FCR and weight gain (WG). However, Onu

and Aniebo (2013) reported that broiler chicks served 20, 40 and 60ml of NLAE/litre of water resulted to no significant (P>0.05) difference in WG, feed and water intake, FCR and protein efficiency ratio among the treatment groups and control. The authors concluded that NLAE could be used in broiler chicks production without any deleterious effect on the performance and blood indices. Verma *et al.* (1998) reported a non-significant (P>0.05) difference in WG of pullet chicks fed neem leaf meal. The FLW of the broiler chicks (BC) varied from 658.33 – 700.00g/bird. This parameter was slightly higher than the reports of Nworgu *etal.* (2007) (585.00-600.00g/bird), but similar to the revelation of Nworgu (2015) (627.20 – 745.80g/bird), the unlike the FCR (3.36-3.75) in the present study. Similar observation was made on the TFI and TWI. Variations could be attributed to the test ingredients used, duration of the projects, health status of the birds and the season the projects were carried out.The mortality of the BC served 10ml of NLAE was 0.00-20.70%. Highest mortality was recorded for the BC in treatment E, where 6 birds diet (20.70%) and non for the birds in treatment D. Lowest mortality of 6.90% for BC in treatment B without conventional drugs, but with 10ml NLAE indicated the anti-microbial properties of NLAE. The mortality recorded was as a result of coccidisis infection which was not noticed in time.

CONCLUSION

The BC feed intake did not follow any definite pattern. The FLW and MFWG of the BC depressed with the inclusion of 10ml NLAE/250ml of water at 4,5, and 6 days interval. Boiler chicks could be reared with the administration of 10ml of NLAE in 250ml of water at 4 days internal without the use of conventional drugs, although this resulted to a weight loss of 6.35% for broiler chicks with respect to control.

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Table 1: Gross composition of broiler starter diet (%)

Ingredients	Broiler starter
Maize	55.00
Corn bran	3.00
Wheat offal	4.00
Soybean meal	20.00
Groundnut cake	10.00
Fish meal (72%)	4.00
Bone meal	2.00
Oyster shell	1.10
Salt	0.25
Methionine	0.15
Lysine	0.20
Vitamin mineral premix	0.30
Calculated analysis (%)	
Crude protein	22.76
Crude fibre	3.60
Ether extract	3.77
Calcium	1.49
Phosphorus	0.36
Lysine	1.21
Methionine	0.35
Metabolizable energy (kcal/kg)	2900

Table 2: Growth Performance of broiler chicks served neem leaf aqueous extract

	Experimental Diets					
Parameters	**A**	**B**	**C**	**D**	**E**	**SEM**
Initial live weight (g/bird)	87.17	87.24	85.90	90.14	87.51	-
Final live weight (g/bird)	700.00^{a}	655.55^{d}	667.31^{c}	687.50^{b}	658.33^{ed}	4.67
Weight gain in 5 weeks (g/bird)	612.83^{a}	568.31^{d}	581.41^{c}	597.09^{b}	570.82^{d}	7.65
Average daily weight gain (g/bird)	17.51	16.24	16.61	17.06	16.31	0.36
Total feed intake (g/bird)	2170.50^{a}	1914.6^{a}	2005.8^{c}	2008.0^{c}	2141.3^{b}	25.33
Average daily feed intake (g/bird)	62.01^{a}	54.70^{b}	57.31^{b}	57.37^{b}	61.18^{a}	0.85
Feed conversion ratio	3.54	3.37	3.45	3.36	3.75	0.23
Total water intake (ml/bird)	3854.39^{d}	3874.81^{c}	4005.06^{a}	371.97^{c}	3926.86^{b}	25.36
Average daily water intake (ml/bird)	110.13^{b}	110.71^{b}	114.43^{a}	106.20^{c}	112.20^{ab}	0.84
Feed water intake ratio	1:1.78	1:2.02	1:2.00	1:1.85	1:1.83	-
Cost of one kg of feed (₦/bird)	104.05	104.05	104.05	104.05	104.05	-
Cost of feed consumed (₦/bird)	225.84	199.21	208.70	208.93	222.80	-
Cost of feed/kg live weight gain ₦/bird (CFPKLWG)	368.52	350.53	358.96	349.92	390.32	2.97
Mortality (%) (*)	3.45(1)	6.90(2)	13.80(4)	0(0)	20.07(6)	-

^{a,b,c,d,e} Means with different superscripts on the same horizontal row differ significantly ($P<0.05$); (*) = Number of birds that died