EFFECT OF DIFFERENT INCLUSION LEVELS OF NEEM (*AZADIRACHTA INDICA*) LEAF MEAL AND HOUSING SYSTEMS ON THE GROWTH PERFORMANCE OF PULLET CHICKENS

***Kargbo, K[1]. Egbeyale, L. T[1]. Sogunle, O. M.[1], Oluwatosin, O. O.[2], Akinlotan, O. T.[1], Fabiyi, O.[1] and Olatunde, H. K[1]**

[1]*Department of Animal Production and Health, Federal University of Agriculture, Abeokuta*
[2]*Department of Animal Nutrition, Federal University of Agriculture, Abeokuta*
**Corresponding author: kaykargbo@gmail.com Phone No. +2347018083597*

Abstract

A study was conducted to determine the growth performance of four-week old pullet chicks to varying levels of neem (Azadirachta indica) leaf meal (NLM) under two housing systems. Two hundred and thirty-four dominant black strain pullet chicks were allotted to two different housing systems (deep litter (DL) and deep litter with run (DLR)). Birds in each housing system were subdivided into three groups based on the neem inclusion levels (0, 0.5 and 1.0 % NLM). Each group consists of thirty nine randomly selected birds and three replicates of thirteen birds. The experiment was arranged in a 2 x 3 factorial layout in a completely randomized design. The birds on DLR recorded higher ($p<0.05$) weight gain (389.18 g) and better feed conversion ratio (3.45). The inclusion of NLM up to 1.0% in the diet of pullets had no significant ($p>0.05$) effect on growth performance indices except protein intake.. It was concluded that inclusion NLM can be included up to 1.0% NLM in the diets of pullet chickens without deleterious effect in their growth performance while deep litter with run improves performance of the birds.

Key words: Neem; performance; pullets; housing systems

Introduction

The use of antibiotics as feed additives was associated with residues in the meat and eggs consumed by consumers, and has been banned or limited in many countries (Diarra *et al.*, 2011). In the European Union, inclusion of antibiotics in animal feed is forbidden. This has triggered the need for several non-conventional plant extracts with antimicrobial properties for possible incorporation into animal feeds for reducing microbial loads of animals, and as natural alternatives to antibiotics due to their wide range of potential beneficial effects (Manesh *et al.*, 2012). *Azadirachta indica* (neem) is a large evergreen fast growing perennial tree that is native to Bangladesh and inhabitant of Southeast Asia. Neem leaves have relieved so many different pains, fevers, infections and other complaints that it has been called "the village pharmacy". Neem is known to increase the production of Glutathione- transferase, thus improving the ability of the liver to detoxify itself of chemical contaminations (Esonu *et al.*, 2007). The study is therefore geared towards determining the growth performance of pullet chickens on neem leaf meal managed in two housing systems.

Materials and Methods

Location of the Experiment

The experiment was carried out at the Poultry unit of the Directorate of University Farms, Federal University of Agriculture, Abeokuta, Ogun State.

Experimental diets

The fresh green neem leaves were harvested from mature Neem trees within the environs of the university farms. The leaves were cleaned, made free of stems and sun-dried on a polyethylene sheet until they became crispy. They were milled and stored in sealed polyethylene bags until they were ready for diet formulation. Three experimental diets were formulated with neem leaf meal inclusion at 0, 0.5, and 1 .0% to partially replace wheat offal. The control diet formulation was maize 40%, wheat offal 25%, fish meal 2%, soybean 18%, PKC 10%, bone meal 2%, oyster shell 2%, lysine 0.25%, methionine 0.25%, premix 0.25% and common salt 0.25%. The 0.5 and 1.0% NLM diets contained 24.5 and 24.00% wheat offal respectively.

Experimental birds and management

Two hundred and thirty-four, 4-weeks old dominant black strain pullet chicks were allotted to two different housing systems (Deep Litter (DL)

and Deep Litter with Run (DLR)). Birds in each housing system were subdivided into three groups based on the neem inclusion levels (0, 0.5 and 1.0 % NLM). Each group consists of three replicates of thirteen birds each. Only the birds on control diet were given antibiotics from start to the end of the experiment. The birds were fed *ad libitum*. The experiment lasted for a period of four weeks.

Data collection

The initial body weights of the birds were taken with subsequent body weight recorded on weekly bases. A known quantity of feed was given to the birds at the start of every week and the leftover of feed at the end of the week was weighed to determine weekly feed intake and consequently daily feed intake. The feed conversion of each of the groups of the birds was determined by calculating the ratio of feed intake to weight gain. The protein efficiency ratio was determined by dividing the weekly body weight gain by weekly protein consumed for each group of birds. Mortality rate was calculated by subtracting the number of live birds at the end of the experiment from the total number of birds at the start of the experiment. The resulted was then divided by the total number of birds at the start of the experiment and was multiplied by 100 for percentage mortality rate.

Statistical analysis

The experiment was arranged in a 2x3 factorial layout. The data collected were subjected to a Completely Randomised Design using one-way analysis of variance (SAS, 2010). Significant ($p<0.05$) different means were separated using the Duncan's New Multiple Range F-Test (DNMRT) of the software package.

Results

Table1 shows the main effects of housing systems and neem leaf meal on growth performance of pullet chicks. Birds in the DLR recorded higher ($p<0.05$) values for final weights and weight gain. The best ($p<0.05$) feed conversion ratio and protein efficiency ratio (3.45 and 1.50, respectively) were recorded in birds managed under DLR. The results also showed that NLM elicited marked ($p<0.05$) variations in the protein intakes of the birds. Birds fed with control diet and 0.5% inclusion level of NLM recorded the highest protein intake, while the birds fed with 1.0% inclusion recorded the least values of protein intake. The mortality rate was not significant ($p>0.05$) in both the housing systems and inclusion level of neem. The results for the interactive effect of housing systems and varying levels of NLM on growth performance of pullet chicks are presented in Table 2. There were significant ($p<0.05$) differences on final weight and weight gain of experimental birds. The birds fed control diet in the DLR recorded the highest ($p<0.05$) final weight. However, the value recorded was similar to their counterparts fed 0.5 and 1.0% NLM in the DLR and those fed control diet in the DL while the least value was obtained from those fed with 0.5% NLM in the DL. There was no significant ($p>0.05$) difference in feed intake of birds across treatments. The feed conversion ratio and protein efficiency ratio were best ($p<0.05$) for birds fed control diet in deep litter with run. Birds fed with 0.5% NLM in deep litter housing had the highest protein intake while those fed 1.0% NLM had the lowest protein intake.

Discussion

The pronounced differences in weight gain for birds in the deep liter with run could be attributed to better feed conversion ratio, efficient utilization of protein and as a result of being provided with almost a natural environment. This is in contrast with the work of *Olaniyi et al. (2012) who reported a* decreased in weight gain for cockerel birds on free range systems. The variation with this study could be due to strain of birds, extent of supplementary feeding and space available for birds to scavenge thereby loosing valuable energy and weight in the process. The similar in weight gain with increased inclusion levels of NLM could possibly be that the non-eliminated anti-nutritional factors in the diet containing NLM did not pose threat to growth at the levels. It could also be as a result of similar feed intake. The similarities in feed intake for birds fed diets containing Neem leaf meal at different inclusion levels indicates that the quantity of toxic factors such as terpenes and limonoids as well the active ingredient *Azadirachtin* were minimal to have had a depressing effect on the appetite of the birds in both housing systems (Ogbuewu *et al.*, 2010). The results on feed intake corroborates the work of Kabeh and Jalingo (2007) who obtained no marked variations in feed consumption of broiler birds fed Neem leaf meal.

Conclusion

It could be concluded that the housing systems employed in this study and inclusion of NLM up to 1.0% in the diet of pullet chickens has no depressive effect on their growth performance.

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Table 1: Main effects of housing systems and NLM inclusion on growth performance of pullet chicks

Parameters	Housing systems		Neem Leaf Meal inclusion (%)		
	Deep litter with run	Deep litter	0	0.5	1.0
Initial weight(g)	186.67±1.92	187.52 ± 3.39	187.31 ± 3.22	187.31 ± 3.22	186.67 ± 1.99
Final weight(g)	575.87±29.03^{a}	526.32±27.00^{b}	562.82±47.46	543.54±42.49	546.89±20.26
Total weight gain(g)	389.18±28.82^{a}	338.80±25.57^{b}	375.51±46.63	356.23±42.60	360.22±20.54
Weight gain /day(g)	13.90±1.03	12.10±0.91	13.41±1.67	12.72±1.52	12.87±0.73
Feed intake/bird/day(g)	47.76±2.14	47.38±1.40	47.01±2.01	47.01±1.25	48.68±1.67
Feed Conversion Ratio	3.45±0.30^{a}	3.93±0.27^{b}	3.54±0.39	3.74±0.49	3.79±0.18
Protein intake (g/day)	9.27±0.40	9.20±0.42	9.35±0.40^{a}	9.46±0.25^{a}	8.88±0.30^{b}
Protein Efficiency Ratio	1.50±0.10^{a}	1.32±0.12^{b}	1.43±0.15	1.35±0.18	1.45±0.07
Mortality (%)	0.85±2.56	0.85±2.56	0.00±0.00	2.56±3.97	0.00±0.00

$^{a,b;}$ Means in the same row with different superscript differed significantly (P<0.05)

Table 2: Interactive effects of housing systems and NLM inclusion on growth performance of pullet ch icks

Housing types	Deep litter with run			Deep litter		
Neem Leaf Meal inclusion	0	0.5	1.0	0	0.5	1.0
Parameters						
Initial weight (g)	186.67±2.22	186.67±2.22	186.67±2.22	187.95±4.44	187.95±4.44	186.67±2.22
Final weight (g)	589.74±44.91^{a}	577.03±22.92^{ab}	560.77±14.04^{abc}	535.90±37.95^{abc}	510.04±24.96^{c}	533.01±15.87^{bc}
Total weight gain (g)	403.08±42.83^{a}	390.36±24.86^{ab}	374.10±15.10^{abc}	374.95±36.35^{bc}	322.09±20.60^{c}	346.35±15.47^{bc}
Weight gain/day (g)	14.40±1.53^{a}	13.94±0.89^{ab}	13.36±0.55^{abc}	12.43±1.30^{bc}	11.50±0.74^{c}	12.37±0.55^{bc}
Feed intake/bird/day (g)	47.08±2.96	46.83±1.89	49.36±0.48	46.93±1.17	47.19±0.48	48.00±2.31
Feed Conversion Ratio	3.29±0.27^{a}	3.37±0.35^{ab}	3.70±0.15^{abc}	3.80±0.33^{abc}	4.11±0.25^{c}	3.88±0.19^{c}
Protein (g/day)	9.37±0.59^{ab}	9.42±0.38^{ab}	9.01±0.09^{ab}	9.34±0.23^{ab}	9.50±0.10^{a}	8.76±0.42^{b}
Protein Efficiency Ratio	1.54±0.12^{a}	1.48±0.15^{ab}	1.48±0.06^{ab}	1.33±0.11^{bc}	1.21± 0.08^{c}	1.41± 0.07^{ab}
Mortality (%)	0.00±0.00	2.56±4.44	0.00±0.00	0.00±0.00	2.56±4.44	0.00±0.00

$^{a,b,c;}$ Means in the same row with different superscript are significantly (p<0.05) different.