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Effect of Neem (*Azadirachta Indica*) Leaf Meal Inclusion and Housing systems on Nutrient Digestibility Coefficient and Excreta Egg Count of Pullet Chickens

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Abstract : *This study was conducted to access the response of pullet chickens to varying levels of Neem (Azadirachta indica) leaf meal (NLM) under two housing systems. One hundred and eighty 8-weeks old Dominant black strain pullet chickens were allotted to two different housing systems (deep litter and deep litter with run). 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. Digestibility coefficient and excreta egg count were carried out at 8th and 16th weeks. Results on digestibility showed that the housing systems employed and incorporation of NLM in the diets of the pullets had no effect ($p<0.05$). Pullets fed with diets containing NLM had similar ($p>0.05$) excreta egg counts with those on control diet. It can be concluded that up to 1% NLM inclusions in the diets of pullet chickens preferably raised in deep litter housing could be seen as an effective means of controlling internal parasites. Also, NLM inclusion up to 1.0% in the diet of pullet chickens has no detrimental effect on the digestion and absorption of nutrients.*

Key *word: digestibility, egg count, neem, pullets*

1. Introduction

In an effort to develop new feedstuff for animal rearing, a number of researchers in recent time has investigated the proximate composition of neem seed cake [13, 2] and leaf meal [3, 7] and its use as feed stuff in poultry [3, 7] and rabbit [10, 8]. Recent studies have shown that the proximate compositions of neem leaf meal are 92.42% dry matter, 20.68% crude protein, 16.60% crude fibre, 4.13% ether extract, 7.10% ash and 43.91% nitrogen free extract [3, 7] . De oiled neem seed cake is rich in essential amino acids, crude proteins, fibre contents, sulphur and nitrogen [12]. One common problem encountered in the use of leaf meals in poultry diets is the high fibre content of the leaf meals which limit feed intake at high dietary levels. This could be as a result of lower energy content of the diets since birds eat to satisfy their energy requirement [9].

In third world countries, Neem has been used for centuries to provide health cover to human and livestock in various forms. In poultry, the bark is used to treat wounds, diarrhea, ticks and lice leading to severe weight loss [8]. In poultry industries, aflatoxicosis cause by *Aspergillus flavus* which originate from contaminated poultry feed is prevented using Neem leaves. Neem leaf extract inhibits the production of aflatoxin by *Aspergillus paraciticous* and patulin production by *Penicillium expansum* [6]. The processed Neem cake can be used as excellent poultry feed.

Poultry diseases seriously affect village chicken production. Birds are almost never vaccinated. Very occasionally they receive an antibiotic tablet originally intended for human use [4].

Indigenous knowledge has gone a long way over the years to ensure minimal livelihoods for the rural resource-poor people in Africa. Most small-holder farmers that desire to adopt modern practices of animal health care are constrained by lack of finance and unavailability of consultancy advice from veterinary officers in remote African villages [3]. The rural village Poultry system in Africa typically lacks access to organized health inputs. The structure of the rural Poultry production system in Africa has constrained attempts to institute health extension services. Therefore the use of ethno-veterinary medicines in Poultry feed has been of immense importance.

This study is therefore intended to determine the effects of Neem leaf meal housing types on the nutrient digestibility coefficient and faecal egg count of pullet chickens.

2. Materials and methods

2.1 Location of the experiment

The experiment was carried out at the Poultry unit of the Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta, Ogun State. It fell within the rain forest vegetation zone of South-Western Nigeria at an altitude of 127m, latitude 7° 13'N and longitude 3° 26' E. The climate is humid with a mean annual rain fall of 1037mm. The annual mean temperature is 34.7° C and relative humidity is 82%.

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 brittle. 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 and was offered to the birds from start to the end of the experiment. The ingredient composition of the experimental diet is as shown below.

2.2 Experimental diets

Table 1 Gross composition (%) of grower's diets (8 to 24 weeks)

	% Inclusion levels of neem leaf meal		
Ingredients	0	0.5	1.0
Maize	50.00	50.00	50.00
Soybean meal	12.00	12.00	12.00
Wheat offal	33.00	32.5	32.0
Azadirachta indica	0	0.5	1.0
Bone meal	2.00	2.00	2.00
Oyster shell	2.00	2.00	2.00
Lysine	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Grower's vit./trace mineral premix	0.25	0.25	0.25
Common Salt	0.25	0.25	0.25
Total	100.00	100.00	100.00
Determined analysis (%)			
Crude protein	16.49	15.03	14.88
Ether Extract	3.11	2.96	2.92
Crude fibre	4.10	3.50	3.02
Ash	2.55	2.06	2.03
Calcium	0.06	0.06	0.06
Phosphorus	0.28	0.28	0.28
Lysine	0.77	0.77	0.77
Methionine	0.25	0.25	0.25
Energy (MJ/Kg)	5.52	5.52	5.52

Vit./Min. Premix contained: Premix (Embavit No 90) contained Vit. A, 10 000 000iu; D_3 , 2 000 000iu ; E, 12 500iu; K, 1.30g; B_1, 1.30; B_2, 4.00g; D Calcium-Pantothenate, 1.30g; B_6, 1.30g; B_{12}, 0.01g; nicotinic acid, 15.00g; folic acid, 0.05g; biotin, 0.02g; Co, 0.20g; Cu, 5.00g; Fe, 25.00g; I, 0.06g; Mn, 48.00g; Se, 0.10g; Zn, 45.00g; choline chloride, 200.00g; BHT, 50.00g.

2.3 Experimental birds and management

One hundred and eighty (180) eight weeks dominant black strain pullet chickens were allotted to two housing systems of six treatment groups, each comprising of thirty (30) randomly selected birds in three (3) replicates of ten (10) birds each. Birds in treatments 1, 2 and 3 were managed on deep litter with run while those in treatments 4, 5 and 6 were managed in exclusive deep litter housing. Birds in treatments 1 and 4 fed control diet were given antibiotics from start to the end of the experiment, while those on treatments 2 and 5 and 3 and 6 were offered diets with NLM inclusion at 0.5 and 1.0%, respectively. Newcastle, Infectious Bursal diseases and coccidiosis vaccinations were carried out routinely via drinking water. Vitamin was given prior to vaccination and at the end of each vaccination programme. The experiment lasted for a period of seventeen weeks.

2.4 Data collection

2.4.1 Digestibility study

Apparent nutrient digestibility was carried out using 24 pullets, 4 per treatment. The birds were

transferred and individually housed in a steel metabolic cage; 3 days of acclimatization of birds to cage was allowed and 3 days for collection of excreta after the acclimatization period, a known quantity of feed was offered to each replicate of the treatments represented while the leftover was weighed to determine the feed intake during the metabolic trial. The daily excreta outputs were dried in an oven at a temperature of 80^{o}C for 3 days weighed and milled (1mm sieve). Samples of excreta and diets were taken for chemical and proximate analyses (CP, CF, Ash, EE and NFE) using [1].

2.4.2 Excreta Egg Count

At weeks 8 and 16, fresh excreta samples were collected from each replicate group. Sterile forceps were used to pick the excreta and placed in plain bottles. The samples were taken to the Parasitology Laboratory of the College of Veterinary Medicine, Federal University of Agriculture Abeokuta Ogun State, and Nigeria for analysis. The samples were treated according to a modified Wisconsin salt flotation technique. Three grams of the samples were grounded and mixed with 42 micro litre flotation fluids (a saturated solution). After filtration, sub-samples were taken to both compartments of McMaster ^{R} counting chamber and were allowed to stand for 5 minutes. The number of oocytes that floated was multiplied by 50 which represent the number per gram in the original sample.

3 Results

3.1 Main effects of housing systems and NLM inclusion on digestibility coefficient by grower pullets

The result for main effects of housing systems and NLM at different inclusion levels for the digestibility coefficient of grower pullets is presented in Table2 The result shows that the inclusion levels of NLM had no significant (P>0.05) effect on nutrient digestibility of the birds. Although not significant (P>0.05), birds raised on deep litter recorded slightly high percent digestibility of all the nutrients except for crude protein which was better utilised by birds in the deep litter housing with run. The crude fibre was similar for bird fed with control diet and 1.0% NLM inclusion.

Table2 Main effects of housing systems and NLM inclusion on the digestibility coefficient by grower pullets

Housing systems	% Neem Leaf Meal inclusion				
	Deep litter with run	Deep litter	0	0.5	1.0
Parameters					
Crude protein (%)	97.26±1.10	97.16±2.00	97.58±0.44	96.13±2.28	97.93±0.90
Crude fibre (%)	95.52±1.70	96.26±2.66	96.57±1.64	94.53±5.32	96.57±1.96
Ash (%)	91.44±4.92	93.98±2.79	94.77±1.06	90.35±5.32	93.01±4.16
Ether extract (%)	87.85±2.39	90.47±4.34	90.58±3.02	86.92±2.86	89.97±4.50
NFE (%)	88.71±3.92	91.23±5.19	92.14±2.66	86.09±4.27	91.70±4.61

NFE= Nitrogen Free Extract; NLM= Neem Leaf Mea

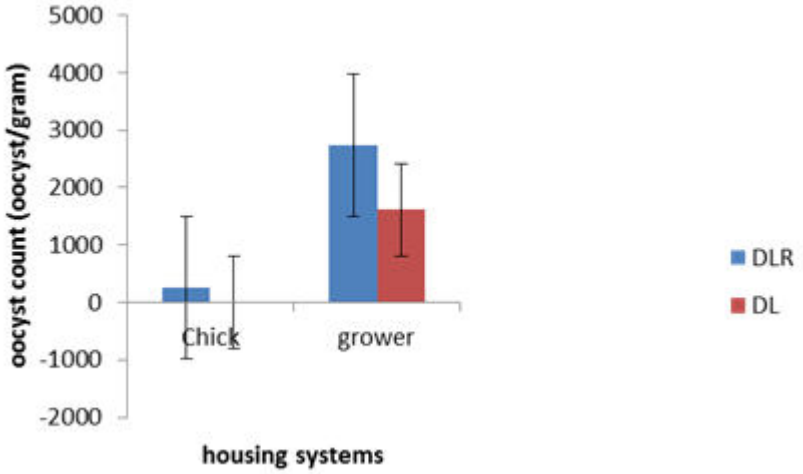
3.2 Effects of NLM inclusion on the excreta egg counts of pullet chicks at both chick and grower phases (weeks 8 and 16)

Figure 2 shows the result for main effect of NLM on the excreta egg counts at both chick and grower phases. The results showed that the inclusion level of NLM had no significant (P>0.05) effect on the excreta egg counts of the birds at chick phase. It was observed that 0.5% inclusion of NLM was effective in controlling parasitic load in pullet chickens. Though not significant, an increase in the number of oocytes counted at grower phase with increased inclusion levels of the test ingredient was also seen.

Effects of housing systems on the excreta egg counts of pullet chicks at both chick and grower phases (weeks 8 and 16)

Figure 1 shows the result for main effect of housing systems on the excreta egg count at both chick and grower phases. The housing systems did not depict any significant (P>0.05) difference for the two set of birds. The results showed a lower count for

chicks in deep litter housing with run and there was no parasite count in deep litter. The number of eggs counted at grower phase was higher (P<0.05) in deep litter with run when compared to their counterparts in the deep litter housing.



DLR= Deep Litter with Run; DL= Deep Litter

Figure 1: Main effect of housing systems on excreta egg count at both chick and grower phases

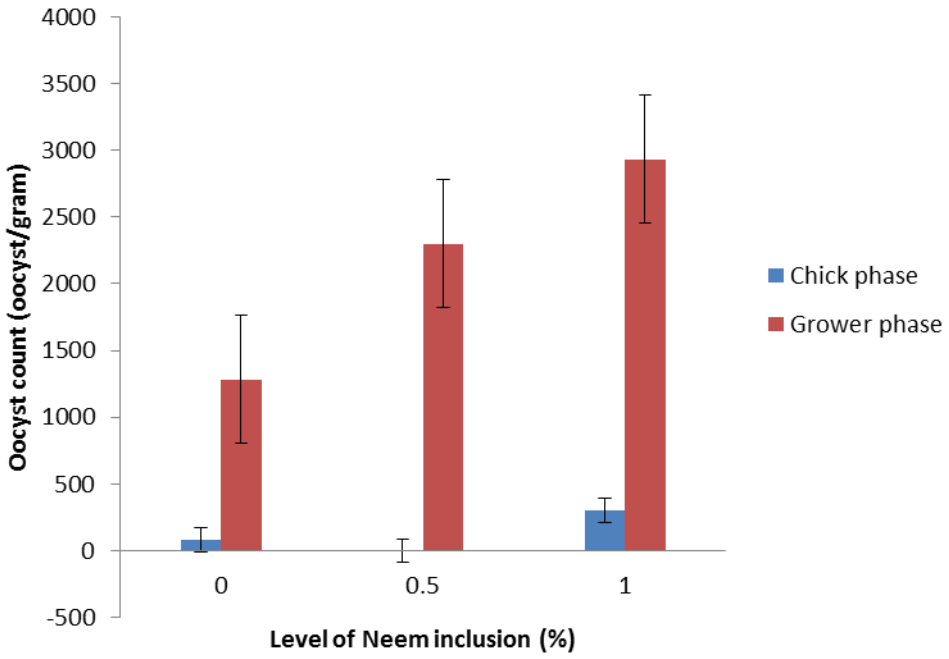


Figure 2: Main effect of Neem Leaf Meal on excreta egg counts at both chick and grower phase

4 Discussion

Neither the housing systems nor the inclusion levels of the NLM had significant effect on the nutrient digestibility of the pullets. This corroborates the findings of [12] who reported non-significant (p>005) difference across treatment for broiler chicken fed dietary *Azadirachta indica* seed and palm oil. This suggests that, the fibre levels employed in this study are within a tolerable limit for the birds and did not interfere with the digestion and absorption of the nutrients.

The birds were free from parasitic loads and remained healthy throughout the experiment. The low excreta egg counts recorded in this experiment is in line with the work of Thomas *et al.* [11] who obtained non-significant (P>0.05) difference on excreta egg count of sheep and goats fed diets containing Neem leaf extract in a combined experiment. Seasonal variation and difference in age of birds could possibly be a cause for the excreta egg count observed in the two phases of chicks in this study. The non- significant differences among the groups fed diet containing Neem Leaf Meal in this study suggest that Neem has the ability to suppress or serve as a remedy to control internal parasites burden in pullet chickens.

5 Conclusions

It can be concluded that up to 1% NLM inclusions in the diets of pullet chickens preferably raised in deep litter housing could be seen as an effective means of controlling internal parasites. Also, NLM inclusion up to 1.0% in the diet of pullet chickens has no detrimental effect on the digestion and absorption of nutrients

6 Recommendation

From the results it can be recommended that neem leaf meal be included up to 1% in the diets of pullet chickens for the control of parasites and efficient utilization of nutrients.

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8 References

[1] AOAC . ''*Official Methods analysis* 18th Edition' 'Association of Official Analytical Chemists, Washington D.C. USA 2005

[2] Bawa, G.S., Orumuyin, M. Agbaji, A. S. Landa, Z. and Okekeifi, U. O. ''Effects of Different Methods of Processing Neem Seeds on Performance Young Growing Rabbits''. *Pakistan Journal of Nutrition,* 2006, pp. 212-216.

[3] Esonu, B. O., Emenalom, O.O., Udedibie, A.B.I., Anyanwu, G.A. Madu, U., and Inyang, A.O., ''Evaluations of Neem (*Azadirachta indica*) Leaf Meal on Performance Carcass Characteristics and Egg Quality of Laying Hens''. *International Journal of Agricultural Development*, 2005, pp. 208 -212.

[4] Gueye, E.F., ''Diseases in Village Chickens: Control through Ethno-Veterinary Medicine''. *ILEIA* Newsletter, 1997, pp. 20-21.

[5] Kolawole, O. D., "Local Knowledge Utilisation and Sustainable Rural Development in the 21st century" *Indigenous Knowledge Development Monitor* 2001, pp. 13–23.

[6] Mossini, S. A., Oheira, K.P., and Kemmelmeier, C., ''Inhibition of Paulin Production by *Penicillium expansum* Cultured with Neem (*Azadirachta indica*) Leaf Extracts''. *Basic Microbiology* 2004, pp. 106-113.

[7] Oforjindu, O., ''The toxicity of Graded levels of Neem *(Azadirachta indica*) Leaf Meal''. B. Agric. Tech. Project Report Federal University of Technology Owerri. 2006, *Pp.* 1-34

[8] Ogbuewu, I. P., ''Physiological Responses of Rabbits Fed Graded Levels of Neem (*Azadirachta indica*) Leaf Meal''. M.Sc. Thesis Federal University of Technology Owerri, Nigeria. 2008.

[9] Oluyemi, J. A., and Roberts, F. A., ''*Poultry production in Warm-Wet Climate''.* Spectrum books Limited. Ibadan, Nigeria, 2000, Pp. 24-49.

[10] Sokumbi, O. A., and Egbunike, G. N., ''The Performance of Growing Rabbits Fed diets containing sun cured Neem Leaf Meal''. Proceeding of the 5th Annual conference ASAN, September. 19-22, PH Nigeria, 2000. Pp. 113-116.

[11] Thomas, G. W., Cooper, B., and Lauckner, B., ''Preliminary Investigation into the use of Neem as an Anthelmintic for the Control of Gastro-Intestinal Parasites of Small Ruminants''. Available at http://www.agriculture.gov.bb/agri/images/stories/information_services/documents/2003NAC/Neem.pdf. Accessed on 22/06/2015.

[12] Uko, O. J. and Kamalu, T. N., ''Performance and Carcass Characteristics of Broilers fed raw and Heat-treated Neem (*Azadirachta indica A.juss)* Seed Kernels'', *Animal Proof in Advance Research*2007, pp. 91-98.

[13] Uko, O.J., and. kamalu, T. N., ''The Neem Tree-uses and Potentials''. *Nigeria Journal of Applied Biology.* 2001, pp. 223-229.