EFFECT OF NEEM (*Azadirachta indica*) LEAF MEAL ON HAEMATOLOGY AND SERUM BIOCHEMISTRY OF BROILER CHICKEN AT THE STARTER PHASE

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ABSTRACT
A 28-day feeding trial was conducted to evaluate the effects of dietary inclusion of Neem (Azadirachta indica) leaf meal on the haematological and serum biochemical indices of starter broilers (0-4 Weeks)*. The Neem leaves used in the experiment were manually harvested, air-dried and milled to become Neem leaf meal. The Neem leaf meal was included in broiler starter diets at 0, 1%, 2%, 3% and 4% levels, respectively. One hundred and fifty (150) Marshal Broiler day-old chicks were divided into 5 groups of 30 birds each and randomly assigned to the 5 experimental diets in a completely randomized design (CRD). Each group was sub-divided into 3 replicates of 10 birds each and each replicate housed in a pen fitted with necessary brooding facilities. The hematological result shows no significant (P<0.5) difference was observed in PVC, RBC, MCV and Basophiles across all the treatments. The hemoglobin value in T1, T2, T3 and T4 are statically similar and within the normal range. A significant (P>0.5) difference was observed in MCHC and WBC but within the normal range for broiler. The result on serum biochemistry shows a significant difference (P> 0.5) in all the parameters measured across the treatment except urea which shows no significant difference (P<0.5). The glucose level increased with an increase in Neem leaf meal, while there was a decreased in cholesterol level as the dietary Neem leaf meal increased. In conclusion the hematological and serum biochemical parameters obtained from this study suggested that dietary Neem leaf meal has no deleterious effects on the internal physiology of starter broilers and may lead to the production of low-cholesterol chicken meat as demand by health-conscious consumers.*
Keywords: Neem leaf meal, Starter Broilers, Haematology, Serum biochemistry

INTRODUCTION

Nigerians' Average animal protein consumption is estimated at 4.5g/head/day as against a minimum requirement of 35g/head/day recommended by the Food and Agricultural Organization of the United Nations (Atsu, 2002). The myriad attempts to solve low protein intake and poverty alleviation by the Nigerian government remain a mirage (Nworgu and Hammed, 2009). The poultry sub-sector is the most commercialized of all of Nigeria's agricultural sub-sectors. In the course of intensive livestock production in Nigeria, it has been estimated that feed costs constitute over 70% of total livestock production costs (Alu 2010). Therefore, the need for alternative feed sources. In evaluating such unconventional feed resources, it is important to also check the effects of such feed resources on the health status of the livestock. Esonu *et al*. (2007) stated that hematological constituents reflect the physiological responsiveness of the animals and the influence of diet on hematological traits is very strong. Current studies on Neem *(Azadirachta indica*) leaf indicate an increasing interest in the plant owing to its versatile application and promising uses. The plant is popular because it is readily available, cheap, non-toxic to animals and humans, and efficacious against malaria. *Azadirachta indica* leaves also contain compounds with proven antimicrobial activity (Wikipedia 2007; Valarmathy *et al.* 2010). The antimicrobial activity of extracts of Neem leaves against such micro-organisms as Staphylococcus spp, Streptococcus spp, Pseudomonas spp *and Escherichia coli*, and some fungal strains have been reported (Valarmathy *et al.* 2010; Koona & Budida 2011). Studies on the effects of neem on poultry production especially of broilers and laying hens also exist (Esonu *et al.* 2007). Antimicrobial studies on the effects of neem leaves and their extracts on cultured micro-organisms in vitro have also been carried out (Koona & Budida 2011). Therefore, this study aimed to evaluate the effects of dietary inclusion of Neem (Azadirachta indica) leaf meal on the haematological and serum biochemical indices of starter broiler.

MATERIALS AND METHODS

The study was conducted at Teaching and Research Farm of the Department of Animal Science, Kano University of Science and Technology, Wudil, Kano State. Nigeria. Feed ingredients were purchased from

Albarka feed (Nig) Limited, while Neem leaves were harvested from the neem trees within the university surrounding. The Neem leaves harvested were air dried under shade for 4 days and milled, after which the leaf meal was added into the commercial diets (Ultima super starter©) at 0%, 1%, 2%, 3% and 4% level of inclusion designated as treatments T1, T2, T3, T4, and T5 respectively. A total of 150 unsexed day-old Marshal Strain, of broiler chickens were allotted to five treatments with 30 bird per treatment each treatment is replicated three times with 10 birds per replicate. The birds were assigned in a completely randomized design (CRD). Each treatment group was fed one of the five experimental diets containing 0, 1%, 2 %, 3% and 4% neem leaf meal. The experimental birds were raised on deep litter systems, which were divided into experimental units. At the end of the four weeks feeding trail. Three birds per treatment were selected, about 2 ml of blood was collected from each bird into two sets of sterilized bottles, one containing EDTA as the anti–coagulant for determination of hematological parameters. Blood parameters determined include Packed cell volume, white blood cell, red blood cell, platelets, hemoglobin and differential counts. The second set of bottles without EDTA was centrifuged in a macro centrifuge to obtain serum for biochemical analysis. The parameters determined includes, Creatinine, Albumen, Total Protein, and Total Cholesterol. The data collected were subjected to analysis of variance (ANOVA). Duncan's Multiple Range (DMR) Test was used to separate means where significant different were observed.

RESULT AND DISCUSSION

Table 1: Show the Hematological Indices of Broiler Chickens Fed Neem Tree (*Azadirachta indica)* at Starter Phase

Parameters	Treatments					SEM
	T1	T2	T3	T4	T5	
PCV	32.36^{a}	33.00^{a}	31.66^{a}	33.33^{a}	39.33^{a}	0.7048
WBC× 10^3(µl)	23.89^{ab}	25.03^{ab}	19.17^{b}	26.58^{a}	26.93^{a}	6.313
RBC	3.35^{a}	3.833^{a}	3.367^{a}	3.37^{a}	2.383^{a}	0.2467
MCV	142.0^{a}	130.2^{a}	131.6^{a}	138.6^{a}	130.9^{a}	2.966
HB(g/a)	13.36^{b}	11.46^{b}	11.56^{b}	12.20^{b}	15.40^{a}	1.1086
MCH---C	32.56^{b}	35.96^{ab}	36.00^{a}	35.20^{a}	33.00^{b}	2.0790
Eosin (%)	57.47^{b}	61.81^{b}	75.36^{a}	51.48^{b}	57.57^{b}	1.3152
Basophils (%)	4.44^{a}	6.177^{a}	6.123^{a}	5.45^{a}	4.343^{a}	0.2871
Neotrophils (%)	5.300^{b}	5.716^{ab}	6.33^{ab}	7.44^{a}	4.670^{b}	0.1995
Monocytes (%)	7.133^{ab}	8.100^{a}	5.566^{b}	5.700^{b}	7.366^{a}	0.0694
Lymphocytes (%)	32.50^{b}	35.70^{ab}	43.16^{ab}	46.90^{a}	45.96^{a}	1.2167

Table 2: Serum Chemistry of Broiler Chickens Fed Meem (*Azadirachta indica)* Leaf Meal at Starter Phase

Parameters	Treatments					SEM
	T1	T2	T3	T4	T5	
Creatinine (mg/dl)	31.00^{a}	24.66^{ab}	19.66^{ab}	17.66^{b}	22.66^{ab}	1.174
Urea (mg/dl)	1.800^{a}	2.800^{a}	1.700^{a}	2.333^{a}	1.766^{a}	0.150
Albumin (g/dl)	15.00^{a}	12.33^{ab}	12.66^{ab}	8.66^{b}	11.66^{ab}	0.467
Total protein(g/l)	232.3^{b}	296.3^{ab}	321.3^{a}	311.0^{a}	289.8^{ab}	6.2111
Glucose (mg/dl)	2.3000^{b}	2.666^{ab}	2.933^{ab}	3.900^{a}	3.700^{a}	0.1334
Total cholesterol(mg/dl)	4.86^{a}	5.900^{a}	4.900^{a}	5.667^{a}	5.567^{a}	0.263

CR: Creatinine, ALB: Albumen, TP: Total Protein, TC: Total Cholesterol

The hematological indices of the starter broilers fed graded levels of Neem leaf meal are presented in table 2. No significant difference was observed in PVC, RBC, MCV AND Basophiles across all the treatments. the non-significant difference in RBC and the high level of PCV for birds on T5 (39.33) though not statistically different ($P<0.5$) indicated that the birds did not show any anemic conditions and this also tend to indicate a better utilization of the Neem leaf meal by the birds high PCV of the birds on T5 showed a better transportation and thus result in increased primary and secondary polychemia. The hemoglobin value in T1, T2, T3 and T4 are statically similar and within the normal range reported by (Okeudo, 2003) the high Hb value observed in Treatment T5 may be due to its macro and micro nutrients such Iron and copper which are necessary for hemoglobin synthesis as reported by (Gayathri and Arun, 2019). Observations on the hematological indices revealed no significant MCV of birds on diets containing 1%, 2% , 3% and 4% inclusion levels of Neem leaf meal, all the values were within the reported range of (104-135fl) for chickens raised under tropical conditions (Bilal *et al.,* 2022). The MCHC which is an indication of the average amount and concentration of hemoglobin in the red blood cells is within reported normal range of (30.0-36.2g/dl) (Bilal *et al.,* 2022). A significant difference ($P>0.5$) was observed in the WBC were T5 recorded the higher values (26.93) but statistically similar to the control group. However, all the values are within the normal range for broiler chicken as reported by (Bounous

& Stedman, 2000). A signicant (P>0.5) difference was observed in all the differential counts except Eosonophils which shows no significant this is in contrary to the findings of Obikaonu *et al.,* (2011) who reported no significant (P<0.5) in lymphocytes and that eosinophil, basophiles and neutrophils were absent when he fed neem leaf meal to broiler chickens. The elevated lymphocytes observed in the treatments group containing neem leaf meal could a physiological adjustment against negative antigenic effect associated with the diet.
The result on Serum chemistry of a Broiler chicken fed Neem leaf meal is presented in table 3. The result shows a significant difference (P> 0.5) in all the parameters measured across the treatment except urea which shows no significant difference (P<0.5). The glucose level increased with an increase in Neem leaf meal, there was a decrease in cholesterol level as the dietary Neem leaf meal increased this is in agreement with the report of Mafouso Sonhafouo *et al*. (2019) in a similar work with broiler chickens. Creatinine level was highest (31.00) in the control compared to the rest of the treatments but Urea was not affected by the treatments (P>0.05), an indication that the proteins in the diets were effectively utilized.

CONCLUSION

In conclusion, feeding broilers with Azadirachta indica leaf meal has no beneficial effect on growth performance but may lead to the production of low-cholesterol chicken meat as demanded by health-conscious consumers.

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