Haematological Characteristics of Broiler Birds Administered Neem Leaf (*Azadirachta indica*) and Pawpaw leaf (*Carica papaya*) Leaf Extracts

J. C. Okonkwo[1*], V. N Ezekwe[2], D. N Onunkwo[3], I. F. Okonkwo[4]

[1,2]Department of Animal Science and Technology, Nnamdi Azikiwe University, Awka, Nigeria.
[3]Department of Animal Nutrition and Forage Science, Michael Okpara University of Agriculture, Umudike
[4]Department of Microbiology and Brewery, Nnamdi Azikiwe University, Awka, Nigeria.
*Corresponding Author

Received:- 10 May 2021/ Revised:- 04 June 2021/ Accepted:- 30 June 2021/ Published: 31-07-2021

Abstract— *One hundred and twenty (120) broilers birds of Abore acere breed were used to determine the effect of pawpaw leaf and neem leaf extracts on the haematological profile of broilers birds. The chicks were randomly assigned to four treatments with 30 birds in each treatment. Each treatment was replicated three times with 10 birds per replicate in a completely randomized design (CRD). Treatment 1 received only vaccine and drugs without the leaf extract in their water, treatment 2 and 3 received 150 ml of the Neem and Pawpaw leaf extracts, respectively, and treatment 4 received 75ml of Neem extract and 75ml of pawpaw leaf extract mixed. 150ml of the extracts were all diluted into 1 litre of fresh drinking water and served to the broiler chicken. At the end of the experiment, which lasted for 7 weeks, blood sample were collected from the birds and analyzed for the haemoglobin concentration, packed cell volume, white blood cell count, and red blood cell count. Differential count was also carried out. Data obtained were subjected to analysis of variance (ANOVA). Result showed that there were no significant differences (P> 0.05) among the treatments in all the parameters tested. The study therefore concluded that 150 ml of neem leaf or pawpaw leaf extracts, or combination of the extracts may be administered to broiler birds without any deleterious effect on broilers' haematological indices.*

Keywords— Haematological indices, Neem leaf extract, Pawpaw leaf extract, broiler.

I. INTRODUCTION

In Nigeria, the demand for broiler meat has increased rapidly, as a result of increased income, population growth and urbanization. Broiler production has grown dramatically in the past two decades; these improvements are largely due to numerous researches and breeding programs which further enhanced feed utilization, growth rate and performance. Current commercial hybrids with high performance require high energy diets which would enable the maximum expression of their genetic potential (Sadeghi, 2005). In order to achieve this, poultry farmers make use of antibiotic, vaccines and growth promoter to enhance feed utilization and growth performance of broilers.

Recently, the use of antibiotics and growth promoters in poultry industry has been seriously criticized by policy makers and consumers, because of the development of microbial resistance to these products and the potential harmful effects on human health. Their use has shown many disadvantages like high cost, adverse side effect on health of birds and long residual properties and carcinogenic effect in humans (Butaye *et al*., 2003). In the presence of low levels of antibiotics, resistant cells survive and grow producing an antibiotic resistant population in the final products. Researchers are concentrating efforts on the use of ancient medicinal practice that involves use of beneficial herbs and plants, which could be safe and increase production in terms of weight gain, feed efficiency, and lowered mortality in poultry birds. The present study was therefore,

carried out with the objective to evaluate the physiological effects of some indigenous medicinal plants and their influence on the hematological parameter of broiler and its general performance.

Neem tree (*Azadirachta indica*) possess wide range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepato- protective and various other properties without showing any adverse effects (Kale *et al*., 2003). Neem leaves extract has immunostimulant effect that activates the cell mediated immune response and therefore, creates an enhanced response to any future challenges occurred by disease organisms and the feeding neem leaves to birds increased their humoral and cell mediate immune responses. Pawpaw leaves are rich sources of the proteolytic enzymes papain and chymopapain which have protein digesting properties and are useful in controlling digestive problems and intestinal worms (Burkhill, 1985)

II. MATERIALS AND METHODS

2.1 Study Area and duration of the study

The study was carried out at the poultry farm of Animal Science Teaching and Research Farm, Nnamdi Azikiwe University Awka. The poultry farm is located on the longitude $7^{\circ}\,08'\,31.9''$ E and latitude $6^{\circ}\,15'\,10.1''$ N. And the period of study lasted for (8) eight weeks.

Fresh neem and pawpaw leaves were harvested from the Nnamdi Azikiwe University environment using table knife. 500g (0.5kg) of neem leaf was weighed using electronic sensitive scale. It was properly washed and manually crushed using wooden mortar in a clean environment for five (5) minutes. 500g of pawpaw leaf was weighed, properly washed and manually crushed using wooden mortar. It was extracted using one litter of clean water. 150ml of the neem leaf and pawpaw leaf extracts were obtained respectively using syringe of 10 ml to collect the extracts. The combination of both neem and pawpaw extracts were 75ml for neem and 75ml for pawpaw extract, extraction method, Edeh (2013).

The birds were given as follow: T1 (vaccine +drugs), T2 NLE (150ml+1L of water), T3 PLE (150ml+1L of water) and T4 NPLE (75ml +75ml +1L of water).

The data collected was subjected to Analysis of variance (ANOVA) using Statistical Package for Social Science (SPSS) version 20. The separation of mean was done using DUNCAN multiple range test.

2.2 Preparation of neem and pawpaw leaf extract.

Fresh neem and pawpaw leaves were harvested in Nnamdi Azikiwe University premises close to the farm area and removed dirt. The leaves were measured (0.5 kg each) and placed in a mortar and crushed with pestle for 5mins. The crushed leaves were scooped into a beaker containing 1.5litre of clean water and stirred for 2 minutes for homogeneity. The leaf mixtures were then sieved to obtain a homogenous extract and given to them as follows:

Treatment 1 (vaccine and drugs) Treatment 2 (150ml neem) Treatment 3 (150ml pawpaw)

Treatment 4 (75ml of neem + 75ml of pawpaw) each in dilution of 1 litre of clean water. They were given at the same time the control treatments were being vaccinated. The crushing and sieving procedures were in accordance to Edeh 2013.

2.3 Experimental diets:

The commercial broiler starter and finisher manufactured by Top Feed Eastern Premier Feed Mills LTD. Was purchased from their distributers in Eke Awka Market Awka south L.G.A of Anambra State.

III. RESULTS AND DISCUSSION

The Effect of Neem (*Azadirachta indica)* and pawpaw (*Carica papaya)* on the haematological parameters of broiler is shown in Table 1.

TABLE 1
EFFECT OF NEEM AND PAWPAW EXTRACT ON HAEMATOLOGICAL PARAMETERS OF BROILER

Parameters/Treatment	T1(VD)	T2(NLE)	T3(PLE)	T4(NPE)	SEM
HB (g/dl)	16.33±0.88	16.67±1.45	15.67±0.88	17.67±1.33	0.54^{NS}
PCV (%)	49.0±3.05	49.67±3.75	47.33±2.60	53.0±4.04	1.58^{NS}
WBC (10^9/µL)	3.67±0.33	4.33±0.33	3.33±0.88	2.33±0.33	0.313^{NS}
RBC (10^{12}/ µL)	4.53±0.34	4.60±0.38	4.40±0.32	4.98±0.39	0.166^{NS}
Plasma fraction (%)	51.0±3.06	50.33±3.76	52.67±2.60	47.0±4.04	0.72^{NS}
Heterophil (%)	57.50±4.50	58.80±0.50	48.00±4.62	58.0±5.00	2.42^{NS}
Lymphocytes (%)	41.0±4.00	40.50±0.50	49.67±5.00	39.5±5.00	2.422^{NS}
Basophil (%)	0.00±00	0.00±0.0	0.00±0.0	0.00±0.0	0.00
Monocytes (%)	1.50±0.50	2.0± 0.00	2.0±0.500	2.00±0.00	0.422^{NS}
MCV(FL)	108.2±1.27	107.9±1.22	107.9±2.69	106.7±0.63	0.72^{NS}
MCHBC (%)	33.33±0.38	33.49±0.47	33.55±0.47	33.35±0.32	0.179^{NS}

VD = Vaccine and Drug; NLE = Neem Leaf Extract; PLE = Pawpaw Leaf Extract, NPE = Neem and Pawpaw Leaf Extract. NS = Not significant (P> 0.05), SEM = the standard error of the mean, TI = Vaccine + drugs, T2 = 150ml of Neem leaf extract, T3 = 150ml of pawpaw leaf extract and T4 =75ml of Neem + 75ml 0f pawpaw leaf extract = (150ml).

From the results shown in Table 1, no significant (P> 0.05) difference existed among the treatment with respect to the haematological parameters, Haemoglobin concentration (HB), Packed cell volume (PCV) Red blood cell count (RBC), Plasma fraction, White blood cell count (WBC), Mean corpuscular haemoglobin (MCHC), Mean corpuscular volume (MCV), Heterophil, Monocytes, Lymphocytes, and Basophil.

With respect to the Packed cell volume (PVC) ,there was no significant difference (P>0.05) when the treatment were compared, but the use of Neem leaf extract and pawpaw leaf extract had an enhancing effect on the packed blood cell volume of broilers with the highest range on T4 (75ml Neem +75mlpawpaw extract) with a mean range of 53.00, the result agrees with the findings of Obikaonu *et al*. (2014), Ihekwumere and Herbert(2003), Edeh (2013) and Nusrat (2014) who reported the that inclusion of neem and pawpaw leaf extract had no significance difference on the packed cell volume of broiler birds.

Also haemoglobin (Hb) ,the present findings and results showed no significant difference (p> 0.05), among the treatment which support the report of Obikaonu *et al* 2014, Iheukwumere and Herbert (2003), Islam *et al* (2003) and Nusrat (2014) who reported that the inclusion of Neem leaf meal had no significant difference on the haemoglobin concentration of broilers.

However, there was no significant difference (p> 0.05), among the treatment with respect to the Red Blood Cell count (RBC) and The white Blood Cell (WBC), but the heterophil were highest, following the lymphocytes value and according to Okeudo *et al*. (2003) lymphocytes is the most numerous in avian. In the findings, monocytes were also observed but there were no trace of eosinophil at all the treatment which conforms to the work of Obikaonu *et al.* (2014). And the presence of monocytes and the absence of eosinophil indicate no toxin or bacterial infection (Frandson, 2004). This finding also agrees to report of Nusrat (2014) .Though from the result the T2 (Neem) had the highest white blood cell count numerically, for the heterophil, T4 (Neem+ Pawpaw) had the highest percentage with the T2 (Neem) as well. Then T3 (pawpaw) had the highest lymphocytes percentage.

IV. SUMMARY

A total of 120 (one hundred and twenty) day older broilers of Abore acre breeds were used for the experiment to determine the effect of Neem and pawpaw leaf extract on the physiological response of the broilers as regard to their haematological profile at a ratio of 150ml to 1 lire of water for 7 weeks and from the finding gotten from the result above showed that there is no significant difference (P> 0.05) but from the result obtained some of the haematological compared more favourably than other even though the differences were not significant. Especially the groups treated with a combination of Neem and pawpaw (T4) and that of treatment 3 (T3) only pawpaw extract had some difference numerically.

V. CONCLUSION

Finally, it can be concluded from the result of the experiment that at end of the experiment, the blood profile of the broilers treated with vaccine and drugs, Neem leaf extract, pawpaw leaf extract and a mixture Neem and pawpaw leaf extract had no significant (P>0.05) difference, all the parameter compared favourably the same with the control treatment.

VI. RECOMMENDATION

In as much as there were no significant difference, but there occur a little high range in treatment 4, therefore I recommend the used of mixture of Neem leaf extract and pawpaw leaf extract (150ml) because it gave higher range on haemoglobin concentration, packed cell volume, red blood cell count, and heterophil percentage, and at the same time it is cost effective as Neem leaves and pawpaw leaves are easily accessible to the farm. Further detailed research should be carried to check level of inclusion of the mixture of Neem and Pawpaw leave extract on the haematological profile of broiler.

REFERENCES

[1] O. A. C. (1995). Association of Official Analytical Chemists Official Methods of Analysis, 7th Edition Washington D.C.

[2] Adene D.F. (2000). Action plan for poultry animal Health in pilot scale study under FAO/NIRI/7822. Pp. 81.

[3] Adene, D.F. (2004). Global dimensions in poultry health problems. National perspective in poultry health and production efficiency, Stirling – Horden Publisher Nigeria Ltd. Lagos, Pp. 213- 219.

[4] Adene, D.F. (2006). Application of cost in disease evaluation to risk management in poultry Book of proceeding WIRP. Ahamadu Bello University, Zaria. Nigeria. pp. 147 -156.

[5] Adenkola, A.Y. and Anugwa, F.O. (2007). Effects of dietary supplement of ascorbic acid on the performance of piglets in Markurdi, Benue state of Nigeria, *Tropical Veterinarian*, 25 (1): 15-17.

[6] Adeyemo, G.O., Ologhobo, A.D. and Adebiyi, O.A. (2010). The effect of graded levels of dietary methionine on the haematology and serum biochemistry of broilers. *International Journal of Poultry Science*, 9(2): 158-161.

[7] Afolabi, K.D., Akinsoyinu, A.O., Abdullah, A.R.O., Olajide R. and Akinleye, S.B. (2011). Haematological parameters of the Nigerian local grower chickens fed varying dietary levels of palm kernel cake. *Poljoprivreda*, 17: (1) 74-78.

[8] Akinmalodun, A.C., Ibukun, E.O., Afor, E., Akirinlola, B.L., Onibon, T.R., Akinboboye, A.O., Obuotor, E.M., and Farombi, E.O. (2007).Chemical constituents and antioxidant activity of *Alstoniaboonei*. *African Journal Biotechnology*, 6(10):1197-1201.

[9] Alodan, M.A. and Mashaly, M.M. (1999). Effect of induced molting in laying hens on production and immune parameters. Poultry Science, 78: 171-177.

[10] Anna Horsbrugh Porter. (17 April 2006). "Neem: India's tree of life". BBC News.

[11] Atta, K. (1999). The Power of Garlic on Cardiovascular disease prevention. Association Bureau Cameroon, p.72.

[12] Ashagidigbi, W.M., Sulaimon, S.A., Adesiyan, A. (2011). Technical efficiency of Egg Production in Osun State. *International Journal of Agricultural Economics and Rural Development*, 6(4):124-130.

[13] Araujo, L.F., Junqueira, O.M., Araujo, C.S.S., Faria, D.E., and Andreotti, M.O. (2004). Different criteria of feed formulation for broilers aged 43 to 49 days. *Brazilian Journal of Poultry Science*, 6(1): 61-64.

[14] Babatunde, B. (2011). Poultry potentials for National Agricultural Revolution. http://www.Google .com. 22nd August 2016.

[15] Bolhius, G.G. (1954). The toxicity of cassava roots, *Neth. Journal Agriculture*, 2:176-185.

[16] Burkhill, H.M. (1985). The useful plants of West Tropical Africa. *Royal Botanical Garden Kew*, 7 (1): 200- 219.

[17] Bush, K.L., and Strobeck, C. (2003). Phylogenetic relationship of the phasianidae reveals. Pp.40- 51.

[18] Butaye, P., Luc, A., Devriese, F., and Haese, B. (2003). Antimicrobial Growth Promoters used in Animal feed: Effects of less well known antibiotics on Gram – positive bacteria. *Clinical Microbiology, Review*, 16 (2):175 – 188.

[19] Chikezie, P.C., Agomuo, E.N., and Amadi, B.A. (2008). Biochemistry, Practical Research Method a Fundamental Approach. Volume 2, Mega soft publishers, pp. 51-53.

[20] Cowan, M.M. (1999). Plant products and antimicrobial agents. *Clinical Microbiology Reviews*, 12:564-582.

[21] Dick, G. (2003). Papaya: A tantalizing taste of the Tropics. Maricopa Country Master Gardener volunteer information, University of Arizona Cooperative Extension http://ag.arizona.edu/maricopa/garden/html/pubs/mgjournal.htm.

[22] Ebenebe, C.I., Itefue, O., Ebere-Ohameje, T.C., and Okonkwo, J.C. (2011). Fortification of the nutritive diet, value of Mushroom (*Termitomycesmicrocarpus*) with paw-paw leaf meal for broiler chicks up to 13 weeks of age. *Pakistian Journal of Nutrition*, 10(2):155-158.

[23] Edeh, H.O. (2013): Physiological Response of Broiler Birds To Oral Supplementation *With Aloe Vera And Neem Leave Extracts*. Visual library Faculty of Agriculture, Department of Animal Science University of Nigeria, Nsukka, 125, 35-40.

[24] Eleazu, C.O., Okafor, P.N., and Ahamefuna, I. (2010). Total antioxidant Capacity, Nutritional Composition and Inhibitory Activity of Unripe Plantain (*Musa paradisiacae*) on Oxidative Stress in Alloxan Induced Diabetic Rabbits, *Pakistan Journal Nutrition*, 9(11):1052-1057.

[25] Eleazu, C.O., Okafor, P.N., Amajor, J., Awa, E., Ikpeama, A.I., and Eleazu, K.C. (2011). Chemical Composition, antioxidant activity, functional properties and inhibitory action of unripe plantain (M. *Paradisiacae*) flour. African Journal Biotechnology, 10(74):6948-6952.

[26] Elizabeth, K. (1994). Immense help from nature's workshop. 1st Edition Elikaf Health Services Ltd. Ikeja, Lagos. pp. 207-209.

[27] Enwere, N.J (1998). Foods of Plant Origin, International Journal Microbiology, 9 (94):329-334.

[28] Eriksson, J., Larson, G. Gunasson, U., Bedhom, B. and Tixier- Biochard, M. (2008). Identification of yellow gene reveals a hybrid origin of the domestic chicken. *Trends in Genetics*, 22(3).

[29] Iheukwumere, F. C., and Herbert, U. (2003).Physiological response of broiler chickens to quantitative water restrictions, Hematology and serum biochemistry. International Journal of Poultry Science, 2:117 – 119.

[30] Nusrat, M. (2014). Effects of neem, papaya and turmeric on growth performances of broilers (thesis) .Bangladesh agricultural university, mymensingh-2202). Pp. 45.

[31] Obikaonu, H.O., Mmereikwu, V.M., Odoemena, V.U., Okoli, I.C., and Udedibie, A.B. (2014). Haematological and serum biochemical indices of finisher broiler fed Neem (Azadirachtaindica) leaf meal. International journal of Agriculture and Rural Development,17(1): 1641-1647.