IMPACT OF SELECTED PLANT LEAF EXTRACTS ON HAEMATOLOGY OF BROILER CHICKS

[1]Okiri, A. L., *[2]Ingweye, J.N. and [1]Kalio, G.A.
[1]Department of Animal Science & Fisheries, Faculty of Agriculture, Ignatius Ajuru University of Education, Port Harcourt, PMB, Port Harcourt, Nigeria.
[2]Department of Animal Science, Faculty of Agriculture, University of Port Harcourt, PMB 5323, Port Harcourt, Nigeria.
Corresponding author's email: jiningweye@gmail.com; +2348032573003

ABSTRACT
The effect of some leaf extracts (Cortus afer, Jatropha curcas and Psidium guajava) delivered in drinking water on the haematology of broiler chickens was assessed using 120 broiler chicks randomly assigned to 4 treatment groups consisting of 30 birds per treatment, subdivided into 10 birds per replicate in Completely Randomized Design (CRD) experiment. The treatments were T1 or control (water + proprietary organic tonic), T2 (water + Costus afer leaf extract), T3 (water + Jatropha curcas leaf extract) and T4 (water + Psidium guajava leaf extract). On the last day of the 5-week study, blood samples from the birds were analysed for PCV, Hb, RBC, WBC, MCHC, MCH and MCV. Results revealed that PCV, Hb, RBC, WBC, MCHC, MCH and MCV values ranged from 28.20–32.84%, 10.34–12.62g/dL, 2.62–3.76 (x106/mm3), 20.09–25.46(x103/mm3), 102.59–122.70fl, 31.86–34.62% and 40.06–44.04pg, respectively. There were significant ($p<0.05$) differences for all indices measured. The values were normal for all the groups. It can be recommended that poultry farmers use Jatropha curcas leaf extract in drinking water (T3) for broiler birds to improve their haematological markers.
Key words: Broilers, leaf extracts, organic tonics, performance and haematology.

INTRODUCTION

One of the effective means of managing broilers is to maintain them in intensive systems with large flocks for higher economic returns (Okujagu and Kalio, 2006). In such a situation, the birds are exposed to stress-inducing factors such as high population density, vaccination and rising temperature. During this period the intestinal microflora balance in the birds could be unfavourably be tilted by these factors, leading to deterioration in the health of the chickens (Shokraneh *et al*., 2016). The imbalance in intestinal microflora may result in weakened immune system and reduced growth performance in the birds (Shokraneh *et al*., 2016). Additives, such as antibiotics, may assist in dealing with such problems. But, long-term inclusion of antibiotics in broiler diets may result in increased microbial resistance to such medications in livestock and humans (Alagbe *et al*., 2021). Thus, antibiotics were banned from being added to feed in the European Union and other countries (Alcicek *et al*., 2004).

Due to this ban on the use of antibiotics and the growing pressure on livestock producers to stem the tide of disease-causing microorganisms, alternative to antibiotics in promoting animal growth and health are being investigated as solutions to the problem. Among those being considered are phytogenics such as plant leaf extracts. Leaf extracts stimulate appetite and feed intake, improve secretion of endogenous digestive enzymes, activate immune responses and support antibacterial, antiviral and antioxidant actions in the body of poultry (Nwokolo, 2021).

Haematological indices reflect the physiological status of animals (Khan and Zafar, 2005) and act as pathological markers (Olafedhan *et al*., 2010). Animals with good haematological indices would likely perform well. This study compares the effect of *Cortus afer*, *Jatropha curcas* and *Psidium guajava* leaf extracts on the haematological indices of broiler chicks using proprietary organic tonic as control.

MATERIALS AND METHODS

Experimental site: The experiment was carried out at the Teaching and Research Farm, Ignatius Ajuru University of Education, Ndele Campus, Port Harcourt, Nigeria at Latitude 4^0 58' N and Longitude 6^0 48' E (Kalio *et al*., 2009). It is situated in the humid tropical zone of Nigeria.

***Processing of test ingredients*:** Fresh leaves of *Cortus afer*, *Jatropha curcas* and *Psidium guajava* were harvested from the premises of Ignatius Ajuru University of Education at Ndele Campus. Proprietary organic tonic was purchased from agro input shop in Port Harcourt. Fresh 60g leaves of *C. afer*, *J. curcas* and *P. guajava* were pounded with mortar pestle and added to 1litre of water and filtered using muslin cloth to extract their juices according to Alabi *et al*. (2017). The extracts were stored in a refrigerator for administration to the chicks. One ml of proprietary organic tonic was mixed with 10 litres of water.

***Birds and their management*:** 120 1-day-old Marshall breed broiler chicks were randomly assigned to the 4 dietary treatments consisting of 30 birds/treatment. Each treatment was replicated 3 times of 10 birds/replicate in a pen of size 3 x 4 x 15m each in a Completely Randomized Design. They were brooded in deep litter system for 28 days using charcoal heaters. The chicks were randomly allotted to four treatment groups: T1 (water + propriety organic tonic or control), T2 (water + *Costus afer* leaf extract), T3 (water + *Jatropha curcas* leaf extract) and T4 (water + *Psidium guajava* leaf extract). The experiment lasted for 5 weeks. Routine medication and vaccination were carried out to ensure proper health of the birds.

***Blood sample collection and analysis*:** On the last day of a 35-day experiment, 3 birds/treatment were slaughtered and 2ml of blood taken for analysis of packed cell volume (PCV), haemoglobin (Hb) concentration, red blood cell (RBC) and white blood cell (WBC). Mean corpuscular haemoglobin (MCHC), mean corpuscular hemoglobin (MCH) and mean corpuscular volume (MCV) were calculated from RBC, Hb and PCV values: where, MCV = [(PCV ÷ RBC) X10]; MCHC = [(Hb ÷ PCV) X100] and MCH = [(Hb ÷ RBC) x10] were calculated (Jain, 1986).

***Statistical analysis*:** Data were analysed using SPSS Statistical Package using Analysis of Variance (ANOVA) procedure for a Completely Randomized Design. Significant means were separated using LSD in SPSS.

RESULTS AND DISCUSSION

Haematology of broiler chicks served organic tonics and leaf extracts in water

The haematological responses of broiler starter birds served with water and different leaf extracts such as: T_1 – Water + organic tonic, T_2 – Water + *Costus afer*, T_3 - Water + *Jatropha curcas* and T_4 - Water + *Psidium guajava* is presented in Table 1. There were significant differences ($p< 0.05$) in the values PCV, haemoglobin (Hb), Red blood cell (RBC) and white blood cell (WBC) among the dietary treatments. The Mean corpuscular volume (MCV), Mean corpuscular haemoglobin concentration (MCHC) and Mean corpuscular haemoglobin (MCH) were significantly ($p< 0.05$) different. The PCV values obtained from this study ranged between 28.20–32.84%. The values reported in this study were within the standard range of values (22–35%) for healthy chickens (Schalm *et al*., 1975).

Table 1: Haematological of broiler chicks drinking organic tonic and leaf extracts in water

	Treatments					
Parameters	T1	T2	T3	T4	Mean	±SEM
PCV (%)	32.84^{a}	28.20^{c}	29.86^{b}	32.00^{a}	30.73	1.21
Hb (g/dL)	12.62^{a}	10.34^{d}	10.76^{c}	11.40^{b}	11.28	0.24
RBC ($x10^6/mm^3$)	3.36^{a}	2.62^{b}	3.76^{a}	3.50^{a}	3.31	0.59
WBC ($x10^3/mm^3$)	25.46^{a}	20.09^{c}	21.53^{c}	22.60^{bc}	22.42	1.72
MCV (*fl*)	102.59^{c}	116.36^{b}	122.70^{a}	116.22^{b}	119.91	1.36
MCHC (%)	34.43^{a}	30.29^{d}	31.86^{c}	$34.\ 62^{a}$	32.80	0.56
MCH (*pg*)	40.52^{c}	42.95^{b}	44.04^{a}	40.06^{c}	41.89	0.65

[a, b, c] Means in same row with different superscripts are significantly different ($p<0.05$); SEM=Standard Error of Mean; PCV=Packed cell volume; Hb=Haemoglobin; RBC=Red blood cell; WBC=White blood cell; MCV=mean cell volume; MCHC=mean corpuscular haemoglobin concentration; MCH=mean corpuscular haemoglobin

The haemoglobin values ranged between 10.34–11.40 g/L. These values were within the normal range (i.e. 7–13g/L) for chickens generally and broiler chickens (8.6–10.7g/L) specifically (Banerjee, 2004; Madubuike and Ekenyen, 2006), implying treatment administration had no impact on haemoglobin. The packed cell volume and haemoglobin values reported for broilers in this study are very relevant as these haematological indices have been earlier correlated with nutritional status of animals

(Adejumo, 2004). The RBC values for the birds ranged between 2.62–3.76 x 10^3/mm^3. These observed values were within the normal range (2.5–3.8 x10^3/mm^3) for normal or healthy chickens (Banerjee, 2004), thus implying that aqueous leaf extracts have no dangerous effect on the broilers as they maintain their normal blood count (Sembulingam and Sembulingam, 2002). The WBC values for the birds ranged between 20.09–25.46 (x 10^3/mm^3) and were higher than normal values. The higher WBC values indicate the extracts are capable of generating antibodies in the process of phagocytosis and making the chickens resistant to diseases (Soetan *et al*., 2013) and enhance adaptability to local environmental and diseases prevalent conditions (Iwuji and Herbert, 2012). The MCV values of the broilers ranged between 102.59–122.70fl. These values fell within the values reported for normal broilers (Akinola and Etuk, 2015), hence, administration of treatments had no effect on MCV values.
The MCHC values ranged between 30.29–34.62%. These values were within the normal range for healthy broilers (Adeyemo and Sani, 2013). Similarly, the MCH values ranged from 40.06–44.04 pg. They were within the normal range for healthy broilers (Adekunle and Omoh, 2014). The range of normal blood values obtained in this study indicate no effects, negative or positive of leaf extracts on haematological parameters of broiler chickens as in concerns the use of these extracts in the nutrition of broiler chickens.

CONCLUSION AND RECOMMENDATION

The haematological indices of broiler chicks exposed aqueous leaf extracts in drinking water was studied. The haematological values obtained were within the normal range. It is recommended that poultry producers may use *Jatropha curcas* leaf extracts as it could improve blood chemistry and performance of broilers.

REFERENCES

Adejumo, D. O. (2004). Performance, organ development and haematological indices of rats fed sole diets graded levels of cassava flour and soybean flour (soygari) as substitutes for energy and protein concentrates. *Tropical Journal of Animal Science,* 7: 57–63.

Adekunle, A.R. and Omoh, O.S. (2014). Haematological traits and serum chemistry of broiler chicken fed bread waste-based diets. *Journal of Animal Health and Production*, 2 (4): 51–54.

Adeyemo, G. O. and Oluyede, F. A. (2015). Dietary inclusion of ethanolic extracts of Jatropha curcas on the performance and carcass characteristics of broiler chickens. *American Journal of Experimental Agriculture,* 8 (2): 130–136.

Akinola, L. A. and Etuk, M. O. (2015). Haematological and serum biochemical responses of broilers fed varying levels of Indomie waste-based diets. IOSR *Journal of Agriculture and Veterinary Science*, 8 (1): 66–70.

Alabi, Q. K., Akomolafe, R O; Omole, J G; Adefisayo, M A; Ogundipe, O L; Aturamu, A; Sanya, J O (2018). Polyphenol-rich extract of *Ocimum gratissimum* leaves ameliorates colitis via attenuating colonic mucosa injury and regulating pro-inflammatory cytokines production and oxidative stress. *Biomedicine & Pharmacotherapy*, 103: 812–822.

Alagbe, J. O., Shittu, M. D. and Ojo, E.A. (2021). Prospect of leaf extracts on the performance and blood profile of monogastric – A Review. *International Journal of Integrated Education*, 3 (8), 122 – 127.

Alçiçek A, Bozkurt M and Çabuk M (2004). The effect of an essential oil combination derived from selected herbs growing wild in Turkey on broiler performance. *South African Journal of Animal Science*, 33(2),89-94.

Benerjee, G.C. (2004). A textbook of animal husbandry, 8th Edition. Oxford and IBH Pub., Co., PVT, LTD.

Iwuji, T. C. and Herbert, U. (2012). Haematological and serum biochemical characteristics of rabbit bucks fed diets containing Garcinia kola seed meal. Proceedings of 37th Annual Conference of Nigerian Society for Animal Production. Pp.87-89.

Jain, N.C., and Schaims (1986). Veterinary Haematology. 4th Edition. Lea and Febiger, Philadelphia U.S.A.

Kalio, G.A., Okafor, B.B., and Legbara, K.P. (2009). Multipurpose trees and shrub foliage as valuable feed resources for integration into commercial snail farming. *Journal of Vocational Education and Technology, 6* (1 & 2), 143 – 150.

Khan, T. A., and Zafar, F. (2005). Haematological Study in Response to Varying Doses of Estrogen in Broiler Chicken. *International Journal of Poultry Science,* 4(10), 748-751.

Madubuike, F.N and Ekenyen, B.U. (2006). Haematology and serum biochemistry characteristics of broiler chicks fed varying dietary levels of *Ipomoea asarifolia* leaf meal. *International Journal of Poultry Science*, 5(1), 9-12.

Nwokolo, C. (2021). Miraculous health benefits of jatropha (hospital too far). https://healthguide.ng/health-benefits-jatropha-hospital-too-far/

Obi, I.U. (2001). Statistical Method of Detecting between Treatment Means. SNAAP Press Nigeria Limited, Enugu, Nigeria.

Okujagu, A.A and Kalio, G.A. (2006). **INTRODUCTION** to Agriculture. Ikogho Publishers Benin City, Edo State, Nigeria.

Olafedehan, C. O., Obun, A. M., Yusuf, M. K., Adewumi, O. O., Oladefedehan, A. O., Awofolaji, A. O., and Adeniji, A. A. (2010). Effects of residual cyanide in processed cassava peal meals on haematological and biochemical indices of growing rabbits. Proceedings of 35th Annual Conference of Nigerian Society for Animal Production. 212pp.

Schalm, O.W., Jain N.C., and Carol E.J. (1975). Veterinary Haematology. 3rd Edition. Publisher. Lea and Febiger Philadelphia.

Sembulingam, K., and Sembulingam, P. (2002). Essentials of medical physiology. (2nd Ed). Jaypee Brothers Medical Publishers (P) Ltd. p. 840.

Shokraneh, M., Ghalamkari, G., Toghyani, M., and Landy, N. (2016). Influence of drinking water containing Aloe vera (*Aloe barbadensis* Miller) gel on growth performance, intestinal microflora, and humoral immune responses of broilers. *Veterinary World*, 9 (11): 1197.