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## HAEMATOLOGY OF BROILER CHICKEN AT STARTER PHASE ADMINISTERED WITH HOG PLUM (*SPONDIAS MOMBIN*) LEAF EXTRACT

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### ABSTRACT

Broiler chicken requires good attention that will aid the growth potential for effective cost of production without compromising the quality and health status. Thus, this study was conducted to investigate effect of *Spondias mombin* leaf extract on haematological indices of broiler chickens at starter phase (0-4weeks). *Spondias mombin* leaf extract was administered at 25mL, 50mL, 75mL and 100mL per litter of water on 200-day-old chicks. Blood sample was collected via jugular vein from two birds per replicate at day 21 into EDA bottles and analysed for packed cell volume (PCV), haemoglobin (Hb), red blood cells (RBC) and white blood cell (WBC) and white blood differential count. Result showed that superior ( $P < 0.05$ ) PCV (35.00%), Hb (18.80g/dl), RBC ( $2.40 \times 10^{12}/l$ ) and heterophils (39.33%) were obtained in birds administered with 75mL extract. Least ( $P < 0.05$ ) white blood cell was obtained with birds on control but was similar ( $P > 0.05$ ) with those on 50mL *Spondias mombin* extract. Monocytes, eosinophils and basophils, mean corpuscular haemoglobin and mean corpuscular volume were similar ( $P > 0.05$ ) across treatments. The study concluded that *Spondias mombin* leaf extract was not toxic and could be administered up to 75mL/litre of water without any deleterious effects on blood of 0-4weeks old broilers.

**Keywords:** *Spondias mombin*, broiler chickens, haematology

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### INTRODUCTION

Poultry is one of the fastest means to achieving improvement in the nutritional status of the human populace across the globe because of its short production interval and quick turnover rate (Ani and Okeke, 2011). However, the industry is challenged by the abuse and over utilisation of antibiotic growth promoters with daunting consequences on health, products quality and food safety (Okorie *et al.*, 2016). Efficient feed utilisation and cost reduction could make quality animal protein available and achievable using natural feed promoters in form of additives (Adegbenjo *et al.*, 2015; Alagbe *et al.*, 2018). *Spondias mombin* is one of the natural plant additives with a promising potential to serve in this capacity. It is widely used in trado-medicine. Every part of the plant is medicinally useful; it is rich in protein and antioxidant (Daniel, 1990). Oladunmoye (2007) reported that methanolic extract of *Spondias mombin* affected the haematology of rats resulting from *in vivo* antimicrobial activity on some pathogens.

Haematological values serve as a standard for comparison in conditions of nutrient deficiency, efficacy and toxicity, and health status of farm animals (Oyawole and Ogunkunle, 2004). Dietary intake has been recognized as the major factor affecting the blood composition because blood transports nutrients, nourishments and other materials to different parts of the body (Olabanji *et al.*, 2007). Consequently, whatever affects quality intake could certainly affect blood and health of an animal (Oluwafemi *et al.*, 2021).

Several research have been carried out on the efficacy of *Spondias mombin* as antibacterial, antifungal, antidiabetic, antitumor, anti-ulcer, antioxidant (Corthout *et al.*, 1992; Adeoye *et al.*, 2015; Okonkwo *et al.*, 2017). Alagbe *et al.* (2018) used it in the treatment of the digestive system. However, there is paucity of information on the aqueous extract of *Spondias mombin* in broiler chickens thus the essence of this study.

### MATERIALS AND METHODS

The experiment was conducted at the Poultry Unit, Directorate of University Farms (DUFARM), Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. Fresh and healthy leaves of *Spondias mombin* were harvested within the University premises. Ten kilograms (10kg) of the leaves were rinsed under running tap water and then boiled in 10litres of water in ratio 1:1 for 30minutes. It was allowed to cool and sieved before being stored in glass bottle containers and afterwards kept in a

refrigerator until use. The extract was added to daily water supply of the birds at the rate of 0, 25, 50, 75 and 100mL per litre of water using measuring cylinder to give five treatments (1, 2, 3, 4 and 5, respectively).

Two hundred (200) day-old chicks were allotted to the treatments. Each treatment replicated five times. The birds were reared using deep litter system. Birds on the control were treated following the commercial convention. Clean and cool water accordingly were provided *ad libitum*. Formulated broiler starter feed (Table 1) was offered to the birds *ad libitum* throughout the starter phase (28 days). Blood samples were collected on day 22 of the trial using syringe and needle via the jugular vein from two birds per replicate according to treatment and analyzed for hematological parameters.

Data obtained was subjected to one-way analysis of variance in a Completely Randomized Design using (SAS, 2002) and where significant differences occurred, means were separated using Duncan's multiple range test as contained in SAS.

Table 1: Composition of Experimental Diet

Ingredients	% composition
Maize	55.00
Fish meal (72%)	2.00
Soybean meal	22.00
Groundnut cake	12.00
Wheat offal	1.00
Bone meal	3.00
Oyster shell	4.00
Lysine	0.10
Methionine	0.10
*Vit/Min premix	0.25
Common salt	0.25
Total	<b>100.00</b>
<b>Determined analysis</b>	
Crude protein (%)	22.18
Crude fibre (%)	2.90
Metabolizable energy	2889.5Kcal/M E
Ether extract (%)	3.80
Calcium (%)	2.40
Phosphorus (%)	0.60

\*Premix composition per kg diet: Vit A :400000IU, Vit D:80000IU, Vit E:40000ng, Vit k3:800mg, Vit B1:1000MG, Vit B2:6000mg, Vit B6:500mg, VitB12:25mg, Niacin:6000mg, Panthothenic acid:2000mg, Folic acid: 200mg, Biotin:8mg, Manganese:300000g, Iron:8000mg, Zinc:20000g, Cobalt:80mg, Iodine:400mg, Selenium:40mg, Choline:800000g

## RESULTS AND DISCUSSION

Effect of *Spondias mombin* on haematological parameters of broiler chickens at starter phase is as shown in Table 2. Aqueous extract *Spondias mombin* had effects ( $P < 0.05$ ) on packed cell volume (PCV), haemoglobin concentration (Hb), red blood cells (RBC), white blood cells (WBC), lymphocytes and heterophils of the birds. Highest PCV (35.00%), Hb (11.80g/dL), RBC ( $2.97 \times 10^2/L$ ) and heterophils (39.33%) were observed with birds on 75ml *Spondias mombin* per litre of water while least values were recorded with birds on 50mL/L. Haematological profiles are commonly used in nutritional studies. The PCV, Hb and RBC recorded in this work indicated absence of toxicity, a healthy state of the animal and good blood formation (Banerjee, 2008). This finding was consistent with that of Esonu *et al.* (2001) who reported that reduction in the concentration of PCV suggests the presence of a toxic factor with adverse effect on blood formation and oxygen (energy combustion) carrying capacity. *Spondias mombin* in this study could be assumed not toxic and thus support blood formation in the broiler chickens; and the birds could therefore be judged not anaemic.

Superior ( $P < 0.05$ ) WBC (11.53g/100mL) and Heterophils (36.33%) were obtained with birds on control (0ml/L of *Spondias mombin*) treatment. These were however similar ( $P > 0.05$ ) with those on 25mL and 50mL while birds on 100ml *Spondias mombin* per litre of water recorded highest WBC (16.4g/100mL. The White blood cell recorded with birds on 75 and 100ml/L inclusion level in this study was slightly higher than the normal blood range values (5.00-15.00g/100mL) suggesting infection of the experimental birds. This finding was contrary to that of Okonkwo and Esiegwu (2017) who reported non-significant effect of *Spondias mombin* meal in diet of finishing broiler chickens. The variation could be the physiology of the birds as finishing broilers are older and assumed to be of stronger immune status compared with starter (younger) birds. This opinion is collaborated by Song *et al.* (2021) who reported that immune system and function did not developed well in young (6 to 13 days) broiler chickens but until 30 to 34 days. Birds in this study were less than the age to be considered as adults. They could be assumed to be low in immune function to properly utilise the *Spondias mombin* derivatives since the WBC increased with increased concentration of *S. mombin*. According to Soetan *et al.* (2013), animal with high WBC could experience organ damage with an overpopulation of the eosinophils within organ tissue. Though, eosinophils was not significant in this study, effect *S. mombin* extract could be assumed not very deteriorating at the time of use suggesting limitation to use time and quantity. Consequently, *S. mombin* should not be administered to young broiler chickens in high concentration to prevent organ/tissue damage.

Aqueous *Spondias mombin* extract had no significant effects ( $P > 0.05$ ) on monocytes, eosinophils, basophils, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration of the birds. The primary function of eosinophil is detoxification of foreign proteins or toxins produced by bacteria and parasites (Banerjee, 2008). This may suggest that there was no toxicity of the blood arising from intake of the test ingredient. The lymphocytes and neutrophils values obtained in this study were within the normal range. This also indicated that *S. mombin* had no negative effects on the birds at 0-4weeks old. There was no significant ( $P > 0.05$ ) effects on the mean cell volume and mean cell haemoglobin of the birds. This was an indication of a physiological normalcy of the red blood cell as the values were within the normal range recommended for healthy chickens (Banerjee, 2008).

Table 2: The effect of haematology profile of broiler chickens administered with *Spondias mombin* leaf extract at starter phase

Parameters	<i>Spondias mombin</i> extract inclusion (mL/L)					SEM	P-value
	0	25	50	75	100		
PCV (%)	28.00 <sup>ab</sup>	28.00 <sup>ab</sup>	26.00 <sup>b</sup>	35.00 <sup>a</sup>	29.00 <sup>ab</sup>	1.16	0.132
HB (g/dL)	9.37 <sup>ab</sup>	9.47 <sup>ab</sup>	8.77 <sup>b</sup>	11.80 <sup>a</sup>	9.73 <sup>ab</sup>	0.38	0.121
RBC ( $\times 10^2$ /L)	2.33 <sup>b</sup>	2.33 <sup>b</sup>	2.67 <sup>b</sup>	2.97 <sup>a</sup>	2.40 <sup>ab</sup>	0.09	0.123
WBC (g/100mL)	11.53 <sup>b</sup>	14.97 <sup>ab</sup>	13.63 <sup>ab</sup>	14.59 <sup>ab</sup>	16.40 <sup>a</sup>	0.59	0.088
LYM (%)	62.00 <sup>ab</sup>	67.00 <sup>a</sup>	63.67 <sup>ab</sup>	58.00 <sup>b</sup>	58.67 <sup>b</sup>	1.21	0.083
MONO (%)	1.00	0.67	1.33	1.33	0.67	0.28	0.917
HET (%)	36.33 <sup>ab</sup>	32.00 <sup>b</sup>	34.00 <sup>ab</sup>	39.33 <sup>a</sup>	39.33 <sup>a</sup>	1.09	0.101
EOS (%)	0.00	0.00	0.00	1.00	0.33	0.15	0.152
BAS (%)	0.67	0.33	1.00	0.33	1.00	1.16	0.534
MCV (fl)	119.90	119.77	116.30	117.87	121.30	0.89	0.463
MCH (pg)	40.10	40.53	39.57	39.80	40.70	0.22	0.494
MCHC (%)	33.47	33.80	34.03	33.77	33.57	0.15	0.844

PCV - Packed Cell Volume HB – Haemoglobin Concentration, RBC- Red Blood Cell, WBC- White Blood Cell, LYM – Lymphocytes, MONO – Monocytes, HET – Heterophil, EOS – Eosinophil, BAS- Basophil, MCV -Mean Corpuscular Volume, MCH - Mean Corpuscular Haemoglobin, MCHC – Mean Corpuscular Haemoglobin Concentrate

## CONCLUSION

From the findings of this study, it could be concluded that *Spondias mombin* aqueous leaves extract had significant effects on packed cell volume, haemoglobin, red blood cells and white blood cells. However, the extract was not toxic and could be administered at up to 75ml per litre of water without any deleterious effects on blood composition of broiler chickens at starter phase.

## REFERENCES

- Adegbenjo, A. A., Oluwatosin, O. O., Jegede, A. V., Oso, A. O., Fafiolu, A. O., Ogunbanke E. A. (2015). Performance and haematological indices of broiler chickens fed diets containing supplements of three phytogetic plants. *African Journals Online (AJOL)*, 63(3) <https://www.ajol.info/index.php/bahpa/article/view/150387>
- Adeoye, O. A., Odukoya, S. A., Oguntoye, O. S. (2015). Antibacterial properties and phytochemical constituents of *Spondias mombin* leaves. *African Journal of Biotechnology*, 14(21): 1826-1831.
- Alagbe, J. O., Omokore, E. A and Tijani, T. D (2018). Effect of dietary supplementation of dried *Spondias mombin* Linn leaf on the performance and blood profile of broiler chickens. *Pacific International Journal*, 2(2): 46-58.
- Ani, A. O. and Okeke, G.C. 2011. The performance of broiler birds fed varying dietary levels of roasted pigeon pea (*Cajanus cajan*) seed meal. *Pakistan Journal of Nutrition* 10(11): 1036-1040.
- Banerjee, G. C. (2008). Haematology of Birds. In Textbook of Animal Husbandry (9th ed., pp. 247-256). New Delhi: Oxford IBH Publishing Co. Pvt. Ltd.
- Corthout, J., Pieters, L., Claeys, M., Berghe, D. V., Vlietinck, A. (1992). Antiviral caffeoyl esters from *Spondias mombin*. *Phytochemistry*, 31(6): 1979-1981.
- Daniel, K. A. (1990). Useful plant of Ghana. Intermediate. Tech. Pub. The royal botanic garden. p. 654.
- Esonu, B. O., Emenalom, O. O., Udedibie, A. B. I., Anyanwu, A., Madu, U., Inyang, A. O. (2005). Evaluation of Neem (*Azadirachta indica*) leaf meal on performance, carcass characteristics and egg quality of laying hens. *International Journal of Agriculture and Rural Development*, 6(1): 208-212.
- Okonkwo, V. N., Esiegwu, A. C. (2017). Haematological and serum biochemical indices of finisher broilers fed *Spondias mombin* leaf meal. Doi: [10.31248/JASVM2018.107](https://doi.org/10.31248/JASVM2018.107)
- Okorie, K. C., Esiegwu, A. C., & Okonkwo, U. N. (2016). Evaluation of the growth performance, carcass characteristics and blood indices of broiler finishers fed graded levels of fermented *Mucuna sloanei* seed meal. *Journal of Tropical Agriculture, Food, Environment and Extension*, 15(1): 39-44.
- Olabanji, R. O., Farinu, G. O., Akinlade, J. A., Ojebiyi, O. O. (2007). Growth performance and haematological characteristics of weaner rabbits fed cyanide in processed cassava peel meals on haematological and biochemical indices of growing rabbits. *Proc. of the 35th Annual Conf. of the Nig. Soc. for Anim. Prod.*, pp 212.
- Oladunmoye, M. K. (2007). Comparative evaluation of the effects of leaf extract from *Spondias mombin* on rats with induced infections from *Bacillus cereus* and *Clostridium sporogenes*. *Research Journal of Phytochemistry*, 1: 68-73.
- Oluwafemi, R. A, Lawal, A. O., Adelowo, S. A., Alagbe, J. O. (2021). Effects of dietary inclusion of ginger (*Zingiber officinale*) and garlic (*Allium sativum*) oil on carcass characteristics and sensory evaluation of broiler chicken. *Texas Journal of Multidisciplinary Studies*, 2(11):180-188
- SAS 2002. SAS/STAT User's Guide: Statistics 8.2 SAS Institute Inc., Cary, NC. U.S.A. GrawHill Book Co.N.Y.
- Soetan, K. O., Olaiya, C. O., Oyewole, O. E. (2013). The importance of mineral elements for humans, domestic animals and plants: A review. *African Journal of Food Science*, 4(5): 200-222.
- Song, B., Tang, D., Yan, S. *et al.* (2021). Effects of age on immune function in broiler chickens. *J Animal Sci Biotechnol* 12, 42 <https://doi.org/10.1186/s40104-021-00559-1>