

Research Article

Haematological Indices of Various Breeds of Broiler Chickens Fed *Mimosa diplotricha* Leaf Meal

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ABSTRACT

One hundred and twenty (120) broilers birds of Abore acer, Cobbs and Ross breeds were used to determine the effect of breed on haematological indices of broilers birds given *Mimosa diplotricha* leaf meal (MDLM). The chicks were randomly assigned to three treatments with 40 birds in each treatment. Each treatment was replicated thrice with 10 birds per replicate and 10 birds as control, in a completely randomized design (CRD). At the end of the experiment which lasted for 7 weeks, blood sample were collected from the birds, and analyzed for haemoglobin, packed cell volume, white blood cell count, red blood cell count, mean corpuscular volume, mean corpuscular hemoglobin, heterophil, lymphocytes, monocytes, basophil and eosinophil. Data obtained were subjected to statistical analysis using the one-way ANOVA in SPSS package. Result showed that there were no significant differences (P>0.05) among the treatments, in HB, PCV, MCHC, lymphocytes, monocytes heterophil, eosinophil and basophil, and there were significant differences in the WBC, RBC, MCV and MCH among the treatments. Thus, breed has no meaningful effect on the haematological profile of broiler chicks maintained on MDLM.

Key words: Breed, MDLM and Haematology

INTRODUCTION

Due to the residual effect of antibiotics in animal products and the development of resistance to it by some bacteria especially the multi-drug resistant food-borne Salmonella and Clostridia infections, there has been urgent search for alternative source of bactericides, fungicides and proboscides'. Today, the use of synthetic antibiotics in animal feed are banned in many countries. The antibiotic used as growth promoters for farm livestock has been gradually restricted and banned by the European commission and Scandinavian countries (Plail, 2006).

Considering the side effects and the resistance that pathogenic protozoan builds against drugs, more attention should be given to extracts and biologically active compounds which are isolated from plant species commonly used in herbal medicine (Essawi and Srour, 2000).

Mimosa diplotricha leaf meal (MDLM) has been studied extensively by various researchers. Some maintained that the leaf extract is capable of acting as antibiotics (Ezeabara and Mbah, 2016) and others claimed that it is growth promoter (Muhammed *et al.*, 2004; Ranjeet *et al.*, 2013). Furthermore, some researchers reported that MDLE inclusion in poultry feed is capable of enhancing the acceptability of the meat (Ranjeet *et al.*, 2013; Ezeabara and Mbah, 2016) while others opined that it alters the blood composition of the bird. Generally, researchers have purported the use of 2% MDLE on broiler feed. However, there is dearth of information on breed effect of inclusion of MDLE on blood indices of broilers. Three prominent commercial broiler breeds in Nigeria include Cobbs, Ross and Arbor acre.

The cobbs strain is from Cobb-Vantress. The breed exhibits high yield of carcass, upper thigh, breast and lower abdominal fat content (Santos *et al.*, 2004). Coneglian *et al.* (2010) in their findings concluded that Cobb breed of broiler has a rapid initial growth rate, and a high carcass and cuts yield. The Ross strain is a product of Aviagen group. Ross broilers have a good feed conversion ratio. As reported by Amao *et al.* (2009), the strain has excellent feed utilization ability. The Arbor acre strain is also from Aviagen group. Arbor acre at 8 weeks of age is superior in body weight as compared to Marshal and Ross breeds of broilers (Udeh *et al.*, 2011).

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There is need to study the efficacy of the use of *Mimosa diplotricha* leaf meal on the haematological parameters of these broilers. Consequently, the study is designed to ascertain breed effect of 2% inclusion level of *Mimosa diplotricha* leaves extract on the hematological parameters of broiler birds.

MATERIALS AND METHODS

Study Area and duration of study

The study was carried out at the poultry farm of Animal Science and Technology Teaching and Research Farm, Nnamdi Azikiwe University Awka, Anambra state. The poultry farm is located on the longitude 7'08'31.9"E and latitude 6"15'10.1"N.

Experimental birds and management

A total of one hundred and twenty (120) day- old broilers of Abor acre strain (40), Cobbs strain (40) and Ross strain (40), from Vertex Farms, Ibadan were procured and transported to the Department of Animal Science and Technology Teaching and Research Farm, Nnamdi Azikiwe University Awka, Anambra State.

The chicks were given coccidostat on arrival for two days and brooded for 7 days for acclimatization. They were assigned to three (3) treatments namely; T1 (Abor acre strain), T2 (Cobbs strain), and T3 (Ross strain), and three replicates.

Preparation of MDLM

Fresh mimosa leaves were harvested in Nnamdi Azikiwe University premises close to the Faculty of Agriculture, within the months of January to March. Contaminants were removed and sundried for about 3 days. The dried leaves were removed from the stems by shaking the dried stem, and the leaves sieved to ensure proper removal of its prickly stem, and stored in air-tight sacs. There was no need for further processing of the leaves (grinding or cutting), given the tiny nature of the mimosa leaves.

Experimental diets

The feeding trial was carried out in two phases; the starter phase and the finisher phase. Two different diets were formulated each for the starter and finisher phases, one containing no mimosa leaves (0% inclusion) fed as control feed and the other containing mimosa leaves (2% inclusion) fed as treatment feed.

The ingredient composition of the starter and finisher diets are shown in the tables 1 and 2, respectively.

Data collection

Collection of blood samples: At the 7th week of the experimental study, blood samples were collected from the birds for haematological analysis. A separate syringe was used for each bird to prevent contamination of the blood samples. The samples were collected from the bird's wing vein using a 2ml syringe and put into a properly labelled EDTA containing tube for determining the hematological parameters (Ritchie *et al.*, 1994; Thrall, 2006). Then the samples were analyzed using standard methods.

Table 1:	Composition	of the	broiler	starter	diet
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Ingredients	Mimosa diplotricha	
	Inclusion levels	
	0%	2%
Maize	50	50
Soybean Meal	30	30
Mimosa diplotricha leaves	0	2
Wheat Offal	8	6
Fish Meal	2	2
Blood Meal	2	2
Palm Kernel Cake	4	4
Bone Meal	3	3
Salt	0.25	0.25
Lysine	0.25	0.25
Methionine	0.25	0.25
*Mineral/Vitamin Prremix	0.25	0.25
	Calculated Analysis	
Crude Protein (%)	22.46	22.48

*to provide Vit. A; 10,000,00iu, Vit.D3; 2,000,00iu, Vit. E; 10,000iu, Vit. K; 2500mg, Vit.B1; 2000mg, Vit.B2; 70,000mg, Vit.B6;2000mg, Niacin; 50,000mg, Vit.B12; 15mg, Pantothenic; 5000mg, Folic Acid; 750mg, Choline Chloride; 400gr, BHT; 125gr, Manganese; 10gr, Zinc; 100gr, Iron; 30gr, Copper; 10gr, Iodine; 1.5gr, Selenium; 200mgr, Cobalt; 200mgr, Lysine; 15gr, Methionine; 20gr, Biotin; 100mgr.

Table 2: Composition of the finisher diet

Ingredients	Mimosa diplotricha Inclusion levels		
-			
	0 %	2 %	
Maize	60	60	
Soybean Meal	20	20	
Mimosa diplotricha leaves	0	2	
Wheat Offal	8	6	
Fish Meal	2	2	
Blood Meal	2	2	
Palm Kernel Cake	4	4	
Bone Meal	3	3	
Salt	0.25	0.25	
Lysine	0.25	0.25	
Methionine	0.25	0.25	
*Mineral/Vitamin Prremix	0.25	0.25	
	Calculated Analysis		
Crude Protein (%)	18.95	18.97	

*to provide Vit.A; 10,000,00iu, Vit.D3; 2,000,00iu, Vit.E; 10,000iu, Vit.K; 2500mg, Vit.B1; 2000mg, Vit.B2; 70,000mg, Vit.B6;2000mg, Niacin; 50,000mg, Vit.B12; 15mg, Pantothenic; 5000mg, Folic Acid; 750mg, Choline Chloride; 400gr, BHT; 125gr, Manganese; 10gr, Zinc; 100gr, Iron; 30gr, Copper; 10gr, Iodine; 1.5gr, Selenium; 200mgr, Cobalt; 200mgr, Lysine; 15gr, Methionine; 20gr, Biotin; 100mgr. The birds were fed *ad libitum* for six weeks.

Haemoglobin concentrations (HB) were determined using Sahli acid haematin method, packed cell volume was determined by the microhaematochrit method, while haemocytometer method as described by Thrall and Weiser (2002) was used to determine Red blood cell count (RBC) and White blood cell (WBC) of the broilers.

Lieshmann stain was used study to the differential count which include the heterophil, basophil, monocytes and lymphocytes.

Data analysis: The blood parameters were analyzed using SPSS 22 statistical package, while the differences between treatment means were separated using the Duncan New Multiple Range Test (Duncan, 1955).

Table 3: Effect of breed on haematological parameters of broilers fed MDLM

Parameters	T1 (Abor acre)	T2 (Cobbs)	T3 (Ross)	SEM
HB (g/dl)	8.23±0.10 ^a	8.75±0.32 ^a	9.05±0.41 ^a	0.42
PCV (%)	24.53±0.35ª	26.25±0.96ª	27.15±1.23 ^a	1.28
WBC $(x10^3 \text{ mm}^3)$	6.05 ± 0.15^{b}	6.93±0.22 ^a	6.58 ± 0.78^{a}	0.05
RBC ($x10^{6}$ mm ³)	3.08±0.09 ^{a,b}	3.38 ± 0.09^{a}	2.78±0.09 ^b	0.08
Heterophil (%)	60.75±2.18 ^a	60.00 ± 2.86^{a}	60.75 ± 0.75^{a}	2.52
Eosinophil (%)	1.25±0.95ª	1.00 ± 0.58^{a}	1.50 ± 0.65^{a}	1.17
Lymphocytes (%)	35.00±2.04ª	36.50±2.75 ^a	34.75±1.03ª	2.46
Basophil (%)	1.00 ± 0.58^{a}	1.00 ± 0.58^{a}	1.00 ± 0.58^{a}	0.82
Monocytes (%)	2.00±0.41ª	1.50±0.29 ^a	2.00 ± 0.71^{a}	0.58
MCV(FL)	80.05±3.34 ^b	78.18 ± 4.88^{b}	98.38±6.36 ^a	5.82
MCH (Pg)	26.68±1.11 ^b	26.68 ± 1.63^{b}	32.79±2.12ª	1.94
MCHC (%)	33.33±0.00	33.33±0.00	33.33±0.00	0.00

^{ab} means in a column with different superscript is significantly different at 5% level of significance; SEM = the standard error of the mean.

RESULTS

The Effect of breed on haematological parameters of broilers fed *Mimosa diplotricha* leaf meal (MDLM) is shown in Table 3. Significant differences (P<0.05) were observed among the treatments with respect to the following parameters; WBC count, RBC count, MCV and MCH. No significant differences (P>0.05) were observed among the treatment groups in haemoglobin (HB), packed cell volume (PCV), heterophil, eosinophil, lymphocytes, basophil, monocytes and MCHC values.

DISCUSSION

Although the mimosa leaf meal at 2% inclusion level exerted significant differences (P<0.05) on the red blood cell count, white blood cell count, mean cell volume and mean cell haemoglobin, the values lie within the referral range for chicken. This is an indication that the MDLM based diet did not have any adverse effect on the haematological parameters irrespective of the breed. The normal range for red blood cell and white blood cell counts in chickens ranged from 2.4 to 4.5 and 5-15, respectively (Togun *et al.*, 2007; Muhammad *et al.*, 2004 Ajuonuma and Uchendu, 2013).

According to Ajuonuma and Uchendu (2013) increased RBC values were associated with high quality dietary protein and disease-free animals. Consequently, the higher RBC recorded in Cobb breed could be that the birds are healthier or tolerated the MDLM better than Ross since uniform protein diets were fed. White blood cells are used as indicators of stress response and sensitive biomarkers crucial to immune functions. Muhammad and Oloyede (2009) reports that bacterial and viral diseases affect the number of white corpuscles and the ratio between the different types of white corpuscles and the percentage of the various types in healthy animals vary slightly but are greatly modified in sick animals. Since the WBC of all the breeds fall within the normal range, neither stress nor disease infection was applicable.

The HB and PCV were similar across the breeds and within the referral ranges indicating that the birds are sound heath wise. Though Thrall (2006) reported a slightly higher value.

The values recorded for MCV and MCH, which were within the normal range is attributed to healthy conditions as reported by Nworgu and Fapohunda (2002). MCV and MCH are used in diagnosing of anaemic conditions, which was not applicable in any of the treatments. Mean cell haemoglobin concentration (MCHC) in all dietary treatment were within the acceptable range of 26-35% (Aiello, 1998; Ashagidigbi, 2011; Nworgu *et al.*, 2003). The results from the leucocyte differential count (heterophils, lymphocytes, eosinophils, basophils and monocytes) show that the birds had no bacterial or viral infection, hence the almost non-significant values (P>0.05) among the treatments, and since the values gotten fall within the normal range it indicates that the feeding pattern did not affect the immune system of the birds (Ameen *et al.*, 2007).

Summary

A total of 120 (one hundred and twenty) day older broilers of Abore acre, Cobbs and Ross breeds were used for the experiment to determine the effect of *Mimosa diplotricha* leaf meal on the physiological response of the broilers as regard to their haematological profile at an inclusion level of 2% in the broiler starter and broiler finisher diets for 7 weeks and from the results, it shows that significant difference (P<0.05) existed among the RBC count, WBC count, MCV and MCH values of the treatments and no significant difference (P>0.05) was observed among the PCV, HB, MCHC, Heterophil, Eosinophil, Lymphocytes, Basophil and Monocytes values of the treatments.

Conclusion

The result obtained in this study showed that MDLM has potentials as feed ingredient in broiler diet. The haematological values obtained were within the normal range for broiler even when significant differences existed, thus showing that the diets were adequately utilized indicating the normal functioning of the internal organs, absence of stress related diseases and muscle degeneration. MDLM at an inclusion rate of 2% has no harmful effect on the exchange of substances in the blood as well as functioning of the internal organs.

The study revealed that MDLM meal could be added to broiler diets to supplement protein without any adverse effect on the haematology. The study is therefore subjected to further investigation.

Recommendation

Inclusion of mimosa leaf meal in broiler diet up to 2% can be used as a protein source as no adverse effect on the health status was observed in the experiment. Its

utilization as a feed ingredient in broiler diet will reduce feed cost as mimosa plants are widely distributed and grow as weeds. Mimosa leaves to be used must be adequately dried to reduce the anti-nutritional factor (mimosine) before inclusion into broiler diet. Further research should be carried out to determine the effect of different levels of mimosa diplotricha inclusion on the haematological indices of broiler birds.

REFERENCES

- Aiello SE, 1998. The Merck Veterinary Manual. Merck and Co., Inc. (Eigth Edition) pp: 4-52.
- Ajuonuma CO and CI Uchendu, 2013. Effect of processed cassava peel meal on the haematology of pullets. J Agric Vet Sci, 6: 27-29.
- Amao SR, O Akinokun, LO Ojedapo, TA Adedeji and FG Sodeinde, 2009. Estimate of genetic variabilities of growth traits of two strains of starter broiler chickens reared in derived savanna environment of Nigeria. Proceeding of the 14th Annual Conference of Animal Science Association of Nigeria. Lautech. Ogbomoso, 14: 103-105.
- Ashagidigbi WM, SA Sulaimon and A Adesiyan, 2011. Technical efficiency of egg production in Osun State. Inter J Agric Econ Rural Develop, 6:124-130.
- Ezeabara Chinelo A and UM Elizabeth, 2016. Phytochemical and Proximate Investigations of leaf, root and stem of Mimosa invisa M. and Mimosa pudica L. J Pharma Sci, 1: 25-29.
- Coneglian JLB, SL Vieira, J Berres and DM Freitas, 2010. Responses of fast and slow growth broilers fed all vegetable diets with variable ideal protein profiles. Revista Brasileira de Zootecnia, 39: 327-334.
- Duncan DB, 1955. Multiple range and multiple F-test Biometrics. 11: 1-42.
- Essawi T and M Srour, 2000. Screening of some palestian medicinal plants for antibacterial activity. J Ethnopharmacol, 70: 343-349.
- Muhammed NO, OB Oloyede, BV Owoyele and JE Olajide, 2004. Deleterious effect of defatted

terminalia catappa seed meal-based diet on haematological and urinary parameters of albino rats. NISEP J, 4: 51-57.

- Muhammad NO and OB Oloyede, 2009. Haematological parameters of broiler chicks fed. Aspergillus Nigeriafermented Terminalia catappa seed meal-based diet. Global J Biotechnol Biochem, 4: 179-183.
- Nworgu FC, GN Egbunike, CF Ononogbu, JB Fapohunda and JU Ogbonna, 2003. Effect of mimosa invisa leaf meal supplement on broiler finisher's performance. Proceedings of Nigerian Society for Animal Production, 28:346
- Nworgu FC and JB Fapohunda, 2002. Performance of broiler chicks fed mimosa (*Mimosa invisa*) leaf meal supplements. Proceeding of 27th Annual Conference of Nigerian Society for Animal Production (NSAP) held at Federal University of Technology Akure on March 17th- 21st, 2002 pp: 128-131.
- Plail R, 2006. The Innovative Power of Probiotics, Poult Inter, pp: 34-36.
- Ranjeet KR, KM Sathish, I Seethalakshmi and MRK Rao, 2013. Phytochemical Analysis of leaves and roots of Mimosa pudica collected from Kalingavaram, Tamil Nadu. J Chem Pharmac Res, 5: 53-55.
- Ritchie BW, JG Harrison and RL Harrison, 1994. Avian medicine. Wingers publishing Inc. Florida.
- Santos AL, NK Sakomura, ER Freitas, NAA Barbosa, MO Mendonça and ENVM Carrilho, 2004. Carcass yield and meat quality of three strains of broiler chicken. Proceedings of 22nd World's Poultry Congress. Istanbul, Turkey (On CD).
- Thrall MA and MG Weiser, 2002. Haematology in Hendrith CM (Ed). Laboratory Procedure to Veterinary Technician, 4th ed. Mosby Inc. Missouri pp: 29-74.
- Thrall MA, 2006. Veterinary hematology and clinical chemistry. Blackwell Publishing, pp: 230-260.
- Udeh I, JO Isikwenu and G Ukughere, 2011. Performance characteristic and prediction of bodyweight using linear body measurements in four strains of broiler chicken. Inter J Anim Vet Adv, 3: 44-46.