

HAEMATOLOGICAL PROFILE OF BROILER CHICKENS FED DIETS CONTAINING PROCESSED IRON WOOD (*Prosopis africana*) SEEDS MEAL

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ABSTRACT

This study was conducted to investigate the haematological profile of broiler chickens fed diets containing varying levels of processed Iron wood (*Prosopis Africana*). Five experimental diets were formulated to contain *Prosopis africana* seed meal at 0, 2.50, 5.00, 7.50 and 10.00 % designated as T1 (Control), T2, T3, T4 and T5, respectively. A total of 200 day old unsexed broiler chicks were randomly allotted to five dietary treatments with four replicates per treatment and 10 birds per replicate in a completely randomized design (CRD). The experiment lasted for 8 weeks. The results revealed that most haematological parameters measured were non-significantly ($P>0.05$) influenced by dietary treatments except White blood cell (WBC), Red blood cell (RBC), Mean corpuscular volume (MCV) and Platelet. In conclusion, inclusion of *Prosopis africana* seed meal (PASM) in broiler diets up to 10 % dietary level of had no deleterious effect on the health status of the birds.

Keywords: Broiler chickens, Iron wood, *Prosopis africana*, Haematology, Serum biochemistry

INTRODUCTION

In the recent years, feed shortage and high prices of conventional feed ingredients has been a major challenge confronting the poultry industry. This unpleasant situation as documented by Bijaya *et al.* (2014) has necessitated the use of non-conventional feed resources which are underutilized, cheaper and non-toxic to maintain productivity and optimal immune response in broiler chickens. *Prosopis africana* is a leguminous and savannah tree found in semi-arid region of tropical Africa (Yusuf *et al.*, 2008). It is frequently called African mesquite and iron tree and one of the 44 species of the genus *Prosopis*. *Prosopis africana* seed is reported to have 42.52% crude protein, 7.93% ether extract, 4.93% crude fibre and 8.12% ash (Abang, *et al.*, 2016). There is, however, the disadvantage of high content of anti-nutritional factors such as tannins, hemagglutinin, prosopine and toxic amino acids which are capable of inducing deleterious effect on simple stomached animals such as birds when consumed without adequate processing (Abang *et al.*, 2016). Abang *et al.* (2016) reported that processing methods such as boiling, fermentation and sun-drying has been found to be effective in reducing the anti-nutritional factors and their after effect. Blood parameters is a reflection of the effects of dietary treatments on the animals in terms of the type, quality and amounts of the feed ingested and available for the animal to meet its physiological, biochemical and metabolic necessities (Ewuola *et al.*, 2004).

There is therefore, a need to evaluate the effect of such novel ingredient on the health status of the birds; hence the examination of the blood to ascertain the extent to which these phytochemicals present in *Prosopis africana* can affect the blood profile of the broiler chickens in this study. Hence, the objective of this study was to evaluate the effect of *Prosopis africana* seed meal on haematological and serum biochemical indices of broiler chickens.

MATERIALS AND METHODS

Experimental site

This study was conducted at the Poultry Unit of the Teaching and Research Farm, Department of Animal Science, Jalingo, Taraba State.

Processing of Test Ingredients

Prosopis africana (Mesquite) seeds were obtained from Jenuwa-Gida, Takum Local Government Area of Taraba State, Nigeria. The seeds were sorted and washed to get rid of dirt and were boiled for five (5) hours using firewood and a galvanized pot. After cooking, the seeds were allowed to cool to normal room temperature (27°C). Boiling was done to soften the hulls and reduces toxic materials present in the test ingredient. Thereafter, the seeds were washed, the water drained and kept in a sack for three days (72 hours) at room temperature for fermentation according to Achi, (1992). The fermented seeds were sundried for five (5) days and milled using hammer mill before incorporation into the diets.

Experimental Diets, Birds and Management

A total number of two hundred (200) day-old unsexed broiler chicks purchased from Zartech Nigeria Limited, Jos, Plateau State were used. Two hundred birds were allotted to five dietary treatments formulated for both starter and finisher phases to meet NRC (1994). T1 served as the control (0 % PASM) while other diets contained 2.50, 5.00,

7.50 and 10.00 % inclusion of fermented *Prosopis africana* seed meal respectively designated as T2, T3, T4 and T5 with 10 birds per replicate in a completely randomized design. Feed and water were provided *ad libitum*, necessary drugs and vaccines were administered and other routine management practices were observed. The experiment lasted for 8 weeks. The experimental diet is presented in Table 1.

Table 1: Composition of Broiler Finisher Diets Containing Graded Levels of Processed *Prosopis africana* Seed Meal (5 - 8weeks)

Ingredients (%)	Treatments				
	T1 0 %	T2 2.50 %	T3 5.00%	T4 7.50 %	T5 10.00 %
Maize	50.00	49.00	46.80	44.50	43.80
SBM (Full fat)	25.00	21.00	22.70	22.70	22.70
Groundnut cake	14.20	18.70	16.70	16.50	14.70
Maize offal	5.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
PASM	0.00	2.50	5.00	7.50	10.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Lysine	0.15	0.15	0.15	0.15	0.15
Methionine	0.15	0.15	0.15	0.15	0.15
Salt	0.25	0.25	0.25	0.25	0.25
Vit. Premix	0.25	0.25	0.25	0.25	0.25
TOTAL	100	100	100	100	100
Calculated Analysis					
ME Kcal/kg	3066.48	3058.23	3036.34	3028.87	3019.88
CP (%)	19.92	20.26	20.61	20.59	20.64
Ether extract (%)	7.48	7.54	7.60	7.64	7.69
Crude fibre (%)	3.22	3.34	3.46	3.54	3.64
Calcium (%)	0.93	0.96	0.99	1.02	1.05
Phosphorus (%)	0.55	0.57	0.58	0.6	0.61
Lysine (%)	1.18	1.24	1.30	1.35	1.40
Methionine (%)	0.49	0.50	0.51	0.52	0.53

Premix (OPTMIX PREMIX – ANIMAL CARE) Composition/kg Vit A: 5000IU; Vit D₃: 888.000IU; Vit E: 12,000mg Vit K₃: 1500mg, Vit B₁:1000mg, Vit B₂:2000mg, Vit B₆:1600mg, Niacin:12000mg, Pantothenic acid:2000mg, Biotin:1000mg, Vit B₁₂:3000mg, Folic acid:1500mg, Cholin chloride:60,000mg, Manganese: 10,000mg, Iron:15000mg, Zinc:800mg, Copper:400mg, Iodine:80mg, Cobalt:40mg, Selenium:8000mg. ME= MetabolizableEnergy

Blood Collection and Analysis

At the end of the 8th week (56 days), two birds were selected per replicate for this study. 1.0 ml of blood samples were collected from the jugular veins of the birds using 5ml disposable syringe and needle (21 gauge), the blood was stored in a sterile, universal bottles with and without anticoagulant (EDTA). The blood samples were analysed and the haematological parameters were measured. The samples investigated for were packed cell volume (PCV), red blood cell count (RBC), white blood cell count (WBC), haemoglobin (Hb), the mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC), mean corpuscular volume (MCV), Neutrophil, lymphocytes, Eosinophil, and Monocyte.

Statistical Analysis

All data obtained were subjected to analysis of variance using the general linear model procedure of Statistical Analytic System (SAS, 2008). Significant differences among treatment means were separated using Tukey model.

RESULTS AND DISCUSSION

The result of haematological parameters of broiler chickens fed diets containing graded levels of *Prosopis africana* seed meal is presented in Table 2.

The results revealed significant ($P < 0.05$) influence of dietary treatments on most of the haematological parameters measured except Packed cell volume (PCV), Mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC), Haemoglobin (Hb), Neutrophil, lymphocytes, Eosinophil, and Monocyte. The white blood cells was comparable among birds fed PAS meal but these were higher compared to those in the control group ($6.20 \times 10^9/L$). WBC is associated with body defence mechanism and values recorded in this study could be an indication of the presence of foreign materials in the portal blood of the broiler chickens. RBC of the

broiler chickens were statistically influenced ($p < 0.05$) by *Prosopis africana* seed meal. The values obtained in this study ranged between 1.70 - 2.36 x 10¹²/L respectively for T1 - T5 and were higher than the RBC values of 1.42 – 1.67x10¹²/l obtained in the report of Emmanuel *et al.* (2017). This result shows that the broiler chickens did not suffer anemia in the course of the study. MCV of the broiler chickens ranged between 115 -141.50 fl and these were similar to the mean values reported by Chinsari and Aengwanich (2007). MCH and MCHC values (46.87 – 54.43pg and 37.13 – 45.53g/dl respectively) of T1 – T5 recorded in this study were less than the range values of 100.67 – 113.00pg and 48.87 – 58.13g/dl respectively reported by Oguntoye *et al.* (2020).

The values (37.13 – 45.53g/dl) obtained for haemoglobin, the oxygen carrying pigment in the blood were higher than the values obtained by Rotimi (2015) who reported value range of 9.23 – 9.27g/dl. This implies that the oxygen content of the RBCs was adequate for normal physiological activities. Platelet values (14.77 - 98.33g/dL) disagreed with the report of Kim *et al.* (2013) who in their study observed lower platelet values for broiler chicken. Platelets according to James and Nester (2015) are critical in blood clotting in case of injury.

Neutrophil, Lymphocyte, Eosinophil and monocytes recorded in this study were within the range values of 16.73 – 36.63%, 57.03 – 72.07%, 2.67 -7.13 % and 2.67 – 5.87% respectively. Lymphocytes are important in forming barriers against localized disease condition and may play a part in generalized antibody formation (Frandsen, 1981)

Table 2: Haematological Indices of Broiler Chickens Fed Varying level of *P. africana* Seed Meal.

Parameters	Treatments					SEM
	T1 0 %	T2 2.5 %	T3 5 %	T4 7.5 %	T5 10 %	
PCV (%)	25.67	28.33	28.67	22.67	24.00	0.97
WBC (x 10 ⁹ /L)	6.20 ^b	8.70 ^{ab}	9.37 ^{ab}	8.80 ^{ab}	11.03 ^a	0.56
RBC (x 10 ¹² /L)	2.03 ^{ab}	2.23 ^{ab}	2.36 ^a	1.93 ^{ab}	1.70 ^b	0.09
MCV (fL)	125.00 ^{ab}	126.33 ^{ab}	119.35 ^b	115.93 ^b	141.50 ^a	3.37
MCH(Pg)	47.90	46.87	49.33	53.03	54.43	3.25
MCHC (g/dL)	38.40	37.13	41.20	45.53	39.33	2.70
Platelet (10 ⁹)	14.77 ^b	66.77 ^{ab}	98.33 ^a	26.67 ^b	16.20 ^b	11.15
Haemoglobin (g/dl)	9.77	10.50	11.97	7.53	9.47	0.65
Neutrophil (%)	30.43	23.37	18.73	36.63	16.73	3.38
Lymphocyte (%)	60.27	68.80	69.10	57.03	72.07	3.60
Eosinophil (%)	5.97	5.17	7.13	2.67	5.33	0.76
Monocyte (%)	3.33	2.67	5.00	3.33	5.87	0.69

^{abc} means followed by different superscript letter in the same row are significantly different ($P < 0.05$). SEM- Standard error of mean

CONCLUSION

From the result of the study, broiler chickens fed processed *Prosopis africana* seed meal (PASM) appeared generally healthy as most haematological and biochemical parameters measured were within the normal range for broiler birds. It was therefore concluded that *Prosopis africana* seed meal (PASM) can be included in the diets of broiler chickens up to 10 % without detrimental effect on the health status of the birds..

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