STUDY ON HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF HELMETED GUINEA FOWL (*NUMIDA MELEAGRIS PALLA*S) IN A SEMI-ARID ENVIRONMENT

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ABSTRACT
The study was conducted to establish the effect of strain and sex effect on their haematology and serum biochemistry of helmeted Guinea fowl. Three strains (Pearl, Lavender and Black) were used for the study. Two hundred and seventy birds were used for the study. Ten (10) healthy birds from each strain of the birds were randomly selected for haematological and serum biochemical analysis. 3ml of blood samples were collected from the prominent wing vein using a sterile syringe early in the morning. The samples were inserted in to two bottles: Ethylene Di-amine Tetra Acetic acid (EDTA) treated bottles for haematological assay and plane bottle for serum biochemistry analysis. The blood samples were analysed for haematology using clinical methods. The lymphocytes and monocytes were read off from a microscope of x100 objective in femtolitres (FL). Total serum protein was determined by Goldberg refractometer method for each blood sample. The result indicated that there were no significant (P>0.05) differences found across the strains and sex in all the measured parameters. However, Pearl Guinea fowl was found to have higher value (94.43) for WBC than Black and Lavender. For the lymphocyte and monocyte parameters, Lavender bird has the higher values of (68.85) and (21.78) respectively. For the sex, no significant (P>0.05) difference was observed across the haematological and serum biochemical parameters. But female has higher value for serum biochemistry. It was concluded that the birds are statistically the same for blood analysis. However, it is recommended to carry out genetic characterization using molecular study.
Keyword: Haematological, Blood chemistry, Parameters, Guinea fowl, Strain

INTRODUCTION

Helmeted Guinea fowl (*Numida Meleagris pallas*) originated in Africa (Embury, 2001) and was first domesticated by ancient Egyptians, from where they spread to other parts of the world where they are now produced commercially on a large scale (Robinson, 2000). The bird also found in Asia and Latin America as semi-domesticated species while in Europe, North America and Australia, large scale production of Guinea fowl dominates (Bonds, 1997). This indicated that Guinea fowl is adaptable to various climatic conditions. Although Guinea fowl is abundant in the wild, they are semi-domesticated in most parts of Nigeria where they co-mingle with the domestic chickens (Haruna *et al.*, 1993). Guinea fowl can also be raised intensively and extensively (Nwagu & Alawa, 1995). It has comparative advantage over the chicken due to its resistance to disease of poultry, greater capacity to scavenge for insects and grains, ability to protect itself against predators and premium quality meat, due to its acceptability, no cultural and religious barriers against its consumption (Ayorinde, 1999). Blood plays major role in transporting nutrients, metabolic waste products and gases in all over the body. Blood act as an indicator for clinical and nutritional health status of animals (Subhadarsini & Silpa, 2020). Researches utilize the haematology and serum biochemical parameters in livestock for selection and improvement to enhance their productivity (Obinna *et al.,* 2011). Substances such as serum enzymes and serum proteins have been established as genetic markers in livestock which can be useful in selection and improving the productive and reproductive performance (Pagot, 1992). The aim of the study was to characterize the strains of helmeted Guinea fowl based on haematology and serum biochemical parameters in semi-arid, Nigeria.

MATERIALS AND METHODS

The study was conducted at the Dantanko farms, Kano. The 270 study birds were purchased at the age of day old from a reliable source and intensively managed to 25th week. Birds were fed *ad libtum* with a commercial diet throughout the study period. Clean drinking water was provided to the birds. The birds were well brooded and all necessary care and management were provided. The laboratory

analysis was done at clinical laboratory of Aminu Kano Teaching hospital, Kano State, Nigeria. Kano lies between longitude 9°30' and 12°30' north and latitude 9°30' and 8°42' east of the Sudan savannah zone of Nigeria. At the end of the study, ten (10) healthy birds from each strain of the experimental birds were randomly selected for the study. 3ml of blood samples were collected from the prominent wing vein using a sterile syringe early in the morning. The samples were inserted in to two bottles: Ethylene Di-amine Tetra Acetic acid (EDTA) treated bottles for haematological assay and plane bottle which allow the blood samples to coagulate to produce sera for blood chemistry measurements. All experimental procedures were carried out in accordance to the guidelines of the Institutional animal ethics committee (IAEC). The blood samples were analysed for haematology using clinical methods of Witrob's micro-hematocrit, improved Neubaur hemocytometer and cyanomethaemoglobin methods respectively. The lymphocytes and monocytes were read off from a microscope of x100 objective in femtolitres (FL). The bottles of coagulated blood were subjected to standard method of serum separation and the harvested sera was then used for evaluation of total serum protein. Total serum protein was determined by Goldberg refractmeter method to obtain concentrations (g/dL) for each blood sample. The standard flame photometry using Gallenkamp analysis was used to determine serum sodium (Na^+) ion. Potassium (K^+) and chlorine (Cl^-) ions was determined.

Study Design

The study was laid in a Completely Randomized Design (CRD) with strain and sex as treatments while haematological parameters and biochemical parameters are the variables. The statistical model used for the study; $Y_{ij}=\mu+X_i+Y_j+E_{ij}$

Where: Y_{ij} is the study parameters measured, μ is the overall mean, X_i is the effect of strain, is Y_j is the effect of sex.

Statistical Analysis

The data collected were subjected to statistical analysis using Excel package (version 2010). The haematological and serum biochemistry parameters were expressed as mean and ± standard error (SE) using t-test: Significant differences were classified at $p<0.05$, $p<0.01$ and $p<0.001$.

RESULTS AND DISCUSSION

Tables 1 and 2 show the effect of strains and sex on haematological. In terms of WBC, Pearl Guinea fowl was found find higher value (94.43) but statistically the same with Black and Lavender. This indicated that Pearl has the highest protection against infection. For the lymphocyte and monocyte parameters, Lavender bird has the higher values of (68.85) and (21.78) respectively. The result also showed that Pearl bird has higher RBC value (3.00) indicating that higher blood cells and antibodies. However, the result revealed that no significant ($P>0.05$) differences were observed across all the haematological parameters of the strain. For the sex, no significant ($P>0.05$) difference was observed across the haematological parameters. The result is in agreement with the report of Orji *et al.,* (1986) and Oyewole and Ogwuegbu (1986). Effect of strain and sex on serum biochemistry was presented on table 3 and 4. The result showed that no significant ($P>0.05$) difference was observed across the strain. The result indicated that female bird has higher Na value than male, but they are statistically the same. The result of Obinna *et al.,* (2011) showed sex showed significant ($P<0.05$) effect on haematology with males being higher in PCV (%), HBC (%), and RBC (x1012/L), while females were higher in MCV and MCH than the males. According to Sturkie (1965) HB and PCV were influenced by androgen. The chloride and ALT that found to be higher in male birds than the females indicated that the activities of this mineral and enzyme are higher in males than in females as reported by Obinna *et al.,* 2011. According to most authors (Pandian *et al.,* 2012: Obinna *et al.,* 2011) sex can affect both haemoglobin and hematocrit parameters, where male animals have higher values. Uko and Ataja (1996) compared and found that both albumins and globulins in the blood were higher in female poultry when compared to male specimens and this was particularly true for the Guinea fowl species.

Table 1: Main Effect of Strain on Haematological Parameters

Parameters	Black	Lavender	Pearl	P value
White blood cells	93.70±2.49	92.30±2.49	94.43±2.49	0.83
Lymphocytes	63.98±2.79	68.85±2.79	64.85 ±2.79	0.47
Monocytes	20.98±0.62	21.78±0.62	21.03±0.62	0.62
RBC	2.95±0.27	2.42±0.27	3.00±0.27	0.32
MCV	190.75±2.88	188.75±2.88	193.70±2.88	0.51
MCH	58.45±1.51	57.90±1.51	57.85±1.51	0.95
MCHC	30.68±0.47	30.68±0.47	29.88±0.47	0.43
Platelets	78.50±7.84	55.50±7.84	64.75±7.84	0.19

RBC= red blood cells, MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration (MCHC)

Table 2: Effect of sex on haematological parameters

Parameters	F	M	P value
White blood cells	91.32±2.03	95.63±2.03	0.18
Lymphocytes	66.78±2.27	65.00±2.27	0.60
Monocytes	21.03±0.51	21.48±0.51	0.55
RBC	2.60± 0.22	2.98±0.39	0.27
MCV	193.10±2.35	189.03±2.35	0.27
MCH	58.13±1.23	58.00±1.23	0.94
MCHC	30.13±0.38	30.68±0.38	0.35
Platelets	63.33±6.40	69.17±6.40	0.54

RBC= red blood cells, MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration (MCHC)

Table 3: Effect of Strain on Serum Biochemistry

Strain	Black	Lavender	Pearl	P value
Na^+ (Mmol/L)	138.25±8.62	140.50±6.45	135.25±6.18	0.60
K^+ (Mmol/L)	4.30±0.14	4.30±0.97	4.70±0.41	0.61
Cl^- (Mmol/L)	99.00±3.46	104.25±3.30	99.25±3.77	0.19
Bicarbonate (Mmol/L)	24.50±0.92	23.00±2.58	24.50±1.00	0.46
Urea (g/dL)	4.78±0.92	5.85±0.71	4.90±1.27	0.22
Creatine (g/dL)	83.75±16.07	97.50±10.41	99.50±24.57	0.49
ALT (IU/L)	9.25±0.50	8.00±0.82	8.50±1.29	0.30
ALP (IU/L)	67.50±2.38	60.25±26.31	75.75±4.57	0.39
Albumin (g/dL)	43.25±0.96	42.00±1.41	42.25±1.26	0.30
Globulin (g/dL)	33.25±4.57	36.25±5.91	34.50±4.51	0.73

ALP= alkaline phosphate, ALT= alanine transaminase

Table 4: Effect of Sex on Serum Biochemistry

Sex	F	M	P value
Na^+ (Mmol/L)	140.33±8.45	135.67±4.32	0.29
K^+ (Mmol/L)	4.42±0.26	4.45±0.83	0.93
Cl^- (Mmol/L)	101.61±4.08	100.00±4.24	0.50
Bicarbonate (Mmol/L)	24.33±1.51	23.67±1.97	0.55
Urea (g/dL)	4.92±0.86	5.43±1.20	0.33
Creatine (g/dL)	87.67±17.58	99.50±17.51	0.33
ALT (IU/L)	8.33±0.82	8.83±1.17	0.44
ALP (IU/L)	70.50±6.38	65.17±21.89	0.55
Albumin (g/dL)	43.00±0.89	42.00±1.41	0.16
Globulin (g/dL)	33.17±4.31	36.17±5.04	0.35

ALP= alkaline phosphate, ALT= alanine transaminase

CONCLUSION

The study on the comparative haematology and biochemical analysis of Guinea fowl concluded that the haematological and serum biochemical parameters can be consulted as the health indicator for disease diagnosis, well management, selection and genetic improvement. However, the information from this study is too scanty to characterize the birds in the study area. It is recommended further study should be conducted on the molecular characterization of the bird.

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