EFFECT OF LITTER DEPTHS ON HAEMATOLOGICAL PROFILE OF ROSS-308 GROWER BROILER CHICKENS IN MAKURDI, SUB-HUMID SAVANNA

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ABSTRACT
The environment of the animal certainly has definite effect on its physiology. The assessment of these effects requires the measure of haematological indices. Hence this experiment was designed to study the effect of wood shaving depths on some haematological indices of Ross-308 grower broiler chickens. The four weeks old, one hundred and twenty (120) grower broiler chickens used for this study were randomly allotted by weight to four treatments of three replicates each, comprising of ten birds per replicate. The experiment was set in a completely randomized design. Feed and water were administered ad-lib. At the end of the experimental period of four weeks, three birds were selected from treatments; one per replicate and sacrificed. Blood was collected from the severed jugular; 3mls each into EDTA and EDTA free bottles for each bird. Samples in the EDTA bottles were used to evaluate PCV, Hb, RBC, WBC, and the erythrocytic indices; MCV, MCH and MCHC were calculated. Serum samples were aspirated from the EDTA free bottles for the analysis of total protein, albumin, glucose, creatinine, total cholesterol and triglyceride. The result of the study showed that the means of Hb, MCHC, ALT, total cholesterol and triglyceride vary significantly ($p<0.05$) among the treatments while means of all other indices were not significantly ($p>0.05$) different. It was observed in this study that Hb, MCHC and triglyceride concentration were influenced by litter depth.
Keywords: Haematology, Serum, litter depth, Broiler, Chicken

INTRODUCTION

The surrounding and materials use in farmhouses could trigger certain physiological responses (which may be negligible or deleterious) to animals in that habitat. One basic and essential thing in broiler production is the litter material. Litter material as bedding is of paramount importance in livestock production and has many uses. Asaniyan *et al*. (2007) noted that litter has its usefulness in broilers' faeces management, as an absorbent, evaporation moisture and removal of gases. In addition, litter material could instigate an environment that enables physiological and psychological welfare of the bird (Adebiyi *et al*., 2021). Asaniyan *et al*. (2007) also suggested the depth of wood-shaving litter to be 5 cm. Wood shaving is conventionally used as bedding for poultry production in Nigeria (Oke *et al*., 2019). Laseinde (1999) had shown that fresh wood shaving bedding or other readily available material could be used up to the depth of 7.5 cm to 10cm. However, Oke *et al*. (2019) noted that bedding materials are becoming scares and expensive. Hence it is important to determine the depth of litter (wood shaving) that will be physiologically appropriate and economical, for broiler chickens. According to Ochefu *et al*. (2020), haematological analysis is a relatively good measure of physiological changes in animals. Nutritional status, level of hydration and condition of stress could be detected by haematological indices (Amaza *et al*., 2020). Therefore, this experiment was structured to study the effect of wood shaving litter depths on haematological profile of Ross-308 grower broiler chickens. This strain of broiler chickens is known for their rapid growth and feed to muscle conversion rate.

MATERIALS AND METHODS

The study was carried out in the Teaching and Research Farm of the College of Animal Science at the Joseph Sarwuan Tarka University, Makurdi; located in the southern guinea savanna, on latitude 7° 48′33.6″N and longitude 8° 37′ 1 2.7″ E (https://www.google.com/maps); with a conspicuous distinctive wet season and dry season periods. Ambient temperature ranges between 25 to 34 □C while annual rainfall is in the range of 178 to 1690 mm (https://nimet.gov.ng/). Recorded relative humidity in the experimental period is 44 % (www.weatherspark.com/m/58530/average-weather-in-

March-in-Makurdi-Nigeria). A total of 120 Ross-308 grower growing broiler chickens were used for the study. The birds were randomly allotted by weight into four treatments (at 1.5, 2.5, 3.5 and 4.5 cm of litter depth respectively), of three replicates with ten birds each. The study lasted for four weeks. Water and a certified commercial feed were administered a*d-lib*. At the end of experimental period, three birds were randomly selected from each treatment and sacrificed. Three mL each of blood were collected from the severed jugular veins into EDTA and plain bottles. Serum samples was decanted from blood in plain bottles after 6 hours. Haematological parameters measured include Packed Cell Volume (PCV), Red Blood Cell (RBC), Haemoglobin Concentration (Hb), and White Blood Cell (WBC), and Leucocyte differential counts. The erythrocytic indices; Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were calculated using appropriate formulae, Serum biochemical parameters determined were total protein, albumin, globulin, glucose, creatinine, Alanine transaminase (ALT), Alkaline phosphatase (ALP), aspartate transaminase (AST), total cholesterol and triglyceride. Data collected were subjected to analysis of variance (ANOVA) using IBM® SPSS® version 25 (2017) software, and where differences exist, means were separated using the Duncan multiple range test of the same software.

RESULTS AND DISCUSSION

The result of the study is presented in Table 1. Significant ($p<0.05$) differences were observed for the treatment means of Hb, MCHC, ALT activity, total serum cholesterol concentration and triglycerides. All the means of other parameter measured did not vary ($p>0.05$). Haemoglobin has the physiologic function of oxygen and carbon dioxide transport (Mitruka and Rawnsley, 1977). The mean Hb concentration in this study were lower (in 3.5 and 4.5cm litter depth) than the reported normal range of 7 to 18 g/dL (Wakenell, 2010); and lower ($p>0.05$) than values observed from 1.5 and 2.5 cm litter depth. It was also observed that mean MCHC presented higher ($p<0.05$) values in the greater litter depths as compared to treatment one (1.5 cm). Rizzi *et al*. (2010) stated that MCHC depicts the haemoglobin density in the erythrocyte population. Tvedten (2010) noted that an increment in MCHC could be due to the presence of Heinz bodies in lysed erythrocyte. The pattern of mean ALT activities is not define, hence cannot be adjudged to be due to litter depth. Higher activity could signify liver

Table 1: Haematological profile of Ross-308 grower broiler chickens in varying litter depths in sub-humid savanna

Parameters	T1	T2	T3	T4
PCV (%)	28.00±1.73	29.30±0.33	28.30±0.88	30.00±1.73
RBC $\times 10^{12}$/L	2.60±0.15	2.60±0.10	2.47±0.21	2.70±0.15
WBC $\times 10^{9}$/L	6.27±0.26	5.93±0.23	6.27±0.48	6.67±0.18
Hb (g/dL)	9.30±0.58^{a}	8.67±1.19^{ab}	6.27±0.48^{b}	6.67±0.18^{b}
MCV (*fL*)	107.60±2.31	113.03±2.97	115.07±1.99	111.10±2.18
MCH (*pg*)	35.80±0.76	37.77±1.03	38.90±0.10	37.07±0.74
MCHC (g/dL)	33.20±0.00^{b}	36.10±1.46^{a}	38.30±0.66^{a}	37.07±0.74^{a}
Lymphocytes (%)	47.00±0.58	48.00±0.58	47.33±0.88	48.00±0.58
Heterophils (%)	50.00±1.73	49.00±0.58	49.33±1.20	48.00±0.58
Eosinophils (%)	0.67±0.67	0.67±0.67	1.33±0.33	1.67±0.33
Basophil (%)	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
Monocytes (%)	2.33±1.20	2.33±0.33	2.33±0.33	2.67±0.33
Total protein (g/dL)	4.07±0.19	3.93±0.18	3.77±0.09	3.87±0.03
Albumin (g/dL)	3.20±0.17	2.80±0.12	2.73±0.12	2.90±0.29
Globulin (g/dL)	1.07±0.49	1.33±0.07	1.03±0.07	0.97±0.26
Glucose (mg/dL)	138.67±2.60	135.20±4.41	141.27±6.97	145.87±1.33
Creatinine (mg/dL)	0.87±0.06	0.87±0.05	0.82±0.08	0.92±0.04
AST (iu/L)	176.33±10.83	159.10±2.42	150.80±3.06	158.10±6.06
ALT (iu/L)	44.50±2.74^{a}	36.37±0.90^{b}	37.10±0.99^{b}	44.50±0.58^{a}
ALP (iu/L)	167.40±28.47	192.00±2.43	181.17±16.86	153.30±4.56
Total cholesterol (mg/dL)	183.43±13.82^{a}	129.70±5.72^{b}	153.23±4.44^{b}	199.10±1.56^{a}
Triglycerides (mg/dL)	234.40±2.43^{a}	215.80±5.97^{b}	205.00±4.33^{b}	180.00±1.44^{c}

abc = means in the same row with different superscripts are significantly ($p<0.05$) different.

dysfunction. Mitruka and Rawnsley (1977) documented a normal range of 9.50 to 37.20 iu/L. Mean serum triglyceride concentrations decreased ($p<0.05$) with increase in litter depth while the differences in total cholesterol concentration may not be ascribed to litter depths. Mean total cholesterol were within the reference range of 129 to 297mg/dL (Simaraks *et al*., 2004). According to Regar *et al*. (2019), serum cholesterol is much affected by genetic factor, feed, and medicines. These authors also posited that serum triglycerides concentration could be affected by diets, oestrogen, fat formation, and diseases.

CONCLUSION

In this study, it is difficult to affirm that litter depth affected blood indices. Although significant variations were observed for several parameters, mean values are within reported range for normal broiler chicken, except for Hb, MHCH and triglyceride concentration.

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