RELATIONSHIPS BETWEEN LIVE WEIGHTAND BLOOD PARAMETERS OF ROSS 308 BROILER BIRDS

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ABSTRACT
The need to save cost and time, while providing guidance to analysis of haematological and serum biochemical parameters in broiler birds necessitated this study. The experiment lasted for 8 weeks and was conducted to evaluate the effect of live weight on packed cell volume, haemoglobin concentration, red blood cells, white blood cells, total protein, globulin, albumin, uric acid, and creatinine of Ross 308 broiler birds. Blood samples for laboratory analysis were collected from 36 birds randomly selected from the population. The data generated were subjected to simple linear regression and shows no significant ($P>0.05$) effect of live weight on packed cell volume (PCV), haemoglobin (Hb) concentration, red blood cell (RBC), white blood cell, total protein (TP), globulin (GLB), albumin (ALB) and uric acid. However, live weight significantly ($P<0.05$) affected the serum creatinine level in the birds to a percentage of 43.7. Therefore, this study demonstrates that live weight of Ross 308 broiler birds can only be used to predict serum creatinine levels in Ross 308 broiler birds, and not other haematological and serum biochemical parameters evaluated in this study.
Keywords: Broiler chicken, creatinine, heamatology, live weight, serum biochemistry

INTRODUCTION
Haematology has been defined as the study of blood and an important part of clinical pathology as well as diagnostic process (Lutz and Pryluski, 2008). Haematology includes not only the examination of the cellular and fluid portions of blood, but also includes a study of the tissues that form, store and circulate blood cells. However, the serum is the component that is neither a blood cell nor a clotting factor. It is the part of blood that is like water and that contains substances (called antibodies) that fight disease. Serum includes all proteins not used in blood clotting and all the electrolytes, antibodies, antigens, hormones and any exogenous substances (Martin, 2007).

The result of haematology and serum analysis is usually used to assess the health status of an animal. Haematological and serum parameters have been observed as good indicators of the physiological status of animal and their changes are important in assessing the response of such animals to various physiological situations (Khan and Zafar, 2005). Furthermore, changes in haematological parameters are often used to assess stress in animals due to environmental, nutritional and/or pathological factors (Afolabi *et al*., 2010)

Due to the importance of haematological and serum biochemical parameters in animals, it is probably the reason why their analyses are usually carried out, especially when the diets of the animals are changed or when there are factors that are suspected to alter the haematological and serum biochemical parameters of the animals (Etim *et al*., 2014). By doing so, the physiological or health status of the animals will be ascertained under the new situation.

However, sometimes carrying out a haematological and serum biochemical analyses may be expensive, cumbersome or urgently needed that there is no time for the analyses. Such situations probably requires an alternative that will give same result or a close prediction of the results. It is for this reason that this experiment is designed to determine the relationships between live weight and haematological and serum biochemical parameters of broiler birds.

MATERIALS AND METHODS
The experiment was carried out at Federal University of Technology, Owerri Teaching and Research farm and lasted for a period of eight weeks.

A total of fifty Ross 308 day old broiler birds were sourced from a reputable farm and used for this experiment. The birds were reared on deep litter following standard procedures as outlined by Oluyemi and Roberts (2007). Standard starter and finisher diets were given to the birds. At eight weeks of age, thirty six birds were randomly selected for sample collection. The live weights of the birds were measured using an electronic scale. Blood for haematological analysis was collected into EDTA containers while those for serum biochemical analysis was collected with plain containers and taken to the laboratory for analysis.The Sysmex KX-21N™ Automated Hematology Analyzer (Sysmex Europe GmbH) was used for heamatological analysis, while biochemical analysis was carried out using the Semi-automated clinical chemistry analyser, Microlab 300 (Vital Scientific, India)

Data collected was subjected to simple linear regression analysis using Statistical Package for Social Sciences (SPSS). The statistical model is as follows;

$Y = a + bX + e$

Where,

Y = Dependent variable

a = Intercept

b = Slope

X = Independent variable

e = Error

RESULTS AND DISCUSSION

The effects of live weight on haematological and serum biochemical parameters of the broilers are presented in Tables 1 and 2, respectively. Live weight of the birds recorded no significant ($P>0.05$) effect on the evaluated haematological parameters; packed cell volume (PCV), red blood cell (RBC), haemoglobin (Hb) concentration and white blood cell (WBC). The degree of relationship between live weight and the haematological parameters evaluated were recorded to be 15.9, 0.0, 4.3 and 10.1 % for PCV, RBC, Hb and WBC, respectively. The inability of the live weight to have significant influence on these parameters may be due to the fact that the live weight of the birds comprised other components apart from protein (Henn *et al*., 2014) which are scarcely components of these parameters evaluated. This will probably imply that weights of components without any relation to the evaluated parameters were included in the analysis. Serum total protein (TP), globulin (GLB), albumin (ALB) and uric acid were not significantly ($P>0.05$) affected by live weight of the birds, but the serum creatinine of the birds were significantly ($P<0.05$) affected (43.7 %) by live weight of the birds. The degree of relationship between live weight and TP (5.8 %), GLB (3.3 %), ALB (2.0 %) and uric acid (8.3 %), respectively were not enough to cause significant effect on the parameters. Since these parameters are mainly protein based (Frandson *et al*., 2009), it could also be that non-relative components of live weight were also included in their analysis. The significant ($P<0.05$) effect of live weight on serum creatinine level of the birds could be due to the fact that creatinine is a waste product produced by the muscle from the breakdown of creatine, and the activities of the muscles involves energy from fat deposits (Frandson *et al*., 2009). This will then imply that the amount of fat deposit (weight) which is a component of live weight (Henn *et al*., 2014) played a relatively significant role in the analysis of the serum creatinine level. It is also observed that the degree of relationship between live weight and serum creatinine level was 43.7 %, and the coefficient of regression was a negative value, which means that increase in live weight of the birds resulted in decreased serum creatinine level. But increase in muscle mass has been reported to increase creatinine level (Alessandra *et al*., 2008); it could then mean that as muscle mass of the birds was increasing, the fat deposit was decreasing, thereby limiting the energy available for creatinine production.

Table 1: Prediction of haematological parameters from live weight of Ross 308 broiler birds

S/N	Regression equation	R	R^2 (%)	SEM (n = 36)	P. Value
1	PCV = 12.81 + 0.008(LW)	0.398	15.9	2.300	0.200
2	RBC = 2.43 + 0.000026(LW)	0.019	0.0	0.182	0.954
3	Hb = 11.34 + 0.001(LW)	0.207	4.3	0.649	0.520
4	WBC = 49.81 + 0.15(LW)	0.317	10.1	5.778	0.315

S/N = Serial number;R = Regression coefficient; SEM = Standard error of means; n = Number of observations; P = Probability; PCV = packed cell volume; RBC = Red blood cell; Hb = Haemoglobin; WBC = White blood cell

Table 2: Effect of live weight on serum biochemical parameters of Ross 308 broiler birds

Parameter	Regression equation	R	R^2 (%)	SEM (n = 36)	P. Value
Total protein	TP = 1.51 + 0.001(LW)	0.241	5.8	0.354	0.451
Globulin	GLB = 0.84 + 0.000(LW)	0.181	3.3	0.247	0.572
Albumin	ALB = 0.66 + 0.000(LW)	0.141	2.0	0.297	0.662
Uric acid	Uric acid = 7.714 – 0.002(LW)	0.288	8.3	0.721	0.364
Creatinine	Creatinine = 2.91 – 0.001(LW)	0.661	43.7	0.160	0.019*

S/N = Serial number;R = Regression coefficient; SEM = Standard error of means; n = Number of observations; P = Probability; TP = Total protein; GLB = Globulin; ALB = Albumin

*****Statistically($P<0.05$)significant

CONCLUSION

This study demonstrated that live weight of Ross 308 broiler birds has no effect on the haematological and serum biochemical parameters evaluated, except for creatinine. Therefore, haematological (packed cell volume, haemoglobin concentration, red blood cells and white blood cells) and serum biochemical (total protein, globulin, albumin and uric acid) parameters are not dependent on live weight of the birds and cannot be used to predict them.

RECOMMENDATION

Based on the result of this study, the following recommendations are made;

(i) Live weight of broiler birds should not be used to predict their haematological and serum biochemical parameters.

(ii) There should be further studies to use only the components of live weight that has relativity to the haematological and serum biochemical parameters to evaluate its effect on them.

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