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Research Article

Effect of Feeding Different Level of Dietary Energy Feeds on the Haematological Parameters of Marshall Broiler Chicken in Hot Dry Season

Ibrahim, N. T.[1], *Harande, I. S.[1], Ribah, I. M.[2], Oshilaja, A. A.[2], Ilevbare, I.[3], Fakai, H. M.[4] and Hassan, Y.[5]

[1]Department of Animal Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi, Nigeria
[2]Department of Animal Science, Faculty of Agriculture, Kebbi State University of Science and Technology Aliero, Nigeria
[3]Department of Veterinary Medicine, College of Veterinary Medicine, Federal University of Agriculture Zuru, Kebbi State, Nigeria
[4]Department of Crop Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi, Nigeria
[5]Department of Economic and Extension Service, College of Agriculture, Federal University of Agriculture Zuru, Kebbi, Nigeria
***Corresponding Author's email*: ibrahimshuaibuharande@gmail.com**

ABSTRACT

The experiment was carried out to determine the effect of feeding different dietary energy levels on the haematological parameters of Marshall Broiler chickens during the hot dry period in semi-arid environment late. A total of 200 broiler chickens were randomly divided into four treatment groups replicated 5 times with 10 birds per replicate and 50 birds per treatment. Four experimental diets were prepared containing 2,800(T1), 2,900(T2), 3000(T3) and 3100 (T4) kcal/kg of ME with iso crude protein of 21%. Each experimental diet were fed to the birds for a period of 8 weeks. Haematological parameters test were also carried out with 5 birds per treatment and the result of (PCV) Packed cell volume, (Hb) Haemoglobin, T1 and T2 (WBC) White Blood cells and T2, T3 and T4 monocytes) were all found within the normal range. However, the result of Mean corpuscular volume (MCV), Mean corpuscular cell volume (MCH), Mean cell haemoglobin concentration (MCHC) and lymphocytes were found to be above the normal range, while that of (RBC) Red blood cells ,heterophil,T3, T4 WBC and T1 monocytes were found below the normal range. Basophil and eosinophil were not found in blood circulation in all of the treatments. The result also showed that high energy diet (3000-3100kcal/ME) should be fed to Marshall Broiler bird at both starter and finisher phase in hot season of semi-arid Sokoto for optimum performance.

Keywords: Broiler; Chickens; Energy; Levels; Hot season; Ematolgy

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INTRODUCTION

Poultry refers to all domesticated birds that are kept for meat and egg production or for any other purpose such as for research and esthetic (prestige). These include domestic fowl, guinea fowl, duck, geese, turkeys, Ostrich etc. (Oluyemi and Roberts, 2009). These groups of animal are also referred to as monogastric (non- ruminants) animals because of their single stomach compartment and hence the in-ability to digest

large quantity of fibrous feed material. Oluyemi and Roberts, (2009).

Hematology studies numbers and morphology of cellular elements of blood, the white blood cells, red blood cells (erythrocytes), and the platelets (thrombocytes) and its use in the diagnosis and monitoring of diseases (Khan and Scott, 2012). Haematological studies are of ecological and physiological importance in helping to understand the relationship between blood characteristics and the environment (Ovuru and Ekweozor, 2004) and in the selection of animals that are genetically resistant to certain diseases and environmental conditions. Hematological parameters are good indicators of physiological status of animals (Khan and Zafar, 2005) and those parameters that are related to the blood and blood forming organs. As reported by Issac *et al.* (2013) that animals with good blood composition are likely to show good performance.

Hot dry period in semi-arid environment represent a challenge to poultry production, and has negative influence on performance, product quality and the health of chicken (Syafwan *et al*., 2011). It has been suggested to include dietary fats/oil in broiler diet to increase metabolizable energy (ME) intake and decrease the heat increment. (Syafwan *et al*., 2011). This study aims to determine the effect of feeding different levels of dietary energy feeds on the haematological parameters of Marshall Broiler chicken in the hot dry season.

MATERIALS AND METHODS

Study Area

The study was carried out on 26 March, 2020 to 14 May, 2020 at the Poultry Production Unit of the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Usmanu Danfodiyo University Sokoto at Veterinary clinic Aliyu Jodi road, Sokoto. Sokoto lies on latitude 13^{O} 05' 00" N and 5^{O} 15' 00" E, within the Sudan Savannah Zone, in the extreme north western part of Nigeria and at an altitude of 350m above the Sea level (Mamman *et al*., 2000). Rainfall is between. May and September with a peak in August. The average annual Rianfall is about 750mm.

Experimental Procedure

A total of two hundred (200) day old broiler chicks of marshal strain averaging 35g were used for the study. The birds were reared on deep litter with all routine management throughout the experimental period of 8weeks with feed and watered *ad libitum*. The experimental design used was completely randomised design (CRD), with four (4) treatments consisting of different level of energy (2800kcal/kg, 3900kcal/kg, 3000kcal/kg, and 3100kcal /kg). Each treatment was replicated five (5) times with ten (10) birds per replicate.

The composition of ingredients and nutrients in the experimental diets are shown in table 1.At the end of the experiment, between the hours of 7:00am-9:00am one bird was randomly selected from each replicate (5 birds per treatment) for blood samples collection. 5mls of blood were collected from the wing vein of each bird using a scalp vein needle set after swabbing with a mentholated spirit. Immediately after blood collection, the blood samples were placed in to sterilized glass tubes/bottles containing Ethylene Diaminetetra-acetic Acid (EDTA)to prevent clotting (Nyaulingo, 2013) for Haematological studies. During the collection of blood, the needle and syringes were changed between birds to prevent contamination.

Red blood cell count (RBC) were determined using the improved Neubauer ruler chamber (WHO 1980), haemoglobin estimation (Hb) by the Sahili Method, white blood cell (WBC) counts as described by (Yahav, *et al.* 1997), packed cell volume (PCV) were determined by the micro haematocrit method. Mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated from RBC, PCV and Hb using the appropriate formulae (Olaniyi *et al*., 2012). Differential leukocytes counts (Lymphocytes, Heterophil, Basophil, Eosinophil and monocytes) were determined using the unopette method as described by Compbell (1984).

Table 1: Composition (%) of experimental diets

	(0-8 weeks)			
Ingrdients	**Diet 1**	**Diet 2**	**Diet 3**	**Diet 4**
Maize	47.00	48.00	45.00	49.60
Corn bran	-	3.10	1.30	-
Wheat offal	16.25	8.90	2.50	4.00
Rice brand	-	-	10.00	5.90
Fish meal	2.50	1.51	0.72	2.00
Soya bean meal	13.05	15.00	15.00	19.80
Groundnut cake	13.75	15.36	15.00	11.00
Blood meal	3.00	3.01	4.00	3.00
G/Oil	1.00	2.06	3.16	4.00
Limestone	1.00	1.50	2.00	1.40
Bone meal	1.00	1.10	2.50	1.00
Salt	0.25	0.20	0.25	0.20
Premix	0.25	0.20	0.25	0.25
Methionine	0.25	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Energy(kcal/kg)	2810.10	2902.92	3000.84	3089.64
Crude protein (%)	21.01	21.00	21.00	21.00
Crude fibre (%)	4.83	4.83	4.85	4.50
Ether extract (%)	3.67	3.59	5.65	4.91
Calcium (%)	0.89	1.00	1.02	1.00
Phosphorus	0.54	0.51	0.51	0.54
Methionine	0.55	0.50	0.50	0.51
Lysine	1.31	1.30	1.32	1.33

RESULTS AND DISCUSSION

Results on the laboratory analysis of the blood sampled of the experimental broiler chickens is presented below in Table 2. Results of the blood sampled of the experimental broiler chickens showed PCV values declining with increase in energy levels. However, all PCV values recorded in all the treatments in this experiment are within the reference value (22-35), which showed that the hot season does not affect the packed cell volume (PCV), which is in line with the findings of Nworgu *et al*. (2007) who fed broilers served pumpkin leaves extracted supplement in late dry season and reported that PCV was found within the normal range (28.0-41.50).

Hb values recorded in all the treatments were within the reference value (6.5-13.0), which also concurred with that of Islam *et al*., (2004) who reported that commercial broiler chicken reared in Sylhet region in Bangladesh had Hb value of 7.06-9.37, which are in line with the values reported in this study.

RBC values increased with an increase in energy levels from T1 to T2 and also from T3 to T4. However, all RBC values recorded in all the treatments were below the reference value (2.5-3.5). This showed that the hot season affects red blood cells. Which is in line with the finding of Nyaulingo (2013), who reported that the iron mineral contained in the diet plays an important role in the synthesis of haemoglobin in the red blood cells, the haemoglobin (Hb) concentration increased as the red blood cells (RBC) decreased.

WBC showed increase with increase in energy level from T1 to T2 but decreased with increase in energy level from T3 to T4. However, WBC values recorded in T3 and T4 were below the reference value. Hot period and energy levels affects the WBC, which is not in line with the findings of Nworgu *et al*. (2007) who fed broilers served pumpkin leaves extracted supplement in late dry season and reported that WBC was found within the normal range.

MCH showed lowest value in T4 and was highest in T1. MCH values recorded in all the treatments in this experiment were above the reference value (32-.47), this is mainly due to the decreased in red blood cells (RBC) counts, as the red blood cells decreased mean corpuscular volume increased and vice versa.

MCH result showed lowest value in T4 and was highest in T1. MCH values decreased with increased energy level from T1 to T2 and also from T3 to T4. The result for MCH in this study is not in line with the findings of AL-Nedawi (2017) who conducted a

research on broiler chickens and found out that MCH value was within the normal range (34.45-36.84pg).

MCHC result showed lowest value in T4 and was highest in T3. MCHC values recorded in all the treatments in this experiment were above the reference value (26-35) except in T4 which is within the reference value, which was lower than those reported by Yahav *et al.* (1997) (24.55g/dl).

Lymphocytes value was highest in T1 and lowest in T4. However, all the lymphocytes values recorded in all the treatments were above the reference value (71-74.45). Lymphocyte values decrease from T1 to T2 as the energy level increased also from T3 to T4. This could be as a result of the hot season.

However, all the heterophils values recorded in all the treatments in this experiment were below the reference values (38.7±9.9-79.8±7), which did not tally with the results of Yahav *et al.* (1997) who reported that exposure of broiler chicken to 39^0C for 2hrs significantly raised heterophil proportion.

Monocytes value was highest in T3, T4, and lowest in T1. However, monocytes values recorded in all the treatments were within the reference values (2.0-5.0) except in T1, which is in line with the finding of Maxwell and Robertson (1998) who reported that broilers given limited feed during hot season showed only a small decrease in monocytes proportion. Eosinophil and basophil values were not found in blood circulation across the treatments (T1-T4). The finding of this research is based on the findings of Maxwell and Robertson 1998, who reported that eosinophils disappear from circulation when broilers are exposed to heat.

CONCLUSION

Findings of this study conclude that feeding a low energy diet (200-2900 kcal/ME) to Marshall Broiler yield better haematological output in the hot dried season**.** It is recommended that a low energy diet (2800-2900 kcal/ME) should be fed to Marshall Broiler birds for optimum production in the hot season of the semi-arid Sokoto.

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