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EFFECT OF BOILING DURATIONS OF ROSELLE SEED ON THE HAEMATOLOGY PROFILE OF BROILER CHICKENS

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Abstract

A study was conducted to evaluate the effect of boiling durations of roselle seed on the haematological profile of broiler chickens. There were six dietary treatments groups; T1 served as the control diet (raw), while T2, T3, T4, T5, T6 and T7 diets containing Roselle seeds boiled for 20min, 30min, 40min, 50min and 60min respectively. Parameter measured were Pack cell volume (PCV), Red blood cells (RBC), White blood cell (WBC), Haemoglobin (Hb), Total blood protein (TP) and differential blood count, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC). There were no significant ($P>0.05$) differences across the dietary treatments for PCV, total protein, white blood cell, red blood cell, haemoglobin, lymphocytes, monocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration with the exception of neutrophils which differ significantly ($P<0.05$). The haematological values were within the reference range for healthy birds. It was therefore concluded that boiling duration of roselle seed has no adverse effects on the health status of the broiler chickens.

Introduction

The Roselle plant (*Hibiscus sabdariffa* var. *sabdariffa*), also called sorrel is an annual herbaceous shrub (Alagbejo, 2000). Effective utilization of Roselle seeds for non-ruminant animal feeding will necessitate processing to reduce or inactivate the anti-nutritional factors (Alagbejo, 2000). Processing methods such as maceration, soaking, fermenting, boiling and sprouting have been reported to be effective in reducing anti nutritional factors in legume seeds. At the moment, there are more documented information on the utilization of Roselle seed as feed ingredient for poultry (Yagoub *et al.*, 2008). The high demand that outweighs the supply of grains especially soybean cake and groundnut cake that are the main sources of protein in animal feeds, being staple food for Nigerians and Agro-allied companies has resulted in prohibitive cost of livestock feeds (Kwari *et al.*, 2010). Efforts are now geared towards alternative protein sources that are cheap and readily available with less competition with humans. Therefore, the study is targeted towards evaluating the haematological performance of broiler chickens fed boiled Roselle seed meal at varying durations.

Materials and Methods

Location of the Experiment

The experiments were carried out at the poultry unit of Animal Science Teaching and Research Farm, Ahmadu Bello University, Zaria. Zaria is within the Northern Guinea Savannah zone of



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Nigeria, latitude, 11°14' 44' N and longitude 7°38' 65' E, at an altitude of 610mm above sea level.

Source and Processing of Roselle Seeds

The Roselle seeds used for the studies were purchased from the open market at Potiskum, Yobe State, Nigeria. The seeds were thoroughly cleaned by winnowing and sieving. The seeds were processed as follows:

Boiling method: To process the Roselle seeds, batches of 25kg seeds were subjected to various boiling time/durations: 0 (Raw), 10, 20, 30, 40, 50 and 60 minutes. A batch of 25kg Roselle was then poured into the boiling water. From this point, the specified time for boiling was taken. At the end of the period of boiling, excess water was drained off. The boiled seeds were then sun-dried for 7days. Milled samples of raw and boiled Roselle were oven dried and used for chemical analysis (Bawa, 2003).

Haematological Parameters

Blood samples (2ml) were collected at the finisher phase (8 weeks) from 2 birds per replicate aseptically from the wing vein between 6.30 and 7.30 am. Each blood sample was transferred into unheparinised (containing anticoagulant, ethylene-diamine tetra-acetic acid (EDTA) tubes which were used to determine the haematological parameters (Pack cell volume (PCV), Red blood cells (RBC), White blood cell (WBC), Haemoglobin (Hb), Total blood protein (TP) and differential blood count) at the Haematology Laboratory of Veterinary Teaching Hospital of Ahmadu Bello University, Samaru, Zaria. Erythrocytes indices which include mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated using the following formulae (Jain 1986).

Data Analysis

All data obtained from the experiments were subjected to analysis of variance (ANOVA) using general linear model procedure of SAS 9.4 (2014). Significant levels of differences among treatment means were separated using the Duncan's Multiple Range Test (Dunnett, 1955) to separate the means.

Result and Discussion

Table 1 shows the haematological parameters of broiler chickens fed diets containing boiled Roselle seeds. There were no significant ($P>0.05$) differences across the dietary treatments for PCV, total protein, white blood cell, red blood cell, haemoglobin, lymphocytes, monocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration with the exception of neutrophils which differ significantly ($P<0.05$).

Table 1: Effect of duration of boiled Roselle seed meal on the hematological status of broiler finisher

Treatments	1	2	3	4	5	6	
	Duration of Boiling Time (minutes)						
Parameters	Raw (0)	20	30	40	50	60	SEM
PCV (%)	29.89	29.82	31.33	31.22	30.67	31	0.86

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Haemoglobin (g/dl)	9.92	9.91	10.41	10.37	10.19	10.3	0.28
Total Protein (g/dl)	2.96	3.05	2.89	3.36	2.89	3.04	0.21
WBC ($\times 10^3/\text{mm}^3$)	9.24	9.47	6.48	8.36	8.98	8.97	1.54
RBC ($\times 10^6/\text{mm}^3$)	4.97	4.98	5.19	5.28	5.07	5.19	0.17
Neutrophils	10.78 ^{ab}	10.56 ^{ab}	10.56 ^{ab}	8.00 ^b	13.89 ^a	10.22 ^{ab}	1.64
Lymphocytes (%)	87.44	89.25	89.30	91.56	85.78	89.56	1.94
Monocytes (%)	0.33	0.53	0.11	0.11	0.11	0.22	0.21
MCV (fl)	60.11	59.87	58.59	59.26	60.49	59.76	0.76
MCH (pg)	19.96	19.89	19.47	19.69	20.11	19.86	0.25
MCHC (g/dl)	3.32	3.32	3.32	3.32	3.32	3.32	0.00

SEM = Standard Error of Means; ^{abcd}Means with different superscripts within the same row are significantly (P<0.05) different; PCV = Packed Cell Volume, WBC = White Blood Cell, RBC = Red Blood Cell

The levels of neutrophil in birds fed Roselle seeds across the dietary treatments were greater (8.00-13.89) than the birds fed Roselle seeds boiled for 40 minutes (8.00). Pack cell volume ranged from 29.89-31.33%, haemoglobin (9.91-10.41g/dl), total protein (2.89-3.36%), WBC ($6.48\text{--}9.47 \times 10^3/\text{mm}^3$), RBC ($4.97\text{--}5.28 \times 10^3/\text{mm}^3$), Neutrophils (8.00-13.89), lymphocytes (87.44-91.56%), monocytes (0.11-0.53%), mean corpuscular volume (59.87-60.49fl) and mean corpuscular haemoglobin (19.47-20.11pg), respectively. The significant differences ($p<0.05$) in Neutrophils agrees with the findings of Duwa *et al.* (2013) who conducted an experiment on the effect of Roselle seed meal on haematological and biochemical indices of broiler chickens. The least neutrophils activity observed in birds fed diet containing Roselle seeds boiled for 40 minutes could be as a result of the body immune system producing antibodies to defend the body against foreign organisms. The PCV values (29.89-31.33%) observed in this study were within the normal range of values (24-31%) for healthy broiler as reported by Banerjee (2007) and Kwari *et al.* (2008). This indicated that the diets were adequate for broiler chickens and the birds were not anaemic. The values obtained in this study for TP (2.89-3.36 g/l) fell within the normal range (3.31 to 5.39 g/l) as reported by Anon (1980) and Mitruka and Rawnsley (1997) respectively with the exception of T3 (2.89g/l) which had value lower than the normal range. The values indicates poor nutritional adequacy of Roselle seeds boiled at 30 minutes in respect to protein. The RBC, WBC and HB fell within the normal range $2\text{--}4 \times 10^{12}/\text{L}$, $3.9\text{--}31 \times 10^9/\text{L}$ and 7 - 13g/dl respectively as reported by Anon (2002). The haemoglobin count observed in this study ranges from (9.91-10.41g/dl) which fell within the normal range (7-13g/dl) recommended for healthy broiler chickens indicating that the birds had sufficient blood pigment for proper transportation of oxygen. The lymphocyte value in this study was between 87.44 – 91.56% which were above the 40 to 48% reported by Bhatti *et al.* (2002).

Conclusions

There were no differences across the dietary treatments for PCV, total protein, white blood cell, red blood cell, haemoglobin, lymphocytes, monocytes, mean corpuscular volume, mean

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corpuscular haemoglobin and mean corpuscular haemoglobin concentration with the exception of neutrophils which differ significantly. It was therefore concluded that boiling duration of roselle seed has no adverse effects on the health status of the broiler chickens.

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