

PRELIMINARY STUDIES ON THE HAEMATOLOGICAL PARAMETERS OF COCKERELS FED RAW AND PROCESSED GUINEA CORN (*SORGHUM BICOLOR*)

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ABSTRACT

The effect of feeding raw and ground guinea corn (*Sorghum bicolor* L. Moench) on the haematological parameters of chicken was investigated in this study. Ten (10) 6-week old cockerels were randomly divided into two groups, A and B, and were fed raw and processed (dried and ground) guinea corn, respectively, for two weeks. Packed cell volume (PCV), Haemoglobin (Hb), Red blood cell count (RBC), White blood cell count (WBC), neutrophils, eosinophils, lymphocyte and monocyte counts were determined before and after the duration of feeding the cockerels with guinea corn. Although significant changes were not observed in most of the haematological parameters, birds fed with processed guinea corn however had a significantly higher red blood cell (RBC) count than birds fed with the raw guinea corn. These findings suggest that feeding of processed guinea corn to cockerels may be more advantageous than feeding of raw guinea corn.

KEYWORDS: Haematology, guinea corn, cockerels, raw, ground

INTRODUCTION

Guinea corn is a popular cereal in Nigeria and other West African countries. It is a staple cultivated and consumed by many people especially in the Northern and Southern Guinea savannah (Lukhele, 1981). Also, guinea corn is a major ingredient in animal feed concentrate, especially for domestic chicken, horses and ruminants. Although widely used in the livestock industry because it is rich in carbohydrates and proteins (Haikerwal and Matheison, 1971), sorghum has been associated with poisoning in horses, a condition which is thought to be due to its content of cyanogenetic glycosides and nitrates. However, there has been little documented information on the effects of raw and processed (dried and ground) guinea corn on haematological parameters of cockerels.

Haematological parameters are very essential in diagnosing pathogenic and metabolic disorders and are vital tools to assess the health status of an individual or flock (REF). The changes in hematological parameters are often used to determine the effects of stress or toxic conditions due to environmental, nutritional or other factors. Normal ranges of haematological parameters can be altered by the ingestion of plants constituents (Ajagbonna *et al.*, 1999). Therefore, the present study was carried out as a preliminary approach to evaluate the effects of feeding raw and processed (dried and ground) guinea corn on the haematological parameters of the domestic chicken.

MATERIALS AND METHODS

Ten (10) 6-week old cockerels purchased from a commercial poultry farm in Ibadan were used in this study. They were divided into two groups A and B, with five birds per group and individually labeled for easy identification. Birds in Group A were fed raw guinea corn for 2 weeks, while Group B Birds were fed with processed (dried and ground) sorghum also for 2 weeks. All the birds were provided with water ad libitum throughout the study period.

Blood samples were collected prior to feeding the raw and processed guinea corn and at the end of the 2 weeks from the jugular vein with sterile syringe and needle for haematological analysis. Parameters including the Packed cell volume (PCV), Hemoglobin concentration (Hb), Red Blood cell count (RBC), neutrophils, eosinophils, total White blood cell count (WBC) and differential leucocyte count (lymphocytes, neutrophils, eosinophils and monocytes) were determined. Packed cell volume (PCV) and haemoglobin concentration were determined by the microhematocrit and cyanmethaemoglobin methods, respectively, as described by Jain (1986). Erythrocyte count was determined by the haematocytometry method also as described by Jain (1986). Total white blood cell (WBC) counts were made in a haemocytometer using the WBC diluting fluid and differential leucocytes counts were made by counting the different types of WBC from giemsa stained slides.

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Table 1. Effect of guinea corn on erythrocyte and erythrocyte indices

PARAMETER	PRE-FEEDING		POST-FEEDING	
	A (RAW)	B (PROCESSED)	A (RAW)	B (PROCESSED)
PCV (%)	27.4±1.52	27.0±1.80	26.60±1.81	25.6±2.07
RBC (x10 ¹² /L)	1.5±0.1	1.42±0.13	1.34±0.09	1.64±0.13
Hb (g/L)	8.76±0.46	8.6±0.55	8.56±0.41	8.3±0.64
MCV (%)	183.44±14.96	190.00±14.70	199.38±20.78	157.56±23.73
MCHC (%)	32.018±1.88	31.87±0.72	32.282±2.39	32.45±1.35
MCH (x10 ⁹ /L)	58.57±14.96	60.75±3.72	64.02±3.53	50.97±23.73

Table 2. Effect of guinea corn on total and differential white blood cell counts

PARAMETER	PRE-FEEDING		POST-FEEDING	
	A (RAW)	B (PROCESSED)	A (RAW)	B (PROCESSED)
WHITE BLOOD CELL (x10 ⁹ /L)	3.92±0.68	3.02±0.91	3.68±0.53	3.64±0.96
LYMPHOCYTES (%)	2.03±0.36	1.38±0.53	2.02±0.43	1.68±0.64
NEUTROPHILS (%)	1.81±0.36	1.61±0.39	1.62±0.20	1.74±0.39
EOSINOPHILS (%)	0.06±0.02	0.05±0.01	0.03±0.01	0.03±0.01
MONOCYTES (%)	0.34±0.01	0.04±0.02	0.34±0.01	0.02±0.01

viewed from each of the 30 fields of oil immersion objective of a microscope (Colès, 1989). Erythrocyte indices including mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were determined from the values obtained from red blood cells (RBC) count, haemoglobin concentration and PCV values (Duncan *et al.*, 1994). All the values were expressed as mean $\pm$ standard deviation and statistical analysis was carried out by using PRISM software package (version 5.0). Statistical significance was assessed by the Analysis of Variance (ANOVA) and the student t-test. Values of probability less than 5% were considered statistically significant.

RESULTS

The result of the effects of guinea corn on the haematological parameters of cockerels are presented in tables 1 to 3. Comparison of pre-feeding and post-feeding haematological values of birds fed with raw guinea corn did not reveal any significant alterations. Likewise, comparison of the values of haematological parameters of the birds fed processed guinea corn were compared with those of the pre-feeding values, significant changes were not observed. However, comparison of post-feeding values of birds fed with raw and processed guinea corn revealed that the birds fed with processed guinea corn had a significantly higher red blood cell (RBC) count and lower Mean corpuscular volume (MCV) values than birds fed with the raw guinea corn.

DISCUSSION

Blood is an important index of physiological and pathological status of man and animal with essential measurable parameters such as packed cell volume, haemoglobin, white blood cell count and platelets count (Schalm *et al.*, 1975). The normal ranges of these parameters can be altered by the ingestion of plants constituent (Ajagbonna *et al.*, 1999), especially antinutritional factors such as saponins and tannins,

which may induce changes in cellular integrity and membrane permeability of cells (Hoffbrand *et al.*, 1997). In this study, the birds fed with the processed guinea corn had a significantly higher red blood cell count compared with those fed with the raw guinea corn. In addition, the MCV is significantly increased, suggesting that the red blood cells in circulation are of larger sizes and may include a large number of reticulocytes which have the same quantity of haemoglobin as the mature red blood cells (erythrocytes). Although, there was no significant change in the levels of haemoglobin, which is a protein utilized by red blood cells for the distribution of oxygen to other tissues and cells in the body (Choudhari & Deshmukh, 2007), and the value of MCHC of the birds, there is an indication that the processed guinea corn may have higher concentration, per weight of feed, of substances with the ability of potentiating responses to anaemia in birds because reticulocytes are often seen in bone marrow responsiveness to anaemia and reticulocyte count is an important index for measuring bone marrow responsiveness, which increases in blood loss anaemia, but decreases in bone marrow hypofunction.

The processes involved in the drying and grinding of the guinea corn generates a form of heat and pressure on them and this could lead to a reduction in the inherent antinutritional factors (ANFs) in them. It has been reported that several processing methods like drying, soaking, boiling, heating and germination reduces the levels of ANFs in cereals and legumes (Tuleun *et al.*, 2009; Uhegbu *et al.*, 2009; Abeke *et al.*, 2010). Grinding is a common procedure applied to processing and mixing of animal feeds and a form of heat is generated on the feeds in the process. This study confirms the need to adequately process poultry feeds before feeding them to birds. More work is required on the haematological effects of long term feeding of raw and processed guinea corn to cockerels. These effects also need to be investigated on layers.

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