HAEMATOLOGICAL RESPONSE OF LOCAL LAYING HENS FED JACKFRUIT (ARTOCARPUS HETEROPHYLLUS) LEAF MEAL

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ABSTRACT
A study lasting eight weeks was conducted to evaluate the haematological responses of 72 local laying hens fed different levels of jackfruit leaf meal (Artocarpus heterophyllus) (JLM). The hens were randomly allotted to four different treatment groups in a completely randomized design. Each treatment containing 18 hens was replicated 3 times with each replicate containing 6 laying hens. The JLM was prepared by plucking fresh leaves and air dried under room temperature until crispy. The dried leaves were milled into powder and stored in an air- tight container. The JLM was included in the basal feed at 0, 20, 40 and 60 g /kg of feed, representing T1, T2, T3, and T4 respectively. Results showed that there were high significant differences ($p < 0.01$) in PCV, RBC, and HB among the treatment groups. The values obtained, increased as the level of jackfruit leaf meal increased, but WBC, MCV, MCH and MCHHC did not vary significantly ($p > 0.05$) across the treatment groups, although WBC decreased as the JLM increased. It was therefore concluded that inclusion of Jackfruit leaf meal improved the blood profile of local laying hens.
Keywords: Alternative feedstuff, Health status, Jackfruit, Leaf meal, Sustainability, Stress

INTRODUCTION

Nigeria's native chicken is a significant source of protein and household food security, with distinct sensory qualities and minimal chemical contamination (Manyelo *et al.,* 2020). However, diseases, high costs, and scarcity of essential feedstuff limit the chicken's potential and protein supply. Native chickens grow slowly, so there is little need to feed them high protein and energy diets. To increase production without increasing costs, it is crucial to enhance their health and strengthen their immune system. Jackfruit (*Artocarpus heterophyllus*) a tropical tree fruit native to southwest India is used for furniture, animal feed, and human consumption. Its leaves are abundant and have reported to have anti-bacterial, anti-diabetic, anti-oxidant, anti-inflammatory, and anti-helminthic properties (Eburuaja *et al.,* 2019). Jack fruit leaf meal (JLM) in poultry feeds can improve blood profile, boosting productivity. It is rich in bioactive compounds, vitamins, and minerals essential for both animal and human life. The JLM micronutrients are crucial for animal metabolism, growth, development, maintenance, reproduction, and optimal health (Shastak, and Pelletier, 2024). Most bioactive compounds in poultry must come from the diet, as birds cannot synthesize them large enough. Deficiencies in certain minerals and vitamins result to haematological changes in chickens such as anaemia, poor feathering and bone lesions. Enriching local hens' diets with unconventional feedstuff rich in vitamins and minerals, can improve their performance and health traits. This can meet consumer demand and contribute to revenue for rural farmers. Hence, this study evaluates haematological response of local laying hens fed *Artocarpus heterophyllus* (Jackfruit) leaf meal.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the poultry Unit Department of Animal Science, Teaching and Research Farm, University of Nigeria, Nsukka in Enugu State, South Eastern Nigeria. Nsukka is located at the latitude 6°51'28.19'' N and longitude 7°'23'44.77'' E. The average temperature is 24.9°C/ 76.8 °F. and annual rainfall is 1579mm/ 62.2 inch (Ihinegbu, 2019).

Experimental animals, diet and management

A total of 72 local laying hens of 22 weeks old were used for this study. The local hens were obtained from the Poultry Unit, of the Department of Animal Science, Teaching and Research Farm, University of Nigeria, Nsukka. The study was carried out in a completely randomized design (CRD) with four treatments: control, 0, 20, 40, and 60 g /kg of feed, representing T1, T2, T3, and T4 respectively. The laying hens were randomly assigned to the four treatment groups with three replicates each, having 6 hens each. They were housed in deep litter pen with adequate space, ventilation and lighting. Wood shavings were used as main bedding material. The hens were fed *ad libitum* with basal diets and safe drinking water for eight weeks. The chickens were properly administered routine vaccinations and prophylactic treatments, and were closely monitored for signs of ill health throughout the study. The fresh leaves of jackfruit were plucked from the Crop Science Department University of Nigeria, Nsukka. The leaves were washed to remove diet and then air-dried at room temperature 28°C until the leaves were crispy to touch. The dried leaves are milled using the miller subsequently sieving to obtain powder. The powder is stored in air tight containers.

Data Collection and Statistical Analysis

The data were analyzed using one-way analysis of variance of the Statistical Product Service Solution software (version 22.0) was used to analyze experimental data for significant differences by comparing means of the different treatments. Significantly different means were separated using Duncan's new multiple range tests.

RESULTS

Haematological response of local laying hens fed jackfruit (*Artocarpus heterophyllus)* leaf meal

The haematological response of local hens fed Jackfruit (*Artocarpus heterophyllus)* Leaf meal is presented on table 1.

Table 1. Haematological Indices of Local Laying Hens Fed Jackfruit (*Artocarpus heterophyllus)* Leaf Meal

Parameters	T1 control	T2 20g/kg JLM	T3 40g/kg JLM	T4 60g/kg JLM	P-value
PCV (%)	33.33 ± 0.88^{c}	38.00±1.16^{b}	41.00 ± 0.58^{a}	41.67±0.33^{a}	0.00**
Hemoglobin (g/dL)	8.30±0.10^{c}	9.37 ± 0.12^{b}	9.83±0.29^{ab}	10.23±0.07^{a}	0.00**
RBC (x $10^{6)}$	9.01 ± 0.34^{b}	11.00±0.24^{a}	11.41±0.40^{a}	11.83±0.08^{a}	0.00**
WBC (x10mm^3)	9133.33±176.38	9600.00±11547	9800±208.17	9566.67±317.98	0.25^{NS}
MCV (*fl*)	37.16 ±2.16	34.52±0.32	36.05±1.81	35.22±0.42	0.62^{NS}
MCH(*pg*)	9.25±0.45	8.52±0.20	8.62±0.17	8.65±0.01	0.26^{NS}
MCHC(g/dL)	24.93±0.68	24.69±0.72	24.00±0.94	24.56±0.31	0.82^{NS}

^{abc} means on the same row with different superscripts are significantly different at 5% probability. PCV: packed cell volume; RBC: red blood cell; WBC: white blood cell; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration.

The findings of the effect of jackfruit leaf meal on haematological indices of local laying hens are presented in Table 1. Results showed that packed cell volume (PCV), red blood cell (RBC), haemoglobin (HB) was highly significant (P< 0.01) while white blood cell (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were not significant (P>0.05).

DISCUSSION

The values obtained for haematological parameters in this study is within the normal range for packed cell volume (PCV) 25-45%, hemoglobin (Hb) 8.7-11.3g/dL, red blood cell (RBC) 2.0-4.0 x10^6/ mm^3, and white blood cell 3.7-11.9 x10^9/L, for laying hens (Edeh *et al.,*2023). PCV, RBC, and Hgb are important for the health of laying hens because they are indicators of the birds' bone marrow capacity to produce red blood cells, oxygen carrying capacity and can help diagnose anemia. The significant increase in packed cell volume, red blood cell, and hemoglobin observed among the treatment groups is in line with the report of Edeh *et al* (2023). Improvement observed among the treatment groups, suggest that JLM may have beneficial effect on blood profile of laying hen. This could be attributed to the high vitamin content, mineral contents such as phosphorus, calcium, zinc and copper (Afotry *et al.,* 2024). JLM is rich in proteins and essential nutrients which enhance overall blood health. The elevated PCV, in this study indicated increased erythrocyte production which is essential for oxygen transport and metabolic functions, thus resulting to the overall health and physiological status of the hens (Edeh *et al.,* 2023). The red blood cells are primarily responsible for carrying oxygen from the lungs to issues throughout the hen body facilitating cell increase as the JLM increased (Ebruaja *et al*., 2020). This can be attributed to the high content of iron in JLM. The aid of the WBC is to protect the body against pathogens and infectious agents. Although WBC is not affected by JLM in this study, it decreased as JLM increased indicating absence of infectious agents or pathogen as evidenced by better immune system. The MCV, MCH and MCHC recorded in this current study is in line with the findings of Edeh *et al*. (2023).Although not significantly (P>0.05) affected by JLM across the treatment groups, their values indicate the average size of red blood cells, the amount of hemoglobin per cell, and the concentration of hemoglobin in a given volume of packed red blood cells. The improvement in the haematological parameters in this study indicated that the healths of the hens were not compromised and also that erythropoiesis was not affected in the internal system of the laying hens.

CONCLUSION

From the study, jackfruit leaf meal fed to local laying hens improved blood profile without any negative impact on the health status of the hens.

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