Effect of Red Mangrove Leaves on Haematological Parameters of Broilers

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Abstract: **A completely randomized design experiment was conducted to study the effect of mangrove leaves on the blood parameters of broilers. Sixty day old hubbard broiler chicks were randomly distributed into four treatment groups A, B, C, and D of 15 birds per group. All groups were replicated thrice with five birds. The birds were administered with dried powdered mangrove leaves at graded levels of 10g/Kg feed for B, 20g/Kg feed for C, and 30g/Kg for D, while A served as the control without mangrove leaves. The experiment lasted for eight weeks. Proximate analysis was carried out on the leaves for fat, crude protein, and ash contents. The blood parameters measured were PCV, RBC, and WBC. The results from the proximate analysis showed that red mangrove leaves contained 2.4% fat, 9.9% crude protein, and 34.4% ash contents. Findings from the study indicated that dietary levels of 10g/Kg, 20g/Kg, and 30g/Kg red mangrove leaves significantly increased treatment means of packed cell volume, and red blood cells. It was also observed from the study that total white blood cells were not affected by the graded levels of red mangrove leaves powder incorporated into the feeds. Red mangrove leaves are of great value on improving packed cell volume and red blood cells of broilers. This means an increased ability to carry and distribute oxygen and nutrients to the body, consequently increasing the productivity or livability of the birds. The increase in these blood parameters shows the potential of red mangrove leaves in improving the health status of broilers. Feed compounders should incorporate red mangrove leaves in their feeds.**

Key Words: **Red mangrove, blood parameters, broilers, and red blood cells**

I. INTRODUCTION

The rapidly increasing demand for livestock products being driven by population growth, urbanization, and increasing incomes in developing countries (Delgado 2005) remains a concern for food security. Meeting the ever-increasing animal protein demand paved the way for numerous endeavours geared towards the production of animals that attain maturity early and at a relatively shorter time interval with a cheaper rate. The broiler bird is considered a feasible option for bridging the animal protein gap in Nigeria (Shidi *et al.,* 2020). This is because broiler production has the highest and the quickest rate of turnover in the livestock and meat industry (Smith, 1990).To achieve this, attention is drawn to the improvement of broiler production by administering additives (growth stimulants or growth promoters).

Feed additives are substances added to feed in relatively small amounts; to impact desirable properties or to suppress undesirable ones. These additives or growth-promoting substances are primarily to improve the growth and other performances of farm animals (Randel, 1975). The use of feed additives or growth promoters has been adopted as a strategy to improve animal performance and productivity (Wekhe & Taylor, 1992; Berepubo *et al.*, 1996; Wekhe &Igoni, 1999; Wekhe & Njoku 2000, Yang *et al.*, 2018). The use of growth promoters in feed has been in practice for a long (Yang *et al.*, 2018); in which antibiotics have gained preeminence (Chattopadhyay 2014) but due to animal and human, including environmental health issues, the use of antibiotic growth promoters have been restricted in the European Union and other parts of the world (Sigolo *et al.*, 2021). According to Ozogul *et al.* (2015) and Gracia *et al.* (2016), antibiotic growth promoters' alternatives such as organic acids, herbs, essential oils, and plant extracts (Hashemi *et al.*, 2011), and the mixtures of either of them are used in poultry production. These alternatives effectively enhances animal growth in areas of improving absorption of nutrients, reducing the amount of growth-depressing metabolites, reducing the incidence and severity of subclinical infections, reducing the microbial use of nutrients, inhibiting the macrophages excretion of cytokines and antimicrobial activities (Humphrey & Klasing, 2003).

It has been suggested that innovative way of surmounting the problem of feed or medical resources in animal production must be sought through the careful identification and testing of the numerous indigenous plant species which abound in the tropics (Ogebe, 1987). Particularly, plant extracts to stimulate the secretion of digestive enzymes thereby improving digestion and making nutrients in feeds readily available for absorption aside from antibiotic activities (Chao *et al.*, 2000). These synergic activities by plant active substances in turn improve health and performance of livestock (Manzanilla *et al.*, 2001). The previous study has shown improvement in the haematological indices of chicken-fed diets containing Yohimbe supplements (Obajuluwa *et al.*, 2020). The PCV and other blood indices like Haemoglobin, are indicators for assessing the circulatory electrolytes (Peters *et al.*, 2011). It is suggested that high PCV implies an increase in RBC production (Chineke *et al.*, 2006). The haematological indices improvement of chickens with Yohimbe contained diet is traceable to its' ability to stimulate the production of Red Blood Cells as it is reportedly used as a blood tonic in western African medicine (Clark & Sunderland, 2004). In addition, there was increase in the White Blood Cell (WBC) counts and their differentials with the supplementation of Yohimbe in chickens' diets. This agrees with the findings that reported Yohimbe bark

extract used in African tropics as a stimulant and a tonic for men originally Kuhlmann (1999; Obajuluwa *et al.*, 2020). The increase in WBC due to use of Yohimbe additives in the diets of the birds is traceable to the immunostimulatory properties of the herb (Vidanarachchi *et al.*, 2006). Similarly, Delonix regia, Parkia biglobosa leaf extract, and garlic/ lemon grass extract has been discovered to have improved blood profile, weight gain, and reduce mortality in birds (Alagbe, 2019). Red mangrove (Rhizophora racemosa) is the red of the mangrove plant species. It is the abundant plant among the common trees of the salt-water swamp. In the Niger Delta Region of Nigeria, red mangrove remains the most abundant and highly underutilized plant of the region. Hence, the effect of red mangrove leaves on haematological parameters (PCV, RBC, and WBC) broilers are investigated using 10, 20, and 30g/kg feed.

II. METHODOLOGY

A completely randomized design experiment was conducted to study the effect of mangrove leaves on some blood parameters of broilers. Sixty-day-old hubbard broiler chicks were randomly distributed into four treatment groups A, B, C, and D of 15 birds per group. All groups were replicated thrice with five birds. The birds were administered with dried powdered mangrove leaves at graded levels of 10g/Kg feed for B, 20g/Kg feed for C, and 30g/Kg for D, while A served as the control without mangrove leaves. The experiment lasted for eight weeks.

Red mangrove leaves were collected from Eagle Island, Port Harcourt, Rivers State of Nigeria. The collected leaves were washed, oven-dried, milled, and weighed according to the treatment levels 10g, 20g, and 30g. The powdered leaves were weighed into dosages. A sensitive mettle electro-balance model AA 163 was used. The graded levels were wrapped into papers and labeled and tied in polythene for security.

A proximate analysis was carried out on the powdered mangrove leaves to ascertain its nutrient contents. The powdered mangrove leaves were dispensed to the chicks in their feed from day old to eight weeks. The bids were fed conventional broiler feed (commercial feeds) unto which powdered red mangrove was mixed at graded levels for the respective treatment groups.

The poultry house was thoroughly cleaned and kept tidy before the arrival of the birds. Drinkers, feeders, and the floor of the poultry house were disinfected. Litter materials were replaced with fresh ones. The open walls of the poultry house were covered with polythene materials to converse heat. Two hours before the arrival of the birds, the drinking troughs were filled with clean water and anti-stress (vitality) was added to the water.

The birds were brooded by the conventional method. They were brooded with 200watt bulb. At four weeks old, the chick feeders were replaced with adult linear feeders, the birds were vaccinated against Newcastle disease with the Newcastle Disease vaccine (NDV lasota). Coccidiostat was given to the given to in the third and fifth weeks. The mode of administration was through drinking water. Feed and water were given *ad libitum*.

Blood samples were collected from two birds in each treatment group at the end of the 8th week from the neck after decapitating the birds. Heparinized tubes were used to collect blood samples for packed cell volume, red blood cells, and total white blood cell analysis.

The means of results obtained were analyzed statistically by analysis of variance (ANOVA). Differences between means were tested for significance using Ducan's new Multiple Range (DMRT) tests (Steel and Torrie, 1980).

III. RESULTS

Proximate analysis of red mangrove leaves

The result of the proximate analysis of red mangrove leaves is presented in Table 1. The results showed 34.4% ash, 2.4% ether extract, and 9.9% crude protein content.

Table 1. Proximate analysis of red mangrove leaves

Crude Protein %	Ether Extract %	Ash %
9.9	2.4	34.4

Blood parameters

The blood parameters of broilers fed with graded levels of red mangrove leaves are shown in Table 2. The packed cell volume of the control and treatment groups is 31.5%, 35 %, 34.5 % and 35 %. These results showed an increase between the control and treatment groups. The increase in PVC was significant ($P < 0.05$) as shown in Table 2. The red blood cells of the broilers at the end of eight weeks are 1.36 x 106/m3 for the control group and 1.76 x106/m3, 1.65 x 106/m3, 1.37 x 106/m3 for treatment groups B, C, and D respectively. The red blood cells increased significantly ($P < 0.05$). The total white blood cells of the control and treatment groups remained the same. The cells were not affected by the graded levels of the mangrove leaves ($P > 0.05$).

Table 2. Effect of red mangrove leaves on some blood parameters

Blood parameters	Treatments				Standard Error of Means
	A (Control)	B	C	D	
Packed Cell Volume (PVC) %	31.5^{b}	35^{a}	34.5^{a}	35^{a}	0.81
Red Blood Cells (RBC) X $10^6/m^3$	1.36^{b}	1.76^{a}	1.65^{a}	1.37^{b}	8.7×10^4
White Blood Cells (WBC) X $10^6/m^3$	4.44	4.44	4.44	4.44	-

Values are means of three broilers selected randomly per treatment at the end of starter and finisher diets (8 weeks), superscripts a and b implies means with significant ($P < 0.05$) difference from each other.

IV. DISCUSSION

Some of the major proximate parameters such as crude protein, fat, and ash contents were analyzed for the proximate analysis of red mangrove leaves as they remain key parameters of interest. One major parameter that ought to have been analyzed was the crude fibre content of red mangrove leaves but lack of facility rendered this component not to be analyzed.

It was observed that red mangrove leaves have high ash content. The high ash content of mangrove leaves revealed from the analysis could be a pointer that the presence of principal mineral elements of dietary requirement is high in the leaves.

The packed cell volume and red blood cells of the birds were found to be significantly ($P<0.05$) increased compared to the control groups by the graded levels of red mangrove leaves. PCV also or hematocrit value indicates the volume of erythrocytes in a given volume of blood in the whole blood sample. Fast-growing birds like broilers require an adequate supply of and distribution of oxygen and nutrients; to meet their fast metabolic rate. This also accounts for broilers having a high number of red blood cells. The increase in RBC and PCV implies great enhancing potentials to supply and distribute oxygen and nutrients to broilers body tissues. In addition, the supply and distribution of oxygen and nutrients would provide energy and support good health. This would in turn promote production performance and livability of broilers. The increase in PCV and RBC was in tandem with the reports of Shidi *et al.* (2020) whose study discovered a significant increase in RBC almost twice the level of the control in both leaf and root-bark at the highest dosage of 90g/kg feed. This implies enhanced potency of the function of RBC; which includes regulation of acid-base balance; citation of gases or respiration; stoppage of bleeding; regulation of body temperature and regulation of body fluids nutrient hormone and enzyme transport; transport of cellular wastes to kidneys, liver including lungs and sweat glands for removal from the body. This increase in red blood cells means a state of well-being for the body increased energy production for work by the increased oxygen carrying capacity with consequent productivity due to facilitated metabolism of nutrients. Also, Nwate (1995) study revealed the use of common salt as additives positively affected broilers blood parameters. Although, the red mangrove leaves were not analyzed for common salt but its' high ash content and the marine habitat in which the plant grew could be a pointer for the likely presence of common salt.

On the other hand, the white blood cells of broilers were not affected by red mangrove leaves. This could imply the zero toxicity levels on broilers. Although, the values of WBC of the control group and the treatment groups were the same ($4.44 \times 10^4/m^3$) but not in agreement with the result reported by Banerjee (1992) whose study reported 15,000 to 35,000 per cubic milliliter for sexually matured chickens. Wekhe & Oboh, (2007) discovered hypertrophy of the bursa of Fabricus of broiler birds due to increased production of antibodies against red mangrove leaves which the body regarded as foreign when fed with pulverized leaves of the plant. An increase in the size of the bursa of Fabricus in broilers suggests an immunological reaction of the birds to the presence of a foreign body. This is a lymphoepithelial organ (bursa of Fabricus) peculiar to birds. The authors on the contrary discovered no visible pathological differences either in size, texture, or appearance on other visceral organs such as liver, spleen, gizzard, kidney, and heart, and did not show. This implies that pulverized red mangrove leaves remain nontoxic to broiler birds at the incorporated levels.

V. CONCLUSION

Red mangrove leaves are of great value in improving packed cell volume and red blood cells of broilers. This means an increased ability to carry and distribute oxygen and nutrients to the body, consequently increasing the productivity or livability of the birds. The increase in these blood parameters shows the potential of red mangrove leaves in improving the health status of broilers. Feed compounders should incorporate red mangrove leaves in their feeds.

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