



**KIDNEY PARAMETERS OF
BROILER FED DIETS
CONTAINING STEM BARK OF
AFRICAN LOCUST (*Parkia
biglobosa*) BEANS AS
REPLACEMENT TO ANTIBIOTICS**

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INTRODUCTION

The domestic chicken (*Gallus gallus domestica*) is an important domestic animal worldwide, especially for its nutritious flesh that is used as source of food (Unang, 2023), food security and revenue for rural households. In developing countries, (Sami and Ogundipe 2020) smallholders' poultry rearing is a common practice in most rural and some urban areas, where the demand for birds is expanding as a result of population growth, increased urbanization, and rising income. Kidneys are dynamic organ which are directly or indirectly associate with multiple body system (Echols *et al.*, 2020). The kidneys are paired of been shaped organs on either of the spine below the ribs and behind the belly, (Brenner, 2018). Blood

Abstract

The research was conducted at the Department of Animal Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi State. To assess the kidney parameters of broilers fed diets containing stem bark of *Parkia biglobosa* as replacement to antibiotics. The specific objectives were to assess serum urea and creatinine level. A total of two hundred birds were used in the experiment in which they were managed under deep litter system for the period of 8 weeks. The birds were divided into 4 dietary treatments with 50 birds per each treatment and each treatment was replicated 5 times containing with 10 birds per replicate, in a completely randomized

design (CRD). T₁ contains 200g antibiotic powder, Stem bark

Keyword: Kidney Parameters, Broiler, African Locust Beans, Replacement, Antibiotics

powder of *Parkia biglobosa* was incorporated into the other treatments as follows: T₂ (100g/100kg), T₃ (200g/100kg), T₄ (300g/100kg). At the end of the experiment, the result obtained from this study indicates that there were no significant differences ($P>0.05$) for all the parameters measured. But numerically variations were observed. The highest numerical value recorded for urea was seen in T₁ (7.00mg/dl), followed by T₄ (6.20mg/dl) and T₃ (5.0

7mg/dl). The lowest also the best urea value was observed in T₂ (3.20mg/dl). The lowest creatinine content of the birds was observed in T₂ (0.8 mg/dl) followed by T₄ (1.03mg/dl), T₄ (1.13) and T₃ (1.20mg/dl). Conclusively, based on the findings of this study stem bark powder of *Parkia biglobosa* had no adverse effect on the kidney Parameters level of broilers. It can be recommended that stem bark powder of *Parkia biglobosa* can be incorporated into broilers diets. It is also recommended that other parameters such as heamatological and carcass analysis should be carried out on broilers fed *Parkia biglobosa* stem bark.

biochemical parameters are important indicators of health status in animal and have been an indispensable tool in diagnosis, treatment and prognosis of many diseases (Sami and Ogundipe 2020). One of the fastest means of assessing the health status of animals fed a particular diet is the use of blood analysis (Maxwell, 1990). Blood test for blood Urea nitrogen (BUN), (Kamal, 2014) which is a breakdown of protein and Amino catabolism (Golda *et al.*, 2020)

and creatinine (Kamal 2021) which is a breakdown of creatinine phosphate in muscle (Golda *et al.*, 2023) are excreted by kidneys.

Feed additive is an additive of extra nutrient or drug of livestock. Such additives include vitamins, amino acids, fatty acids, minerals, pharmaceuticals fungal product and steroidal compounds. The additives might impact feed presentation, hygiene, digestibility or effect on intestinal health, (Merek, 2020).

Parkia biglobosa known as African Locust bean, a tropical trees which is a native of Africa and widely attributed in the Savannah region (Adewosi 2009). *Parkia* species have traditionally found usefulness as foods, and folklore remedies for some ailments (E-Mahmood *et al.*, 2019). The aim of this research is to determine the kidney parameters of broiler fed diets containing stem bark of African locust (*Parkia biglobosa*) beans as replacement to antibiotics.

MATERIALS AND METHODS

Experimental Site

This research work was conducted in the Poultry Unit of the Department of Animal Science, College of Agriculture. It is located in the Northern Guinea Savannah of Kebbi State. Zuru is located within the latitude 11°35' and 11°55' North and longitude in the Northern Guinea Savannah of the South- Western part of Kebbi State (Baba *et al.*, 2013).

Medication

The chicks were given anti stress in drinking water on their arrival to the experimental site and other medications were done as the case arises.

Management of Experimental Birds

The chicks were managed under deep litter system in the brooding pen for a period of four weeks (4) at starter phase and the last four (4) weeks at finishing pen. Before the arrival of the birds the brooder was clean, disinfected using germicide.

Source of Experiment Materials

Stem bark of *Parkia biglobosa* was obtained from the College orchard. It was dried for one week and then grinded into powder, sieved and kept in plastic bottles prior to the formulation of the feeds.

Experiment Diets

Experiment diets were formulated and tag T₁, T₂, T₃, and T₄ *Parkia biglobosa* stem (PBS) bark powder was incorporated into the diets as follows: T₁ (100gANB),

T₂ (100gPBS), T₃ (200gPBS). T₄, (300gPBS) in addition to other feed ingredients as shown in the table below.

Table 1: Basal diets for starting phase

Ingredient	T₁ (100ANB)	T₂(100kgPBS)	T₃(200kgPBS)	T₄(300bPBS)
Maize	45.00	45.00	45.00	45.00
SBM	29.00	29.00	29.00	29.00
GNC	10.00	10.00	10.00	10.00
W/Offal	10.00	10.00	10.00	10.00
FM	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00
Premix	0.30	0.30	0.30	0.30
Methionine	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20
Salt	0.20	0.20	0.20	0.20
Total	100	100	100	100
Calculated Chemical Composition				
ME (kcal/kg)	29.44	29.44	29.44	29.44
Protein	23.9	23.9	23.9	23.9
Calcium	1.3	1.3	1.3	1.3
Phosphorus	0.8	0.8	0.8	0.8
Fiber	4.2	4.2	4.2	4.2

Keys

SBM: Soya Bean Meal, GNC: Groundnut Cake, W/Offal: Wheat Offal, FM: Fish Meal, ANB : Antibiotics, PBS: Parkia biblobosa stem.

Table 2: Basal diets for finisher phase

Ingredient	T₁ (100ANB)	T₂(100kgPBS)	T₃(200kgPBS)	T₄(300bPBS)
Maize	52.00	52.00	52.00	52.00
SBM	19.51	19.51	19.51	19.51
GNC	17.00	17.00	17.00	1.00
W/Offal	5.6	5.6	5.6	5.6
FM	1.5	1.5	1.5	1.5
Bone meal	2.38	2.38	2.38	2.38
Premix	0.21	0.14	0.14	0.14
Methionine	0.14	0.14	0.14	0.14
Lysine	0.21	0.21	0.21	0.21
Salt	0.14	0.14	0.14	0.14
Total	100	100	100	100
Calculated Chemical Composition				
ME (kcal/kg)	29.60	29.60	29.60	29.60
Protein	19.4	19.4	19.4	19.4
Calcium	1.5	1.5	1.5	1.5
Phosphorus	1.0	1.0	1.0	1.0
Fiber	4.2	4.2	4.2	4.2

Experimental Design

The birds were randomly allocated into one of the four dietary treatments group of designated T₁, T₂, T₃, T₄ each treatment contains 50 birds, replicate five times with ten birds in each replicated on arrival of the chicks they were weighted and recorded. The experiment was last for a period of eight weeks.

Sample Collection

Blood samples were collected at the end of eight (8) weeks of study from the experimental birds, blood samples were collected through wing vein 5ml of blood was collected over a labeled sterile sample bottle without anti-coagulant and used to determine the biochemical component as described by Tuleum *et al.*, 2009).

Determinant of Serum Urea and Creatinine

Serum Urea

Serum urea was determined by diacetylmonoxime method using thiosemicabazide (Natelson *et al.*, 1981).

Principle

Urea reacts with diacetylmonoxime at high temperature in an acid medium, the presence of calcium ion and thiosemicabazide to produce a red coloured complex whose absorbance is proportional to urea concentration.

Procedure

The test tube was labeled test, standard and blank reagents was pipetted into the test tube to be as shown below

Reagent	Blank	Standard	Sample
Standard (μ)	-	20	-
Sample (μ)	-	-	20
Regent (μ)	1000	1000	1000
Distilled Water (μ)	20	-	-

The content of the test was properly mixed and were placed in boiling water both for 15-20minutes. The absorbance of the colour was produced and read at 52nm against blank. Uric and standard concentration (80mg/dl).

Calculation

Concentration of serum urea (mg/d) =

$$\frac{A_{\text{sample}}}{A_{\text{standard}}} \times \text{Concentration of standard}$$

A Sample = Absorbed of sample

A standard = Absorbance of standards

Serum Creatine

Colorimetric method with deproteinization was used by Natelson *et al.*, 1981.

Principle

Creatinine in alkaline solution with picrate to form (deproteinization) a coloured complex.

Procedure

The following was pipetted into centrifuge tubes.

Trichloroacetic Acid (TCA)..... 0.5cm

Serum or heparinised plasma 0.5cm

The contents were mixed using a glass rod to every disperse the precipitate. They would be centrifuged at 2500rpm for 10 minutes. The supernatants were poured of and then stored for about 7 days at 2°C to 8°C.

Mixture (cm ³)	1.0	1.0	1.0
Distilled water (cm ³)	0.5	0.5	-
Solution (cm ³)	0.5	0.5	0.5
TCA (cm ³)	-	-	0.5
Supernatant (cm ³)	-	-	1.0

The mixture was allowed to stand for 20 minutes at 25°C. The absorbance of the sample and standard against blank was measured 500nm wavelength

Calculations

Concentration of serum or plasma

$$\frac{A_{\text{sample}}}{A_{\text{standard}}} \times \text{concentration of standard (H mol/l)} = \text{mol/l}$$

Serum = Creatinine standard (177.0 µmol/l).

Serum = Creatinine standard of standards (2.0mg/dl).

Data Collection

At the end of the experiment the birds were fasted overnight. Two birds were selected from each replicate 2ml of blood was collected from each of the selected birds around 6-7am using 2ml syringe and 23g needle and then dispensed into bottles containing no anticoagulant. And stored in ice block before take to laboratory for analysis of urea and creatinine

Data Analysis

The data that has been generated from laboratory analysis was expressed as mean and standard error mean (SEM) at 5% level of significance. The means was separated by Duncan multiple range test.

Results

Table 3: Kidney parameters of broilers fed diet containing stem bark *Parkia biglobosa* as replacement to antibiotics

Parameter	T ₁ (100gANB)	T ₂ (100gPBS)	T ₃ (200gPBS)	T ₄ (300gPBS)	SEM
Urea (mg/dl)	7.00	3.20	5.87	6.20	0.75
Creatinine mg/dl)	1.03	0.87	1.20	1.13	0.06

Key

ANB: Antibiotic, SEM: Standard Error Mean, PBS: *Parkia biglobosa*

The result obtained from this study indicates that there were no significant differences ($P>0.05$) for all the parameters measured. But numerically variations were observed. The highest numerical value recorded for urea was seen in T₂ (7.00mg/dl) followed T₄ (6.20mg/dl), T₃ (5.07mg/dl). The lowest also the best urea value was observed in T₂ 3.20mg/dl). The lowest creatinine content of the birds was also observed in T₂ (0.87mg/dl) then T₁ (1.03mg/dl), T₄ (1.13) and T₃ (1.20mg/d).

Discussion

Ojewuyi *et al.* (2020) stated that each medicinal plants species has its own nutrient composition besides having pharmacologically important phytochemical metabolites which performs multiple biological activities such as antioxidants, anti-microbials effect. modulation of detoxification enzymes, and stimulation of immune system (Jorothy *et al.*, 2019). Urea is a useful indicator of kidney failure in birds, (Alagbe *et al.*, 2019) The values for urea recorded (3.2 -7.0mg/dl) were within the acceptable normal range for broiler. According to Borges *et al.*, (2021), creatinine bulds up in the blood can occur once the kidney is not filtering the blood effectively. However, creatinine level was not significantly influenced ($P>0.005$) by inclusion of *Parkia biglobosa* stem bark in the diets, this shows the integrity of the animals kidney is maintained. Thus indicating that there was no renal damage or muscles wastage that may be attributed to the dietary inclusion of stem bark powder of *Parkia biglobosa* in the diets of broilers. All values observed in creatinine were within the normal range(0.41 – 1.4 l mmol/|). Higher values than normal indicates kidney malfunction (Champe *et al.*, 2020). Therefore, all

the values of serum kidney biochemical constituents fall within the normal ranges of broilers reported by Ibrahim (2022). The result indicates that there is no impaired glomerular filtration functions of the kidney, (Joyce. 2019).

CONCLUSION

The study concluded as follows:

- a. 300g graded levels of *Parkia biglobosa* stem bark at both starting and finishing phase does not have effect on the kidney Parameters level of broilers.
- b. There was improved feed intake of broiler at 300g *Parkia biglobosa* stem bark inclusion.
- c. Based on the findings of this study stem bark powder of *Parkia biglobosa* had no adverse effect on the kidney Parameters level of broilers.

RECOMMENDATIONS

- (i) It can be recommended that stem bark powder of *Parkia biglobosa* can be incorporated into broilers diets.
- (ii) It is also recommended that other parameters such as haematological and carcass analysis should be carried out on broilers fed *Parkia biglobosa* stem bark powder.
- (iii) Larger experiments should be carried out using various breeds and strains of broiler at levels above 300g to ascertain the optimum inclusion level.

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