

MORPHOMETRIC PROFILE OF FINISHER BROILER FED DIETARY LEVELS OF ASH-TREATED *Parkia biglobosa* HULL (ATPBH).

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ABSTRACT

A twenty-one (21) day feeding trial was conducted to investigate the morphometric profile of finisher broiler-fed dietary levels of ash-treated *Parkia biglobosa* hull (ATPBH). A total of 63 broiler birds at three weeks of age were allocated in a Completely Randomized Design (CRD) to three (3) treatments of three (3) replicates each. Three on-farm formulated diets were compounded such that ATPBH replaced 0%, 25%, and 50% of Palm Kernel Cake (PKC) in T₁, T₂, and T₃, respectively. Each treatment had twenty-one (21) birds replicated three times to have seven (7) birds/replicate. Data collected were subjected to one-way analysis of variance (ANOVA) with the aid of SPSS, where a significant difference was observed, and the means were compared using Least Significance Difference (LSD). Most of the parameters measured were not significantly ($P > 0.05$) different except for Back length and Thigh length ($P < 0.05$). The results observed for body length, back length, thigh length, shank length, wing length, breast girth, bird length, and back length ranged from 11.02 - 11.26cm, 7.71 - 8.18cm, 4.90 - 5.18cm, 2.77 - 2.88cm, 3.88 - 4.07cm, 11.21 - 11.70cm, 12.43 - 12.83cm and 1.44 - 1.45cm, respectively. It was concluded that 50% ATPBH gave a similar ($P > 0.05$) best result for back length and thigh length as the control. The inclusion of 50% ATPBH as a replacement for Palm Kernel cake in the diets of finisher broiler birds was recommended for the body morphometric profile of broiler birds.

Keywords: Morphometric traits, broiler, Ash-treated *Parkia biglobosa* hull

INTRODUCTION

As a result of the growing number of people starting chicken businesses and the resulting high demand for commercial feeds, feed manufacturers are more likely to produce inferior feeds, particularly in Nigeria where quality control agencies are either non-existent or not very concerned (Halilu *et al.*, 2016). This development leaves commercial feed millers, suppliers of raw feed materials, and processors in control of farmers, consumers, and the general public. This claim is reasonable given that, depending on the region and production season, feeding chickens alone can account for as much as 70% of production costs (Oyediji, 2001). This has always led to a rise in poultry product prices that are out of the average person's reach and a decrease in the consumption of animal protein (Amir *et al.*, 2001).

Parkia biglobosa, also called the African Locust Bean tree is a leguminous crop peculiar to the tropics, particularly, the North Central geographical zone in Nigeria. It is a perennial tree that belongs to the subfamily Mimosodee and family Leguminosae (now Fabaceae) (Akande *et al.*, 2010). *Parkia biglobosa* is a tree that is not normally cultivated but is found in a population of two or more in the savannah regions of West Africa. *Parkia biglobosa* is an important tree species that provides edible products and income to rural households. However, the common practice in this region is to discard the hull after the seeds have been removed and process environmental challenges in the form of smell when allowed to rot away. Previous studies have shown these hulls to contain considerable protein and high fibre and the presence of anti-nutrients which restricts their dietary inclusion for broiler chickens. Various chemical, physical, and biological treatments have attempted to improve the feed value of the hull. Ajegen *et al.* (2020), reported that fermentation of agro-waste materials reduces their crude fibre contents and enhances the crude protein, which helps in the utilization of such in monogastric and feeding. Yisah *et al.* (2024) also opined that crude fibre and protein contents for ash-treated *Parkia biglobosa* samples showed excellent fibre-reducing ability of ash with little effect on the protein hence making it an awesome ingredient in chicken feed production.

One of the key aspects of poultry genetics is the study of morphometric traits, which include measurable physical characteristics such as body weight, body length, shank length, and breast girth. These traits are essential indicators of the overall health, growth potential, and economic value of poultry birds (Yakubu *et al.*, 2010). The assessment of morphometric traits in poultry birds has been a focus of numerous studies aimed at improving breeding programs and enhancing productivity. Many studies have shown the nutritional benefit of *Parkia biglobosa*, especially the seed as a viable protein source in both human and chicken diets. Despite this nutritional benefit of *Parkia biglobosa* seed, there is still limited information on *Parkia biglobosa* hull and its effect on the morphometric profile of

finisher broiler chicken. The need to make this information available on the potentials of *Parkia biglobosa* and its effects on and viable source of feed ingredient and its impact on broiler morphometric parts while ameliorating the environmental impacts of this hull when allowed to rot away necessitates this research.

MATERIALS AND METHODS

Experimental Location

The study was conducted at the Department of Animal Health and Production Technology, School of Agricultural Technology, Kogi State Polytechnic, Itakpe Campus. Kogi State is located in the Guinea savanna of coordinate 7.63840N, 6.33500E. The temperature throughout the year ranges from 18.89 °C to 34.4 °C and the annual rainfall ranges from 804.5 mm to 1767 mm (<https://www.mindat.org/loc-39831.html>).

Collection and Processing of *Parkia biglobosa* hull

Parkia biglobosa hulls were collected at various processing sites around the Itakpe community. The hulls were air-dried, milled, and then treated with wood ash in the ratio of 2kg *Parkia biglobosa* hull:1kg of wood ash; and allowed to ferment in an air-tight container for 21days after which the ash-treated *Parkia biglobosa* hull was air-dried and sieved using 2.00 mesh size sieve.

Experimental Layout and Management of Birds

A total of 63 broiler birds at three weeks of age were allocated in a Completely Randomized Design (CRD) to three (3) treatments of three (3) replicates each. The three on-farm formulated diets were compounded such that Ash-treated *Parkia biglobosa* hull (ATPBH) was used to replace 0%, 25% and 50% of Palm Kernel Cake (PKC) in T₁, T₂ and T₃, respectively. Each treatment had twenty-one (21) birds such that each of the replicates had seven (7) birds that were raised on a deep liter system. Feed and water were provided *ad libitum*. Standard management practices were observed.

Table 1: Gross and Nutrient Composition of Experimental Diets (%DM basis)

Ingredient	Level of Inclusion of <i>Parkia biglobosa</i> Hull %		
	T1 (0.00)	T2 (25.00)	T3 (50.00)
Maize	50.00	50.00	50.00
Soybean Meal	25.05	25.05	25.05
Palm Kernel cake	12.50	9.37	6.25
<i>Parkia biglobosa</i> Hull	0.00	3.13	6.25
Maize offal	9.75	9.75	9.75
Limestone	1.50	1.50	1.50
Bone meal	0.55	0.55	0.55
Lysine	0.15	0.15	0.15
Methionine	0.15	0.15	0.15
Vitamin Premix	0.20	0.20	0.20
Salt	0.15	0.15	0.15
Total	100.00	100.00	100.00
Nutrients Composition			
Metabolizable energy (Kcal/kg)	2936.01	2940.68	2944.44
Crude protein (%)	18.00	18.07	18.14
Crude Fibre (%)	5.00	5.14	5.28

Data Collection

Body Weight: Body weight was measured weekly using a top-loading 20kg scale with a sensitivity of 10g

Thigh length: This was taken from the beginning of the fibula to the hock joint.

Shank length: This was taken from the beginning of the hock joint to the last ring before the tarsal or meta-tarsal digit.

Breast Width: This was taken from the point of depression to the sharp edge.

Wing Length: Distance between the tip of the phalanges and the coracoids-humerus joint.

Body Length: The distance between the base of the neck and the pygostyle. The body traits were measured using tailor's measuring tape (cm) and body weight with a weighing scale.

Data Analysis

Data obtained for morphometric traits were analysed using analysis of variance, where significant effects were observed, and the means were compared using LSD at 5% significant level.

RESULTS AND DISCUSSION

The morphometric traits of finisher broiler birds fed diets containing varying levels of ash-treated *Parkia biglobosa* hull are presented in Table 4.1 below. All parameters measured were not significantly ($P > 0.05$) different except for Back length and Thigh length ($P < 0.05$). The results observed for body length, back length, thigh length, shank length, Wing length, breast girth, bird length, and back length ranged from 11.02 - 11.26cm, 7.71 - 8.18cm, 4.90 - 5.18cm, 2.77 - 2.88cm, 3.88 - 4.07cm, 11.21 - 11.70cm, 12.43 - 12.83cm and 1.44 - 1.45cm, respectively.

Table 2: Effects of *Parkia biglobosa* on the Morphometric Traits of Finisher Broiler Birds (3-6 weeks)

Parameters (cm)	Treatment			SEM	P-value
	T1	T2	T3		
Body length	11.13	11.02	11.26	0.09	0.58
Back length	8.18 ^a	8.00 ^a	7.71 ^b	0.06	0.01
Thigh length	5.18 ^a	5.16 ^a	4.90 ^b	0.04	0.01
Shank length	2.88	2.86	2.77	0.04	0.36
Wing length	3.90	4.07	3.88	0.05	0.23
Breast girth	11.70	11.45	11.21	0.10	0.16
Bird height	12.50	12.83	12.43	0.11	0.30
Beak length	1.45	1.44	1.45	0.01	0.91

^{ab}Means with different superscripts across the row are significantly ($P < 0.05$), T1= 0% Ash-treated *Parkia biglobosa* hull inclusion, T2=25% Ash-treated *Parkia biglobosa* inclusion, T3= Ash-treated *Parkia biglobosa* inclusion hull inclusion, and SEM= Standard Error of Mean.

The effect of different dietary levels of Ash-treated *Parkia biglobosa* Hull (ATPBH) on the morphometric profile of the finisher broiler is presented in Table 2 above. Body length, Back length, Wing length, Breast girth, bird length and beak length were not statistically ($P > 0.05$) significant across all the dietary means. However, birds on T2 showed numerically higher values for Wing length, and bird length, while T1 showed the highest numerical values in shank length, breast girth, and beak length, while T3 was highest in body length and beak length. Ajayi *et al.* (2016) reported insignificant dietary effects for these parameters. However, the insignificant ($P > 0.05$) treatment effect observed in these parameters could have resulted from the short period of the study as the treatments may have not fully impacted the body growth of the birds. The back length was significantly ($P < 0.05$) different. Birds on T2 showed the best value of 5.16cm which was statistically similar ($P > 0.05$) to those on T1 but differed significantly ($P < 0.05$) from birds on T3 which had the lowest value of 4.90cm for back length. Thigh length followed a similar trend as back length with birds on T1 and T2 having the highest similar ($p > 0.05$) values for thigh length but different ($p > 0.05$) statically from those on T3 which had the least values for back length and body length. The progressive decrease in back length as the inclusion of ATPBH increased in the diets of the birds suggests a possible depression in the body weight of the birds negatively affecting the body morphometric profile of the birds. This observation agrees with the finding of Ajayi *et al.* (2016), who reported a negative on the body weight of birds and also their body morphometry. This observation agrees with the findings of Ajayi *et al.* (2016) who also reported that the body weight of birds was negatively influenced and other morphometric parts of broiler chicken by the inclusion of cocoa bean shell meal in their diets.

CONCLUSION AND RECOMMENDATION

This study investigated the effects of Ash-treated *Parkia biglobosa* hull (ATPBH) on the morphometric traits of broiler finisher birds. The result of the study showed no significant ($P > 0.05$) influence of *Parkia biglobosa* on most of the parameters measured except for beak length and thigh length ($p > 0.05$) which was best in the T1 and T2 respectively. The observed trend showed that the inclusion of ATPBH at 50% as a replacement for palm kernel cake gave a similar ($p > 0.05$) best result for morphometric traits, especially in back length and thigh length.

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