



Original Research Paper

## INFLUENCE OF FEEDING ROASTED LEBBECK (*ALBIZIA LEBBECK*) SEED MEAL DIETS ON THE GROWTH PERFORMANCE AND SENSORY EVALUATION OF BROILER CHICKENS

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### ABSTRACT

*This study was conducted to determine the dietary influence of graded levels of roasted lebbeck (*Albizia lebbeck*) seed meal on the growth performance and sensory evaluation of broiler chickens. One hundred and sixty Ross 308 birds were used for the experiment. The birds were randomly allotted to four treatments having forty birds per treatment with four replicates in a completely randomized design. Roasted lebbeck seed meal (RLS) was included in diets of broilers at 0, 1.5, 3.0, and 4.5 % levels for Treatments 1 (control), 2, 3, and 4, respectively. The diets formulated were isocaloric and isonitrogenous. The results showed that the dry matter and ash contents of the raw and RLS were similar. While the crude protein and nitrogen-free extract contents of the seed were increased upon roasting. The crude protein content increased from 28.03 in the raw to 31.93 (12.35 % change). However, crude fibre dropped from 18.50 in the raw seed to 7.50 % in the RLS, producing a drastic change of 59.9 %. There was a decrease in ether extract content from 11.06 in raw to 10.04 % in RLS, which is a 9.22 % decrease. Results revealed that as the inclusion levels of RLS increased in the diets, the daily feed intake, daily weight gain, and final live weight decreased significantly ( $p < 0.05$ ). This result may be because the growth-retarding factors in the RLS were partly eliminated during the processing of the seeds. However, the feed efficiency for all*

treatments was similar ( $p>0.05$ ), which may imply that the amount of feed required to produce a unit of weight gain was not significantly different for broilers fed different levels of *Albizia lebbeck*. The sensory attributes like; colour, juiciness, appearance, aroma, and overall acceptability were not significantly ( $p>0.05$ ) influenced by the dietary treatments. However, flavour and tenderness were significantly ( $p<0.05$ ) affected. It is, therefore, recommended that RLS be included up to 1.5 % in the diet of broilers for optimum growth performance.

**Keywords:** Performance, roasted lebbeck, Ross 308 broilers, antinutritional factors, sensory attributes

## INTRODUCTION

The high cost of conventional feedstuff has compelled animal nutritionists to focus research on unconventional feed sources, especially protein sources. Therefore, research efforts have been directed at producing quality feed at affordable prices to increase the net profit of farmers and provide animal protein to meet the daily protein requirement of the average Nigerian. The use of non-conventional feedstuff will go a long way to reduce the competition for conventional feedstuff like soybean and groundnut cake (Ukpah *et al.*, 2021). One way of tackling this challenge is the use of unconventional feedstuff such as *Albizia lebbeck* which is widely distributed in Nigeria and can be exploited for feeding monogastrics because of its nutritive composition.

*Albizia lebbeck* is a species of lebbeck, native to tropical Asia, widely cultivated and naturalized in other tropical and subtropical regions (Sivakrishnan and Kavitha, 2018). English names for it include Lebbeck, Flea tree, Frywood, Koko, and Woman's tongues tree. The latter name is a play of sounds the seed makes as they rattle inside the pods (Chakrabarti, 2014). *Albizia lebbeck* often called the siris tree or the lebbeck tree, is indigenous to Southeast Asia and the Indian subcontinent. It is thought to have originated from the areas that include modern-day Thailand, Myanmar (Burma), India and Sri Lanka (Balkrishna *et al.*, 2022). In many other parts of the world, such as Africa, the Americas, and numerous tropical and subtropical climates, the tree has been extensively farmed and allowed to naturally occur (Petermann and Buzhdygan, 2021).

*Albizia lebbeck* has been used for many purposes; Arya and Pandey (2009) found that the tree of *Albizia lebbeck* has a wide range of medicinal properties, including anti-inflammatory, antipyretic,

and antidiarrheal effects. Mohan and Singh (2006) evaluated the nutritive value of *Albizia lebbbeck* leaves for feeding to ruminants. They found that the leaves are a good source of protein and fibre, and they can be used as a substitute for conventional fodders. The leaves, pods, and seeds of *Albizia lebbbeck* can all be fed to animals. The leaves are particularly high in protein and fibre. Singh and Singh (2009) reported that the lambs that were fed *Albizia lebbbeck* leaf meal had similar growth rates and feed intake as the lambs that were fed a conventional diet.

Conventional feedstuffs are expensive, this has brought about the need to search for alternative feedstuffs that can replace the exorbitant ones to reduce the cost of livestock production, as well as the cost of meat and other animal products (FAO, 2014). Nutritional information and feeding trial using roasted *Albizia* is scanty. There is little or no information on feeding trials and nutritional information on roasted lebbbeck seeds. Therefore, this study was conducted to evaluate the influence of feeding graded levels of roasted lebbbeck (*Albizia lebbbeck*) seed meal diets on the performance of broiler chickens.

## **METHODOLOGY**

### **Location of the Study and Source of Experimental Test Ingredient**

The research work was carried out at the Poultry Unit of the Department of Animal Production Teaching and Research Farm, Gidan Kwano Campus, Federal University of Technology Minna, Niger State. Mature and dry pods were harvested from lebbbeck trees in Minna town. Raw seeds of lebbbeck (*Albizia lebbbeck*) were removed from the pods by threshing in a mortar using a pestle.

### **Processing Method (roasting)**

Seeds of *Albizia lebbbeck* were collected and sorted to remove undesirable particles (foreign materials). Raw seeds of lebbbeck were ground to powder with the use of a hammer mill. A pot was heated to 120 °C before pouring 100 g of grounded lebbbeck seed meal and stirring for 4-5 minutes until it turned light brown and gave an aroma similar to roasted beans. It was poured on a clean tray to cool and stored in an airtight container and labelled as roasted lebbbeck seed meal (RLS) until ready for use.

## Proximate Analyses

The proximate analyses of lebbeck seeds (both raw and roasted seeds) were carried out at the Animal Production Laboratory, Federal University of Technology, Minna, Niger State, Nigeria, using the methods outlined by the Association of Official Analytical Chemists (AOAC, 2000).

## Experimental design

A total of one hundred and sixty Ross 308 mixed-sex day-old broiler chicks were purchased. These experiments were carried out using a completely randomized design (CRD). Roasted lebbeck seed meal was included in diets of broiler chicken at 0, 1.5, 3.0, and 4.5 % levels for Treatments 1, 2, 3, and 4, respectively, in a single-phase feeding. The birds were randomly assigned to four dietary treatments with four replicates (40 birds per treatment). The diets were formulated as isocaloric and isonitrogenous.

**Table 1: Experimental composition of varying levels of roasted *Albizia lebbeck* seed meal diets**

<b>Ingredients</b>	<b>0 % (T1)</b>	<b>1.5 % (T2)</b>	<b>3.0 % (T3)</b>	<b>4.5 % (T4)</b>
Maize	45.85	45.85	45.85	45.85
Soybeans (full fat)	40.00	38.50	37.00	35.50
Maize offal	6.00	6.00	6.00	6.00
Roasted lebbeck seed meal	0.00	1.50	3.00	4.50
Fish meal	4.00	4.00	4.00	4.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25	0.25
Toxin binder	0.15	0.15	0.15	0.15
Total	100	100	100	100
<b>Calculated</b>				
Crude protein %	22.42	22.33	22.24	22.15
ME (kcal /kg)	3044.22	3041.69	3039.15	3036.62

ME= Metabolizable energy

## Management of experimental birds

Birds were raised on deep litter. The pen was washed and disinfected with Izal. Drinkers and feeders were thoroughly washed and made ready for use. Before the arrival of the birds, wood

shavings were spread on the floor, a heat source was made available for brooding the chicks and a foot dip was provided at the entrance of the poultry house. On arrival of the chicks, they were weighed to obtain their initial weights after which they were randomly distributed to the various treatment groups. The birds were vaccinated against the prevailing diseases; the first dose of the Gumboro vaccine was administered at week one against Gumboro disease, and at week two the first dose of the Lasota vaccine was administered to the birds against Newcastle disease. When the birds were three weeks old the second dose of the Gumboro vaccine was given. The last dose of the Lasota vaccine was administered in the fourth week. The feeding trial was conducted for seven weeks. Feed intake was measured daily while the weighing of birds was done weekly.

### **Sensory evaluation**

Meat samples of broiler breast portions that had been frozen were thawed at room temperature for sensory evaluation. The meat samples were cut into smaller pieces of about 3-5 grammes of about 1-2 cm according to their treatments and replicates. The meat samples were then boiled in a pot containing 150ml of water for ten minutes, and one gramme of salt was added.

Thirty semi-trained taste panellists from the Federal University of Technology, Minna Gidan Kwano Campus community were used for the meat sensory evaluation. This evaluation was performed according to the method described by Grunert *et al.* (2004) using a 9-point hedonic scale rated as follows: 9= like extremely, 8= like very much, 7= like moderately, 6= like slightly, 5= neither like nor dislike, 4= dislike slightly, 3= dislike moderately, 2= dislike very much, 1= dislike extremely. The meat samples given to the panellists were evaluated for sensory attributes such as meat colour, appearance, juiciness, tenderness, taste, aroma, texture, and overall acceptability. Each panellist was given cracker biscuits and water to rinse their mouth with after tasting each sample to eliminate flavour carryover from previous samples.

### **Data analysis**

All data collected during the experiment from the measured parameters were subjected to one-way analysis of variance (ANOVA) using IBM SPSS version 23.0. The significant means were separated using Duncan's multiple range test.

## RESULTS AND DISCUSSION

The proximate composition of raw roasted *Albizia lebbbeck* seed meal on the growth performance of broiler chickens is presented in Table 2. The result showed that the dry matter and ash contents of the raw and roasted seeds were similar. While the protein and nitrogen-free extract content of the seed was increased upon roasting. The crude protein content increased from 28.03 % in the raw to 31.93 % (12.35 % change). However, crude fibre dropped from 18.50 % in the raw seed to 7.50 % in the roasted seed, producing a drastic change of 59.9 %. There was a decrease in ether extract content from 11.06 % in raw to 10.04 % in roasted seed, which is a 9.22 % decrease.

**Table 2: Proximate composition of raw and roasted lebbbeck (*Albizia lebbbeck*) seeds**

Nutrients	Raw lebbbeck seeds	Roasted lebbbeck seeds	Percentage change
Dry matter	91.81	91.28	0.58
Crude protein	28.03	31.98	12.35
Crude fibre	18.50	7.50	59.46
Ash	4.52	4.50	0.44
Ether extract	11.06	10.04	9.22
Nitrogen free extract	29.70	37.26	20.29

### **Growth performance of broiler chickens fed varying levels of roasted *Albizia lebbbeck* seed meal**

The results of the effect of varying levels of roasted *Albizia lebbbeck* seed meal on the growth performance of broiler chickens are presented in Table 3. The results showed that as the level of inclusion of roasted *Albizia lebbbeck* seed meal diet increases, there was a significant ( $p < 0.05$ ) decrease in the final live weight, daily weight gain, and daily feed intake except the feed efficiency which was not significantly different ( $p > 0.05$ ) across dietary treatments. However, the result revealed that Treatment 2 with 1.5 % roasted *Albizia lebbbeck* was statistically the same ( $p > 0.05$ ) as the control in terms of final live weight, daily weight gain, and daily feed intake.

The final weight of broiler chickens fed 1.5 % roasted *Albizia lebbbeck* seed meal diet was 1868.75g and the birds on the control had 1898.13 g was significantly ( $p < 0.05$ ) higher than broilers fed 3.0 and 4.5 % roasted *Albizia lebbbeck* seed meal diet which recorded 1570.88 and 1357.50 g,

respectively. Similarly, broiler chickens fed 1.5 % of roasted *Albizia lebbbeck* seed meal diet (37.36 g) and the control (37.75 g) recorded statistically ( $p<0.05$ ) higher daily weight gain compared to those fed 3.0 and 4.5 % of roasted *Albizia lebbbeck* seed meal supplemented diet that had 37.75 and 26.93 g, respectively. The same trend was also observed in daily feed intake as the control (64.54 g) and broiler birds fed 1.5 % of roasted *Albizia lebbbeck* seed meal supplemented diet (62.31 g) consumed significantly ( $p<0.05$ ) higher than those fed 3.0 and 4.5 % of roasted *Albizia lebbbeck* seed meal supplemented diet (52.27 and 44.63 g). The significant decrease in these growth parameters may be because *Albizia lebbbeck* contained antinutrients, such as tannins and phytates that inhibited the absorption of nutrients and thus, led to the reduction in growth. The findings of this study are consistent with the findings of previous studies conducted by Olorunsanya *et al.* (2009) found that final live weight, average weight gain, and average feed intake of broiler chickens decreased significantly as the level of *Albizia lebbbeck* inclusion increased from 0 % to 15 %.

The feed efficiency which was not significantly ( $p>0.05$ ) different across dietary treatment, means that the amount of feed required to produce a unit of weight gain was not significantly different for broilers fed different levels of *Albizia lebbbeck*. These findings agree with the reports of Olorunsanya *et al.* (2009); Chand *et al.* (2014) and Agboola *et al.* (2015) when they fed varying inclusion levels of *Albizia lebbbeck* to birds. Therefore, the non-significant ( $p>0.05$ ) effect recorded in the feed efficiency of birds in this research work showed that *Albizia lebbbeck* is a potential feed ingredient in broiler chicken diets.

**Table 3: Effect of roasted *lebbbeck* seed meal diets on growth performance of broiler chickens**

	Treatments				SEM	P-value	LS
	0 %	1.5 %	3.0 %	4.5 %			
Parameters	T1	T2	T3	T4			
Initial weight (g)	37.63	38.00	38.38	38.00	0.144	0.365	NS
Final weight (g)	1898.13 <sup>a</sup>	1868.75 <sup>a</sup>	1570.88 <sup>b</sup>	1357.50 <sup>c</sup>	59.877	0.001	*
Daily weight gain (g)	37.75 <sup>a</sup>	37.36 <sup>a</sup>	37.75 <sup>b</sup>	26.93 <sup>c</sup>	1.203	0.000	*
Daily feed intake (g)	64.54 <sup>a</sup>	62.3 <sup>a</sup>	52.27 <sup>b</sup>	44.63 <sup>c</sup>	2.335	0.000	*
Feed efficiency	59.06	60.16	60.14	60.58	0.948	0.961	NS

<sup>abc</sup>; means with different superscripts along the row are significantly ( $p \leq 0.05$ ) different, NS = Not significant, \* = Significant, SEM = Standard error of mean, P-value = Probability value, LS = Level of significance

**The treatment groups were tagged as follows:**

T1 = Diet supplemented with 0 % *lebbeck* seed meal (RLS) control

T2 = Diet supplemented with 1.5 % *lebbeck* seed meal (RLS)

T3 = Diet supplemented with 3.5 % *lebbeck* seed meal (RLS)

T4 = Diet supplemented with 4.0 % *lebbeck* seed meal (RLS)

The result obtained from this study showed that flavour and tenderness were significantly affected by dietary treatments. The differences observed as pertains to the meat flavour and tenderness across groups could be attributed to the effect of the dietary inclusion of roasted *Albizia lebbeck* seed meal in the diets, although the mechanism or mode of this effect may be unknown. This result agrees with the findings of Tsado *et al.* (2018), who observed a significant ( $p < 0.05$ ) effect of boiled *Albizia lebbeck* on the flavour of the meat of rabbits.

**Sensory evaluation of meat of broiler chickens fed graded levels of roasted *Albizia lebbeck* seed meal diets**

The organoleptic evaluation of meat of broiler chickens fed graded levels of roasted *Albizia lebbeck* seed meal diets is presented in Table 4. From the results, the sensory attributes like; colour, juiciness, appearance, aroma, and overall acceptability were not significantly ( $p > 0.05$ ) influenced by the different treatment groups. However, flavour and tenderness were significantly ( $p < 0.05$ ) affected.

**Table 4: Sensory evaluation of meat of broiler chickens fed graded levels of roasted *Albizia lebbeck* seed meal**

Parameters	T1	T2	T3	T4	SEM	P-value	LS
Colour	5.80	6.18	6.13	5.97	0.27	0.67	NS
Juiciness	6.36	6.69	6.39	6.50	0.15	0.42	NS
Appearance	6.74	7.01	7.01	6.87	0.13	0.70	NS
Flavour	6.76 <sup>ab</sup>	7.15 <sup>a</sup>	6.50 <sup>4b</sup>	6.81 <sup>ab</sup>	0.06	0.04	*
Aroma	6.93	7.20	6.80	6.88	0.09	0.35	NS
Tenderness	7.13 <sup>a</sup>	6.97 <sup>ab</sup>	6.98 <sup>ab</sup>	6.84 <sup>b</sup>	0.08	0.05	*
Overall acceptability	7.25	7.39	7.11	7.26	0.09	0.47	NS

<sup>abc</sup>; means with different superscripts along the row are significantly ( $p \leq 0.05$ ) different, SEM = Standard error of mean, P-value = Probability value, LS = Level of significance, NS = Not significant, \* = Significant



## CONCLUSION AND RECOMMENDATIONS

Overall, the findings of this study suggest that *Albizia lebbeck* in poultry feed should be limited to low levels. It is, therefore, recommended that roasted *Albizia lebbeck*, an unconventional feedstuff, can be included up to 1.50 % in the diet of broiler chickens for optimum growth performance. Further research is needed to identify ways to mitigate the effects of higher inclusion levels of roasted lebbeck in broiler diets. In addition, there is a need to examine the effect of different roasting durations of *Albizia lebbeck* on the growth performance and sensory evaluation of broiler chickens and the combination of two processing methods for lebbeck.

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