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Growth Performance and Carcass Analysis of Broiler Chickens Fed Graded Levels of Toasted *Albizia lebbeck* Seed Meal

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Abstract: One hundred day old broiler chicks were used for this study. They were fed on a conventional broiler starter feed for the first seven days after which they were randomly allotted into five treatment groups of twenty birds with ten birds per replicate. A seven week trial was conducted to investigate the nutritive value of Toasted *Albizia lebbeck* Seed Meal (TASM) on the birds. The test material was included at dietary levels of 0, 5, 10, 15 and 20%. At the end of the trial, three birds were randomly selected per replicate, starved overnight, bled through jugular vein, de-feathered and eviscerated. Average feed intake, weight gain, feed conversion efficiency and mortality showed significant ($p<0.05$) difference. However, at 0 and 5% dietary levels, there was no significant ($p>0.05$) difference in the performance characteristics. The carcass parameters showed that 0 and 5% TASM dietary levels were significantly ($p<0.05$) higher than other treatments in all the parameters assessed. The above showed that the birds were able to tolerate TASM up to 5% level of inclusion, but beyond this, overall performances, carcass characteristics and mortality were affected.

Key words: Broilers, *Albizia lebbeck*, carcass and performance characteristics

INTRODUCTION

The increasing demand for animal protein has aroused greater interest in the production of fast growing animals with short generation intervals (Obinne and Okorie, 2008). Apantaku *et al*. (1998) reported that expansion of poultry industry in Nigeria holds the greatest promise of bridging the animal protein gap prevailing in the country within the shortest possible time. The protein from poultry meat and eggs, according to Atteh (2004), is of such quality that it is used as a standard against which other proteins are compared. Broiler chickens are fast growing species of poultry that are commonly raised to provide tender meat for human consumption. However, the rising cost of poultry feed has continued to be a serious problem. This is because the feed alone accounts for about 70% of the total production (Olorede and Longe, 1999).

Competition for conventional feedstuffs by man and livestock has contributed immensely to the high cost of these feedstuffs in the local markets. This high cost coupled with inadequate knowledge of possible alternative and cheap ingredients have been the most important factors militating against increased commercial poultry production in Nigeria (Olorede and Ajayi, 2005). Therefore, the quest for cheap ingredients in dietary formulations to reduce production cost becomes imperative.

Some non-conventional feedstuffs have been evaluated and found to be good replacements for the expensive conventional types which have direct bearings with human beings. There exist some legumes which are underutilized but have great potentials of been developed into livestock feed. One of such is *Albizia lebbeck*, which is a tropical legume. It is one of the most widespread and common species of *Albizia* worldwide (Wikipedia, 2009). Most livestock readily eat leaves and young twigs of this promising fodder tree. Crude protein concentration is about 20% for green leaves, 13% for leaf litter, 10% for twigs and the edible material has no known toxic compounds (FACT Net, 1986). It has common names such as "woman's tongue" and "rattle pod" derived from the noise of pods shaking in the wind. It is a tree growing to a height of 18-30 m tall with a trunk 50 cm to 1 m in diameter. The leaves are bipinnate, 7.5-15 cm long, with one to four pairs of pinnae, each pinna with 6-18 leaflets. The flowers are white, with numerous long stamens 2.5-3.8 cm and very fragrant. The fruit is a pod 15-30 cm long and 2.5-5.0 cm broad, containing six to twelve seeds. Leaves are free of toxins and tannins and low in soluble phenolic compounds. Flowers contain no adverse constituents. Pods contain saponins which may limit intake but appear to have no other adverse effect. There is a claim of toxicity in the seed (Wikipedia, 2009). The objective of this study

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however, is to investigate the optimum level at which Toasted *Albizia lebbeck* Seed Meal (TASM) could be fed to broiler chickens for optimal performance.

MATERIALS AND METHODS

Albizia lebbeck seeds used in this study were collected around Ilorin metropolis, in Kwara State, Nigeria. The seeds collected were toasted using the local groundnut processing method. Briefly, this involves putting sand and the seeds in a large frying pan over a naked flame until the colour of the seeds had changed to dark brown coupled with an appetizing aroma. The seeds were cooled and then milled before incorporated into the formulated ration.

A total of 100 day-old Anak broiler chicks were raised for this study at graded levels of 0, 5, 10, 15 and 20% (Table 1). The birds were randomly allotted to five dietary treatments replicated twice with ten (10) birds per replicate in a Completely Randomized Design (CRD) experiment. Routine and periodic management practices were carried out. The chicks were brooded on wood shavings as litter materials in a tropical type (dwarf walled and open-sided) poultry house with equal size. 100 watts electric bulbs and hurricane lanterns (during power failure), were used to provide continuous light and heat during the brooding stage (0-4 weeks of age).

The birds were fed a commercial broiler starter ration for the first seven (7) days before given the experimental diets. Feed and cool, clean water were provided *ad libitum*. The amount of feed given and the left over were recorded on daily basis. The initial body weights of the birds were determined at the onset of the experiment and subsequently at one week interval until the experiment was terminated (8 weeks old). Weekly feed intakes were also recorded. Feed conversion ratio was then calculated from weight gain and feed intake of the birds. Daily records of mortality were taken and expressed as percentage at the termination of the experiment. Data collected were subjected to Analysis of Variance (ANOVA) and significant treated means were separated using the Duncan's multiple range tests (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Performance of chicks on experimental diets: Data on performance characteristics and mortality rate of the broiler chicken were summarized in Table 2. The dietary level of TASM had a significant effect on the feed intake of the birds. Birds on the control diet had the highest feed intake which differed significantly ($p<0.05$) from others except those fed 5% TASM. Feed intake of birds fed 10, 15 and 20% TASM diets were significantly ($p<0.05$) lower than those on 0 and 5% dietary levels. The above might not be unconnected with the presence of tannins and saponins in *Albezia lebbeck* which according to Liener (1989) and Bate-Smith (1973) do affect feed intake and digestion. This implies that the dietary level of TASM beyond 5% does not support feed intake of broiler chicken.

Results on body weight gain of birds fed 0 and 5% TASM showed no significant ($p>0.05$) difference but differed significantly ($p<0.05$) from those fed 10% and above. Birds on 10% TASM and above had similar weight gain but significantly ($p<0.05$) lower weight than those on 0 and 5% TASM diets. Therefore, any slight increase in TASM dietary level in broiler chicken diets above 5% may not support growth and thus reduce weight gain. This may be due to decreased feed intake and inability of the birds to utilize the diets as a result of poor digestion and absorption. This supports Wikipedia (2009) reports that the presence of anti-nutritional factors in this plant do limit feed intake.

The dietary levels of TASM had a significant ($p<0.05$) effect on feed conversion ratio of the broiler chicken. Birds fed 0 and 5% had very close feed/gain ratio which differed significantly ($p<0.05$) from those birds on 10% TASM and above. The superior feed conversion ratio exhibited by 0 and 5% dietary levels may therefore proved that birds on these dietary levels optimally utilized the feed consumed.

The inclusion level of TASM diets had significant ($p<0.05$) effect on the mortality rate of the birds. An increase in inclusion level of TASM leads to an increase in mortality rate. Birds on 10, 15 and 20% TASM diets were significantly ($p<0.05$) higher in mortality than those on 5%. There was no mortality at 0% inclusion level. This sequence may probably be due to the cumulative effects of the anti-nutritional factors in the seeds, which could be an indication that the toasting process was not appropriate enough to eliminate the anti-nutritional factors. The above findings agreed with the reports of Esonu *et al*. (1997), that most legumes have thermo-labile and thermo-stable anti-nutrients which needed more than one treatment applications.

The effect of feeding graded levels of toasted *Albizia lebbeck* seed meal on the cut-up parts of the birds is represented in Table 3. TASM diets had significant ($p<0.05$) effect on live shrunk weight of the broiler chicken. There was no significant ($p>0.05$) effect at 0 and 5% inclusion levels, but at 10% and above the live shrunk weights were depressed. This might be due to the low feed intake recorded at these levels caused by the presence of anti nutritional factors leading to reduced feed palatability, intake, digestion, utilization and growth. The dressed weight and dressing percentage were significantly ($p<0.05$) influenced by the diets. The level of TASM is inversely proportional to the weight and dressing percentage. That is, the higher the level of TASM in the diets, the lower the dressed weight and dressing percentage. At 0 and 5% dietary levels, no

Table 1: Composition of experimental diets

	Dietary level of TASM (%)				
Feed ingredient	0	5	10	15	20
Maize	36.40	29.48	22.86	18.00	12.25
Maize milling waste	10.04	14.64	18.74	20.78	23.53
Fish meal	3.00	3.00	3.00	3.00	3.00
Wheat offal	20.14	22.66	24.18	27.00	30.00
Soybean meal	26.67	22.47	17.47	12.47	7.47
TASM	00.00	5.00	10.00	15.00	20.00
Oyster shell	0.50	0.50	0.50	0.50	0.50
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Bone meal	2.50	2.50	2.50	2.50	2.50
Salt	0.30	0.30	0.30	0.30	0.30
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00
Calculated chemical composition					
Crude protein (%)	21.662	21.894	21.823	21.769	21.740
Crude fibre (%)	5.735	6.625	7.319	7.969	8.691
Ether extract (%)	3.857	3.867	3.802	3.845	3.871
Ash (%)	4.179	4.329	4.369	4.505	4.643
M.E. (Kcal/kg)	2973.46	2937.36	2908.18	2882.19	2852.83
Calorie:Protein	137.27	134.16	133.26	132.40	131.22

Table 2: Effect of dietary level of TASM on performance characteristics of broiler chicken

	Dietary level of TASM				
Parameter	0	5	10	15	20
Average daily feed intake (g)	82.17^{a}	55.01^{ac}	28.63^{bc}	28.50^{b}	27.39^{b}
Average daily weight gain (g)	22.81^{a}	17.23^{a}	4.16^{b}	3.60^{b}	3.27^{b}
Feed conversion ratio	3.60^{a}	3.19^{a}	6.88^{b}	7.92^{b}	8.38^{b}
Mortality (%)	0.00^{a}	5.00^{a}	50.00^{b}	80.00^{c}	90.00^{c}

^{abc}Means with the same superscripts are not significantly (p>0.05) different.

Carcass characteristics of broiler chicken

Table 3: Effect of dietary level of TASM carcass characteristics of broiler chicken

	Dietary level of TASM				
Parameter	0	5	10	15	20
Live shrunk weight (g)	1140.0^{a}	1073.33^{a}	304.24^{b}	274.73^{b}	277.65^{b}
Dressed weight (g)	898.63^{a}	781.33^{a}	233.71^{b}	161.30^{b}	158.95^{b}
Dressing percentage (%)	78.79^{a}	72.81^{a}	59.37^{b}	58.17^{b}	57.12^{b}
Thigh (%)	13.68^{a}	14.58^{a}	11.29^{b}	11.86^{b}	11.42^{b}
Drumstick (%)	14.45^{a}	14.19^{a}	10.82^{b}	11.38^{b}	10.63^{b}
Breast (%)	21.62^{a}	17.98^{b}	16.60^{bd}	14.71^{c}	14.93^{cd}
Back (%)	19.60^{a}	18.77^{a}	21.54^{b}	19.19^{a}	19.64^{a}
Head (%)	4.05^{a}	4.75^{a}	7.74^{b}	8.87^{b}	8.90^{b}
Wing (%)	10.90	10.76	10.35	11.81	11.66
Neck (%)	5.80	6.66	6.77	6.79	6.82
Shank (%)	6.76	8.39	6.84	7.23	7.20

^{abcd}Means with the same superscript are not significantly (p>0.05) different

significant (p>0.05) difference was observed in the two parameters. As the dietary level increases to10% and above, dressed weight and dressing percentage were significantly (p<0.05) influenced with the lowest value obtained at 20% TASM inclusion levels.

The thigh and drumstick at 0 and 5% dietary levels were not significantly (p>0.05) affected by the diets but differed greatly from others. The breast was also influenced by the amount of TASM in the diets. Birds on 0% had the highest breast value while the least value was obtained at 15% level of inclusion. The head of the birds were similar at 0 and 5% but greatly different from those obtained from other dietary levels. The higher the TASM level in the diets, the more developed were the heads relative to the dressed weights. However, the backs were not significantly (p>0.05) different across the treatments means except in 10% TASM where high back value was obtained. Wing, neck and shank were not

affected by the level of TASM in the diets. The results from the carcass evaluation relate well with those obtained in performance characteristics and it was observed that superior values were obtained for all the parameters evaluated.

Conclusion and Recommendations: The feeding trial revealed that the broiler chicken fed the control diet and 5% TASM were significantly ($p<0.05$) better in all parameters evaluated than those on 10% TASM and above. Therefore, it can be concluded that toasting process of detoxification of *Albizia lebbeck* alone may not be sufficient in eliminating all the anti-nutritional factors. It is recommended that TASM could be a valuable feedstuff which could be included up to 5% of the broiler diets without any deleterious effects.

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