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GROWTH PERFORMANCE OF ROSS 308 BROILER CHICKENS FED DIETS CONTAINING VARYING LEVELS OF BOILED *ALBIZIA LEBBECK* SEED MEAL

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ABSTRACT
This experiment was conducted to investigate the dietary effect of graded levels of boiled Albizia lebbeck seed meal (ASM) on the growth performance of broiler chickens. A total of one hundred and sixty (160) day-old unsexed Ross 308 broiler chicks were used in a seven-week feeding trial. A completely randomized design was used for the experiment. Chicks were randomly assigned to one of four treatments each of which was replicated four times. Each replicate consisted of ten birds, making a total of forty birds per treatment. Treatment 1 served as the control (0%) with no boiled ASM, while treatments 2, 3, and 4 were diets with 1.5, 3.0, and 4.5 % inclusion levels of ASM respectively. A single-phase feeding regime was employed and the diets formulated were isocaloric and isonitrogenous. The results obtained showed that dietary treatments significantly affected (p<0.05) the daily feed intake, daily weight gain, final live weight and feed efficiency of birds. However, there was no significant difference in percentage mortality across all the treatment groups. It is noteworthy that as the inclusion levels of boiled Albizia lebbeck increase in the diets, the daily feed intake, daily weight gain as well as final live weight decreases significantly (p<0.05). Nevertheless, the feed efficiency followed a slightly different trend. Treatment 1 (the control with 0% ASM) was similar to treatment 2 (birds fed 1.5% ASM) whereas birds on treatment 3 (3.0% ASM) and treatment 4 (4.5% ASM) had feed efficiency that was statistically the same. The results obtained show that the growth-retarding factors in the seeds were partially eliminated by boiling the seeds for 30 minutes. Probably, extending the boiling time may further reduce the levels of the antinutrients to achieve improved growth performance of birds.

Keywords: *Growth performance; boiled; Albizia lebbeck; Ross 308 broilers; antinutrients*

INTRODUCTION

Albizia lebbeck is a unique plant with potent free radical scavenging ability as well as a rich source of lysine, potassium, and linoleic acid, it is also cholesterol-free, low in saturated fat, and high in protein and crude fibre (Zia-ul-Haq *et al*., 2013). This plant has the potential to become a key source of micronutrients for formulating livestock feed (Hassan *et al*., 2007).

For the sustainability of poultry production and nutritional security, the need arises to exploit underutilized and locally available nutritional potentials of unconventional feed resources due to the challenge of nutritional security in Nigeria. The use of alternative feed resources as a replacement for conventional feedstuffs is one way of alleviating the effect of feed shortages due to high costs (Akande and Alabi, 2021). Therefore, proper processing of feedstuff is vital for achieving optimum broiler performance and a high-profit margin (Ayanwale *et al*., 2007).

The presence of antinutrients in *Albizia lebbeck* necessitates processing to either reduce or eliminate them and enhance the nutritive quality of the seeds. Researchers have utilized different processing methods in an attempt to improve the nutritional value of feedstuffs (Akande and Fabiyi, 2010). Some techniques employed in processing *Albizia lebbeck* seeds are fermentation Adegbehingbe *et al*. (2018); Tsado *et al.* (2018b), toasting Olorunsanya *et al*. (2010) and fermentation and toasting Tsado *et al.* (2018a).

Antinutritional constituents of plants vary, so there is a need to determine a suitable and efficient processing method for feedstuffs before their incorporation into animal diets (Akande *et al*., 2010).

Heat processing is generally accepted as an effective way of inactivating the thermo-labile antinutritional substances present in legume seeds. The nutritive quality of major legume grains, particularly lima beans, cowpeas, soybeans and pigeon peas, is markedly improved by employing heat processing. Notably, about 30-40% of the polyphenols can be removed from *Phaseolus vulgaris* by cooking and discarding the cooking water solution (Bressani and Elias, 1980).

Research studies and feeding trials conducted on the use of *Albizia lebbeck* seed meal in broiler production are few and limited, hence this experiment was carried out to determine the dietary effect of varying levels of boiled *Albizia lebbeck* seed meal on the growth performance of broiler chickens.

MATERIALS AND METHODS

Experimental study location

The research work was carried out at the Teaching and Research Farm of the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Niger State, Nigeria. This experiment followed the ethics of the Department of Animal Production.

The procedure employed in processing *Albizia lebbeck* seeds

The threshing of the *A. lebbeck* seeds was carried out using a mortar and pestle. After threshing, the seeds were separated from the chaff and other debris. About 10 kg of raw *A. lebbeck* seeds were boiled in 20 litres of water at 100^{o}C for 30 minutes. The lebbeck seeds were then poured into a sieve to drain the water from the seeds. After cooling, the seeds were sun-dried for 3 days, and the dried seeds were ground with a hammer mill.

Proximate analysis

The proximate analyses of both raw and boiled *Albizia lebbeck* seeds were conducted at the Animal Production Laboratory, Federal University of Technology, Minna, Niger State, Nigeria, using the methods described by the Association of Official Analytical Chemists (AOAC, 2000). The parameters determined were moisture content, crude protein, ether extract, ash, crude fibre and nitrogen-free extract.

Experimental design

A total of 160 one-day-old unsexed Ross 308 broiler chicks were used in a seven-week feeding trial. The completely randomized design (CRD) was used for the experiment; the day-old chicks were randomly allotted to four dietary treatments which were replicated four times. Each replicate consisted of ten birds making a total of 40 birds per treatment. Treatment 1 served as the control (0%) with no boiled ASM, while treatments 2, 3, and 4 were diets with 1.5, 3.0, and 4.5% inclusion levels of ASM respectively (Table 1). A single-phase feeding regime was used for the experiment, the diets formulated were isocaloric and isonitrogenous, with 22% crude protein (Table 1).

Management of experimental birds

In preparation for the arrival of birds, the pens were washed and disinfected. The drinkers and feeders were thoroughly washed and dried. Before the arrival of the birds, wood shavings were spread on the floor, and a foot dip was provided at the entrance of the poultry house.

On the arrival of the chicks, their initial body weights were recorded. They were then randomly distributed to the various treatment groups. Birds were raised in a deep litter housing system. Throughout the period of the experiment, feed and water were provided for the birds' *ad libitum*. The feeding trial was conducted for seven (7) weeks. Feed intake was measured daily while the weighing of birds was done weekly. Mortality was recorded as it occurred.

Performance parameters measured

At the beginning of the feeding trial, the initial body weight of the chicks was recorded, and at

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

Ingredients	0% ASM (T1)	1.5% ASM (T2)	3.0% ASM (T3)	4.5% ASM (T4)
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
Albizia lebbeck seed meal (ASM)	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
Calculated				
Phosphorus (available) %	0.51	0.51	0.50	0.50
Calcium %	1.19	1.20	1.20	1.20
Crude fibre %	4.38	4.55	4.72	4.90
Crude protein %	22.42	22.28	22.13	22.00
ME (kcal /kg)	3,044.22	3,041.69	3,039.15	3,036.62
Proximate analysis				
Moisture content %	8.60	8.60	8.30	8.62
Crude protein %	22.33	22.30	22.44	22.54
Crude fibre %	5.24	5.32	5.39	5.43
Ash %	6.00	6.50	6.50	6.00
Ether extract %	5.38	5.32	5.29	5.63

ME= Metabolizable energy
The treatment groups were designated as follows:
T1 = basal diet supplemented with 0% Albizia lebbeck seed meal (ASM) Control
T2 = basal diet supplemented with 1.5% Albizia lebbeck seed meal (ASM)
T3 = basal diet supplemented with 3.0% Albizia lebbeck seed meal (ASM)
T4 = basal diet supplemented with 4.5% Albizia lebbeck seed meal (ASM)

the end of the feeding trial, the birds were weighed for their final live weight. Data on daily feed intake, daily weight gain, and feed efficiency were calculated.

$$\text{Feed efficiency (\%)} = \frac{\text{Body weight gain (g)}}{\text{Feed intake (g)}} \times 100$$

Analysis of data

All data were subjected to one-way analysis of variance (ANOVA), and significant treatment means where they occurred were separated by Duncan multiple range test using (IBM SPSS, 2017) version 16.0.

RESULTS AND DISCUSSION

The proximate composition of the raw and boiled *A. lebbeck* seeds is shown in Table 2. The crude protein was in the range of 28.03 to 28.35% for the raw and boiled seeds, respectively. There were occurrences of minor changes in the content of crude protein, moisture content, and nitrogen-free extract after boiling the *A. lebbeck* seeds but this was with the exemption of the crude fibre, ether extract, and ash contents.

The crude fibre reduced from 18.50% in the raw seeds to 16.98% in the boiled seeds with an 8.22 % change, and the ash content dropped from 4.52% in the raw seeds to 4.02% in the boiled seeds with a decrease of 11.06%. Meanwhile, the ether extract content increased from 11.06% in the raw seeds to 12.0% in the boiled seeds.

On the one hand, Muhammad *et al.* (2010) reported an ash content of 4.20% and a crude protein of 27.30% for raw *A. lebbeck* seeds, which is close to the ash content of 4.52% and a crude protein of 28.35% obtained in this experiment for the raw seeds.

On the other hand, the crude protein value of 36.31% obtained by Adegbehingbe *et al.* (2018) for fermented *A. lebbeck* seed is higher than the value of 28.35% recorded for the boiled seeds in this research study. The disparity in the crude protein may be due to the different types of processing methods used. It is worth noting that in literature nutritional data and information on *A. lebbeck* seed are scanty.

The dietary effect of boiled *A. lebbeck* seed meal on the growth performance of broiler chickens is presented in Table 3. The results revealed that there were significant differences ($p<0.05$) in dietary treatments with respect to the final live weight, daily weight gain, daily feed intake and feed efficiency of birds. However, there was no significant difference in percentage mortality across all the treatment groups. It is worth mentioning that an inverse effect was noticeable, that is; as the inclusion level of boiled *A. lebbeck* increased in the diets, the daily feed intake, daily weight gain as well as final live weight decreased significantly. A similar observation was made by Chand *et al.* (2014) who fed 0%, 2%, 4% and 8% levels of *A. lebbeck* seeds in the diet of broilers reported that increasing levels of *A. lebbeck* in the diets adversely affected the performance of broilers. It was, however, observed that the results obtained for feed efficiency followed a slightly different pattern, in that treat-

Table 2: Proximate composition of raw and boiled *Albizia lebbeck* seeds

Nutrients	Raw *A. lebbeck* seeds (%)	Boiled *A. lebbeck* seeds (%)	Percentage change (%)
Moisture content	8.19	8.20	0.12
Crude protein	28.03	28.35	1.14
Crude fibre	18.50	16.98	8.22
Ash	4.52	4.02	11.06
Ether extract	11.06	12.00	8.50
Nitrogen free extract	29.70	30.45	2.53

Table 3: Effect of graded levels of boiled *Albizia lebbeck* seed meal on growth performance of broilers

Parameters	Treatments				SEM	P value	Significance
	0 % ASM (T1)	1.5% ASM (T2)	3.0% ASM (T3)	4.5% ASM (T4)			
Initial weight (g)	52.63	52.63	52.75	52.75	0.063	0.835	NS
Final weight (g)	2,453.48[a]	1502.73[b]	926.28[c]	679.35[d]	177.15	0.000	*
Daily weight gain (g)	48.98[a]	29.63[b]	17.85[c]	12.80[d]	3.612	0.000	*
Daily feed intake (g)	74.40[a]	44.56[b]	32.21[c]	23.53[d]	4.983	0.000	*
Feed efficiency (%)	65.86[a]	66.45[a]	55.18[b]	54.40[b]	1.595	0.000	*
Mortality (%)	00.00	00.00	00.00	2.50	0.625	0.426	NS

NS = Not significant
** = Significant*
SEM = Standard error of mean
The treatment groups were designated as follows:
T1 = basal diet supplemented with 0% Albizia lebbeck seed meal (ASM) Control
T2 = basal diet supplemented with 1.5% Albizia lebbeck seed meal (ASM)
T3 = basal diet supplemented with 3.0% Albizia lebbeck seed meal (ASM)
T4 = basal diet supplemented with 4.5% Albizia lebbeck seed meal (ASM)

ment 1 (the control) was statistically similar to treatment 2. Birds on treatments 3 and 4 likewise had statistically similar feed efficiency. This implied that birds on treatments 1 and 2, were able to efficiently convert the feed consumed into meat that is, attaining the best feed efficiency.

The significant reduction in daily feed consumption as the level of *A. lebbeck* seed meal increased in the diet from one graded level to another, was such that each dietary treatment was significantly different from the other. This effect suggests that there might have been some traces of residual antinutritional substances still present in the *A. lebbeck* seed after boiling. Notably, this may have been responsible for the drastic drop in feed intake (Akande *et al.,* 2010). Probably the method of processing *A. lebbeck* seed (boiling for 30 minutes) was not sufficient to adequately achieve complete detoxification of antinutrients in the seeds. It may be possible that increasing the duration of boiling may have produced a marked reduction in the growth retarding factors present in the seeds.

In the same vein, there was an obvious decrease in the weight gain of birds as a resultant parallel effect of the significant decrease in feed intake. Consequently, the significant reduction recorded for feed intake and weight gain remarkably influenced the final live weight of birds significantly, following the same trend as observed in the daily feed intake, and daily weight gain as previously mentioned. One of the effects of antinutritional factors is that they cause a reduction in feed intake which may eventually result in retardation in growth (Akande *et al*., 2010).

In contrast to the observation in this experiment, Ikpe and Azu (2016) who fed varying levels of cooked and toasted *Albizia* seed meal to broilers reported a significant increase ($p<0.05$) in body weight gain as the inclusion levels of the seed meal increased in the diets of broilers. This effect may be for the reason that two different processing methods were combined to achieve the improvement in performance. In addition, Tsado *et al.* (2018a) also employed the combination of two methods for processing *A. lebbeck* seed meal (fermentation and toasting) and recommended the inclusion level of 6.75% *A. lebbeck* seed meal for optimum growth performance of broiler chicks.

CONCLUSION

The birds fed the 1.5% *Albizia seed* meal showed promising potential since their efficiency in feed utilization was similar to the control, which was the best. Therefore, with effective processing, *Albizia lebbeck* may serve as a potential non-conventional plant protein feed resource for future inclusion in broiler diets.

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