

Effect of graded levels of toasted African locust bean (*Parkia biglobosa*) seed meal on performance and carcass characteristics of broiler chickens at finishing stage

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Target audience: Poultry farmers feed industries, nutritionist and feed researchers

Abstract

A study was conducted to determine the effect of toasted African locust bean seed meal (TALBM) diets on the growth performance, haematological profile and nutrient digestibility of broiler chicken. Two hundred and ten (210) broiler chickens (Marshall Strain) were fed five diets containing toasted African locust bean seed meal (TALBM) at dietary levels of 0, 7.5, 15, 22.5 and 30% designated as T1, T2, T3, T4 and T5 respectively. Diets were allocated to birds in a completely randomized design (CRD) and each treatment consisted of 42 birds in three replicates of 14 birds. Proximate composition of feeds and faecal samples were determined in laboratory for nutrients digestibility. The experiment lasted for 4 weeks (5-9weeks). There were significant differences ($P<0.05$) in the final body weight, total feed intake and total weight gain of broilers fed TALBSM diets. The broilers fed diet 3 had the highest final body weight (2803.87g) compared to other treatments. The blood of broilers fed 15% TALBSM diet gave the highest value pack cell volume (30.67%), haemoglobin counts (10.20g/dl), total glucose (156.22mmol/l) and red blood cell count ($4.40 \times 10^6/l$). Similarly, the results of carcass analysis of broiler chickens showed there were significant differences ($P<0.05$) in carcass weight, dressing %, breast muscle, drum stick and back weight of broilers. Carcass weight, dressing percentage, breast muscle, drumstick and back values were higher in the 15% TALBSM diet. There were no significant differences ($P>0.05$) in most of organs and gut weights with exception of liver, kidney, small intestine and small intestine length. Crude fibre and nitrogen free extract digestibilities were significantly ($P<0.05$) affected by treatments. The crude fibre digestibility showed a decreasing trend with increase in the dietary inclusion of toasted African Locust bean meal in the diets. It is concluded that 15% dietary inclusion of TALBSM was adequate without any deleterious effect on performance and carcass yield of broiler chickens at finisher phase with significant reduction in the cost of production.

Key words: Locust bean seed, Broiler chickens, Performance, Carcass Characteristics

Description of Problem

The shortage of animal protein intake among the ever increasing human population in the third world countries has long been recognized (1). Nigeria like many developing countries of the world has protein deficiency gap, especially that of high quality animal protein. This low animal protein intake has very serious implication on health status and

well-being of the citizens (2). Broilers are good source of protein and highly prolific due to their short generation intervals compared to all species of animals. They are also potential means of income generation and employment whether in small and large scale production (3).

In livestock production, feed accounts for 70-80% of the total cost of poultry production (4;5). The use of unconventional feed

ingredients in compounding poultry feed in order to reduce cost of production is well documented in literature (6; 7). This necessitates the use of non-conventional feed ingredients and the search for other feed resources that are not expensive. Non conventional feedstuffs offer the best alternatives in our environment for reducing feed cost and therefore a reduction in the cost of meat and animal (8).

Legume grains are good sources of plant protein for poultry feeding. Unfortunately, most of legume seeds contain anti-nutritional factors like enzymes inhibitors, phytate, oxalates, saponin, and polyphenolic compounds, all of which limit their utilization. However, remarkable improvement in the nutritive value and quality of legumes seeds have been achieved through various processing methods (9; 10; 11). The African locust bean is a perennial leguminous plant. It produces seeds and is readily available in the savannah and southern edge of Sahel zones of Nigeria (12; 13). The seed of this plant being leguminous has potential to be utilized in livestock feeding (14). This research is aimed at investigating the effect of toasted African Locust bean Seed Meal diets on the growth performance, haematological parameters, carcass characteristics, organs weights and digestibility of nutrients of broiler chickens.

Experimental Site

This study was conducted at Teaching and Research Farm poultry unit, Department of Animal Science, Faculty of Agriculture and Agricultural Technology, Kano University of Science and Technology, Wudil. The area is located on Latitude 11°51'N and Longitude 9° 20' E at an altitude of 430m above the sea level. The mean annual rainfall is 800mm with relative humidity of 75% during the rainy season with a mean annual temperature of 26°C, (15)

Experimental Diets

Toasting of locust bean seeds

Toasting is one of processing methods of legumes grains and is done by heating which involves dry frying of seeds in an open pan with constant stirring to prevent charring. Toasting of locust bean seeds was done using an open pan, where 1 kg of seeds was cleaned, washed and dried to remove dirt. The pan measuring 52 cm in diameter and 13,5cm deep was placed on fire and heated for 5 minutes to ensure sufficient heating was attained for toasting. Locust bean seeds were poured into the pan, while heating was allowed to continue. Toasting continued by constantly stirring the seeds to have uniform application and to prevent charring. Toasted locust bean seeds were then removed after 20 minutes and spread in trays to cool. The proximate compositions of the raw and toasted processed ALBSM were carried out according the method of A.O.A.C (1990) as presented in Table 1. Similarly, the anti-nutritional factors (Tannin, Saponin, Oxalate, and Trypsin inhibitors) of both raw and toasted ALBSM were evaluated and the percent reductions after processing were determined as presented in Table 2.

Five diets were then formulated and compounded according to NRC (16) recommendations. Five diets were used containing toasted African locust bean seeds meal (ALBSM) at dietary inclusion levels of 0, 7.5, 15, 22.5 and 30% designated as Treatments 1, 2, 3, 4 and 5 respectively. The control diet 0 % had no inclusion of toasted African locust meal as presented in Table 3.

Experimental Animals, Design and management

Two hundred and ten (210) broiler chickens (Marshall Strain) were used for the experiment. After taking the initial weight, diets were allocated to chickens in a

completely randomized design (CRD) and each treatment was replicated 3 times. Each treatment was fed to 42 birds and consisting of 14 birds per replicate. Birds were raised in deep litter room in poultry house which was partitioned into pens as replicate unit measuring 2.10m length, 210m wide and 1.25m height. The wall and air passages were covered with polythene sheets to conserve heat in the room. The birds were vaccinated against Gumboro and Newcastle at 2 weeks and 4 weeks respectively. Feeds were offered and leftover feeds were weighed every morning to determine the amount of feed consumed. Water was supplied to birds *ad libitum*. Birds were weighed weekly and feed intake and feed conversion ratio was calculated. Mortality rate was recorded as it occurred.

Haematology

Blood samples of 1.5 ml were collected from birds at 7 weeks of age via the wing vein to determine the effects of diets on blood compositions. A bottle containing ethylenediamine tetraacetic acid (EDTA) was used for blood sampling. The blood samples were put in an ice pack and transported to the Faculty of veterinary medicine, haematology laboratory of the Ahmadu Bello University, Zaria for examination and determination of Pack cell volume (PCV), red blood cells (RBC), white blood cell (WBC) and its differential components. Haemoglobin (Hb), Blood glucose (BG) and Total blood protein (TBP).

Carcass Analysis

At the end of the experiment, three birds from each replicate to were chosen for carcass and organs evaluation. The final live weights of birds were recorded before slaughtering. The birds were bled by slaughtering, immersed in hot water at 65°C, defeathered and eviscerated. The carcass weights and meat cut (back, drumstick, thigh and wings) were weighed. All the values obtained were

expressed as percentage of the live weight of birds. Similarly, the gut weights (crop, proventriculus, gizzard, small intestine weight, and large intestine) were measured using a portable electric digital weighing scale. The weights of visceral organs were also expressed as percentage of live weight of birds.

Nutrients digestibility study

A digestibility trial was carried out at the end of finisher phase. Five diets containing toasted ALBSM diets were fed to broiler chicks in a Completely Randomized Design (CRD). Each treatment was fed to 12 birds and replicated 3 times with 4 birds per pen. The digestibility trial lasted within 14 days. A known quantity of feeds was offered to birds daily and the leftover feeds were also weighed to determine the amount consumed by bird. The sample of diets and droppings collected and oven dried at a temperature of 600 °C for 24 hours. The feeds and faeces were analyzed in the laboratory for proximate composition as described by A.O.A.C. (17). The digestibility coefficients of dry matter, crude protein, ether extract, crude fibre, ash and nitrogen free extract were determined using the following equation:

$$\% \text{ Digestibility of nutrients} = \frac{\text{Nutrient intake} - \text{Nutrient output}}{\text{Nutrient intake}} \times 100$$

Data Analysis

Data generated were subjected to Analysis of variance (ANOVA) using the general linear model of statistical analysis system (18).

Statistical model used was $Y_{ij} = \mu + P_i + e_{ij}$, Where:

Y_{ij} = the j^{th} observation of the i^{th} processing methods of Locust bean seeds

μ = the overall estimate of the population mean

P_i = the effect of the i^{th} processing methods of African locust bean seeds (1, 2, 3)

E_{ij} = the random error

Table 1: Proximate Compositions of Raw and Toasted African Locust Bean Seed Meal

| Parameter (%) | Raw | Toasted ALBSM |
|---------------|-------|---------------|
| Dry matter | 96.36 | 95.63 |
| Crude Protein | 24.31 | 26.62 |
| Crude fibre | 13.55 | 13.03 |
| Ether extract | 4.97 | 2.66 |
| Ash | 4.85 | 7.36 |
| NFE | 52.75 | 49.52 |

Table 2: Levels of Anti-nutritional factors of Raw and Toasted African locust bean seed meal with percent reduction

| Parameter (mg/100g) | Raw | Toasted | Percent reduction (%) |
|---------------------|------|---------|-----------------------|
| Tannin | 1.08 | 0.14 | 87.04 |
| Phytate | 0.71 | 0.21 | 70.42 |
| Saponin | 2.08 | 0.64 | 69.97 |
| Oxalate | 1.78 | 0.41 | 76.97 |
| Trypsin inhibitor | 0.90 | 0.21 | 76.67 |

Table 3: Composition of experimental diets for broiler finisher containing graded levels of toasted African locust bean seed meal

| Ingredients (%) | % Levels of inclusion of toasted ALBSM | | | | |
|--------------------------------|--|--------------|-------------|---------------|-------------|
| | T1 (0%) | T2 (7.5%) | T3 (15%) | T4 (22.5%) | T5 (30%) |
| Maize | 61.00 | 56.50 | 52.00 | 47.50 | 43.60 |
| Groundnut cake | 18.00 | 15.00 | 12.00 | 9.00 | 5.40 |
| *Toasted ALBSM | 0.00 | 7.50 | 15.00 | 22.50 | 30.00 |
| Soya bean Full-fat | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Fish meal | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Wheat offal | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Bone meal | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Salt | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Lysine | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Methionine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Vitamin-mineral premix* | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| | 100 | 100 | 100 | 100 | 100 |
| Calculated analysis (%) | | | | | |
| Crude protein | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 |
| M. E. (Kcal/kg) | 3030 | 3018 | 3016 | 3015 | 3001 |
| Crude fibre | 3.14 | 3.85 | 4.58 | 4.58 | 4.95 |
| Ether extract | 6.69 | 6.47 | 6.74 | 6.79 | 6.80 |
| Ash | 3.09 | 3.38 | 3.70 | 4.02 | 4.32 |
| Ca | 1.35 | 1.36 | 1.38 | 1.39 | 1.39 |
| P | 0.93 | 0.92 | 0.91 | 0.90 | 0.91 |
| Lysine | 1.12 | 1.16 | 1.19 | 1.20 | 1.29 |
| Methionine+ cystine | 0.56 | 0.60 | 0.64 | 0.67 | 0.68 |
| Feed cost #/Kg | 74.75 | 73.96 | 73.31 | 71.06 | 70.81 |

*Biomix premix supplied the following per kg of diet: Vit A, 10000 IU; Vit D3 2000 i.u.; Vit E, 23mg; Vit K,2mg; Vit K2mg; B1 (thiamine) 1.8mg; Vit B2 (Riboflavin), 5.5mg; Vit B6 (Pyridoxine),3.0mg; Vit. B12, 0.015mg; Pantothenic acid, 7.5mg; Folic acid, 0.75mg; Biotin, 0.06mg; Choline chloride, 300mg; Cobalt, 0.2mg; copper, 3mg; Iodine, 1mg; Iron 20mg; manganese, 40mg; Selenium 0.2mg; Zinc, 30mg; Antioxidant, 1.25mg; M.E = Metabolisable energy, Toasted ALBSM = Toasted African Locust bean Seed meal.

Results and Discussion

The results of performance of birds fed toasted ALBSM diets are presented in Table 4. There were significant differences ($P < 0.05$) in the final body weight, total feed intake and total weight gain of broilers fed TALBSM diets. The broilers fed diet in T3 had the highest final body weight (2803.87g). The final weight of birds in the control, 7.5 and 15% TALBSM diets were similar and better than those of 22.5% and 30% TALBSM diets. This observation disagreed with the report of (19) who stated that the optimum dietary inclusion of ALBSM for the finisher diet was 10%. Total weight gain was highest in T3

(1558.20g) and lowest in T5 (963.44g). Feed intake of birds during the finisher phase was not significantly ($P > 0.05$) different between treatments. Diet 5 had the highest feed conversion ratio value (4.68) while 3 had the lowest (3.35). The feed conversion ratio for the control 7.5, 15 and 22.5% TALBSM were similar and significantly better than that of 30 % TALBSM diets. The cost per kg gain for 7.5 and 15% toasted ALBSM diets were similar and cheaper than cost per kg gain on control diet and other TALBSM diets.. There was no significant effect of diet on the mortality rate.

Table 4: Performance of broiler chickens fed toasted African locust bean seed meal diets during finisher phase (5-9weeks)

| Parameters | % Levels of inclusion of toasted ALBSM | | | | | SEM |
|-------------------------|--|----------------------|----------------------|----------------------|----------------------|-------|
| | T1 (0%) | T2 (7.5%) | T3 (15.00%) | T4 (22.5%) | T5 (30%) | |
| Initial body weight (g) | 1245.68 | 1245.67 | 1245.68 | 1245.68 | 1245.67 | 0.02 |
| Final body weight (g) | 2781.71 ^a | 2772.26 ^a | 2803.87 ^a | 2255.91 ^b | 2209.12 ^b | 35.71 |
| Total weight gain (g) | 1536.07 ^a | 1526.56 ^a | 1558.20 ^a | 1310.23 ^b | 963.44 ^c | 55.68 |
| Total feed intake (g) | 4547.85 | 4435.39 | 4393.57 | 4393.76 | 4475.89 | 70.20 |
| Feed conversion ratio | 3.94 ^b | 3.96 ^b | 3.35 ^b | 3.36 ^b | 4.68 ^a | 0.19 |
| Feed cost ₦/kg gain | 223.12 ^b | 214.98 ^c | 207.43 ^c | 243.79 ^b | 336.95 ^a | 5.70 |
| Mortality rate (%) | 4.52 | 4.76 | 4.76 | 4.76 | 7.14 | 1.98 |

abc= mean with different superscripts on the same row are significantly different ($P < 0.05$), SEM= Standard error of means,

The results of blood analysis of birds fed TALBSM diets on haematological parameters are presented in Table 5. The results showed there were significant differences ($P < 0.05$) in the pack cell volume, haemoglobin, total glucose and white blood cells. The blood of broilers fed 15% TALBSM diet gave the highest value pack cell volume (30.67%), haemoglobin counts (10.20g/dl), total glucose (156.22mmol/l) and red blood cell count ($4.40 \times 10^6/l$) compared to other diets. The PCV fell within the normal range (22-35%) as reported by (20). There were differences ($P < 0.05$) in the

lymphocytes and eosinophils of birds fed toasted ALBSM diets. Diet 2 had highest value of lymphocyte count (61.47%) and lowest lymphocytes count in diet 5 (50.62%). Diet 3 had highest value of eosinophils (2.75%) and lowest diet 5 (1.14%). There were no significant differences ($P > 0.05$) in the neutrophil and monocyte counts. This may be attributed to low level of anti-nutritional factors affecting the blood compositions. The values are within the normal range of chickens as reported by (21).

Table 5: Haematological parameters of broiler chickens fed Toasted African locust bean seed meal at finisher phase

| Parameters | % Levels of inclusion of toasted ALBSM | | | | | SEM |
|---|--|----------------------|---------------------|----------------------|---------------------|------|
| | T1 (0%) | T2 (7.5%) | T3 (15.00%) | T4 (22.5%) | T5 (30%) | |
| Pack cell volume (%) | 28.33 ^{ab} | 26.00 ^b | 30.67 ^a | 29.00 ^a | 26.01 ^b | 0.36 |
| Haemoglobin (g/dl) | 9.43 ^{ab} | 8.63 ^b | 10.20 ^a | 9.63 ^{ab} | 8.63 ^b | 0.41 |
| Total protein (g/dl) | 4.32 | 4.14 | 4.40 | 3.88 | 3.91 | 0.21 |
| Total glucose (mmol/l) | 145.75 ^{ab} | 148.94 ^{ab} | 156.22 ^a | 138.39 ^{ab} | 124.67 ^c | 3.48 |
| Red blood cell (X10 ⁶ /l) | 4.32 | 4.14 | 4.40 | 3.88 | 3.91 | 0.34 |
| White blood cell (X10 ³ /mm) | 2.54 ^b | 3.63 ^{ab} | 3.47 ^{ab} | 3.13 ^c | 4.00 ^a | 0.28 |
| Neutrophils (%) | 33.56 | 31.06 | 31.87 | 37.77 | 38.26 | 1.54 |
| Lymphocytes (%) | 57.89 ^{ab} | 61.47 ^a | 56.72 ^{ab} | 56.62 ^{ab} | 50.62 ^b | 1.34 |
| Monocytes (%0) | 3.29 | 3.53 | 3.09 | 3.53 | 3.27 | 0.24 |
| Eosinophils (%) | 1.59 ^{ab} | 2.24 ^b | 2.75 ^a | 2.62 ^a | 1.14 ^c | 0.29 |

^{abc}= mean with different superscripts on the same row are significantly different (P<0.05), SEM= Standard error of means.

The carcass characteristics of broiler chicken fed toasted African locust bean seed meal was presented in Table 7. The results showed there were significant differences (P<0.05) in carcass weight, dressing %, breast muscle, drum stick and back weight of broilers. Carcass weight, dressing percentage, breast muscle, drum stick and back weight showed highest values in the 15% TALBSM diet. Broiler finishers fed the control diet, 7.5 and 15% TALBSM recorded similar values for carcass weight. Higher and similar values of dressing percentage were recorded by birds fed 7.5% and 15% TALBSM. The carcass weight and dressing percentage were significantly (P<0.05) highest in boilers fed with 15% toasted ALBSM diet. However, the values were reduced at 22.5 and 30% dietary levels. This agreed with the report of (22; 23) who reported that nutrition influence muscular growth and malnutrition causes an increase in protein degeneration in chicken. The breast muscle, drum stick, and thigh were highest at 15% dietary level of toasted ALBSM.

However, the back, neck, and abdominal fat weights were not (P>0.05) influenced by the treatments. It has been shown that as protein level of diet is increased in feed, there may be better muscle deposition and production of leaner carcass (24). There were no significant effect of TALBSM diets (P>0.05) on thigh, wings, neck weights and abdominal fat of broiler chickens.

The results of organs weights are presented in Table 6. There were no significant effect of diets (P>0.05) on the heart, lungs, pancreas, crop, proventriculus and gizzard percent and on small intestine length. However, there were significant differences (P<0.05) in the weights of liver, kidney, small intestine and small intestine length. This agreed with the findings of (25; 26) who reported that liver is the target organ involved in detoxication and hence increase in activity may result in its enlargement. The gut weight showed there were no significantly different (P>0.05) in the crop, proventricus and gizzard weights. Heavier weight of organs could be an

indication of hypertrophy (27). Similarly, (28) reported Lablab seed should be well processed to be properly utilized without posing any danger to the health status of chicks. The large intestine weight was significantly higher in

treatment 4 and 5 than values for other treatments. Similarly, large intestine length increased as the level of toasted ALBSM increased in diets.

Table 6: Carcass characteristics of broiler chicken fed Toasted African Locust Bean Seed Meal Diets at finisher phase

| Parameters | % Levels of inclusion of toasted ALBSM | | | | | SEM |
|-----------------------|--|-----------------------|----------------------|-----------------------|----------------------|------|
| | T1 (0%) | T2 (7.5%) | T3 (15.00%) | T4 (22.5%) | T5 (30%) | |
| Final live weight (g) | 2780.02 ^a | 2770.20 ^{ab} | 2781.23 ^a | 25420.23 ^b | 2201.42 ^c | 0.70 |
| Carcass weight (g) | 1861.06 ^a | 1890.11 ^a | 1902.22 ^a | 1672.56 ^b | 1513.67 ^c | 0.05 |
| Dressing percent (%) | 71.52 ^b | 72.75 ^a | 72.98 ^a | 70.48 ^{bc} | 69.84 ^c | 0.49 |
| Breast muscle (%) | 17.94 ^{bc} | 19.49 ^b | 22.51 ^a | 17.51 ^{bc} | 17.07 ^c | 0.64 |
| Drum stick (%) | 11.75 ^{ab} | 11.93 ^{ab} | 13.32 ^a | 11.08 ^b | 11.99 ^{ab} | 0.58 |
| Thigh (%) | 10.42 | 10.98 | 11.47 | 10.51 | 10.07 | 0.39 |
| Wings (%) | 9.27 | 9.97 | 9.90 | 10.02 | 9.32 | 0.63 |
| Neck weight (%) | 19.35 | 18.49 | 20.11 | 20.11 | 17.89 | 0.91 |
| Back weight (%) | 21.33 ^{ab} | 19.69 ^b | 22.22 ^a | 19.63 ^b | 19.01 ^b | 0.76 |
| Abdominal fat (%) | 2.47 | 2.35 | 2.18 | 2.60 | 2.76 | 0.17 |

^{abc}= mean with different superscripts on the same row are significantly different (P<0.05), SEM= Standard error of means

Table 7: Organs and gut weights of broiler chickens fed toasted African locust bean seed meal diets

| Parameters | % Levels of inclusion of toasted ALBSM | | | | | SEM |
|-----------------------------|--|--------------------|--------------------|---------------------|--------------------|------|
| | T1 (0%) | T2 (7.5%) | T3 (15.00%) | T4 (22.5%) | T5 (30%) | |
| Heart | 0.42 | 0.44 | 0.46 | 0.45 | 0.38 | 0.01 |
| Lungs | 0.45 | 0.51 | 0.56 | 0.57 | 0.54 | 0.03 |
| Liver | 1.85 ^c | 2.17 ^{ab} | 2.00 ^b | 2.29 ^a | 2.07 ^b | 0.11 |
| Pancreas | 0.26 | 0.23 | 0.29 | 0.28 | 0.26 | 0.02 |
| Kidney | 0.28 ^b | 0.33 ^{ab} | 0.29 ^b | 0.38 ^a | 0.34 ^a | 0.02 |
| Crop | 0.11 | 0.13 | 0.12 | 0.11 | 0.11 | 0.04 |
| Proventriculus | 0.34 | 0.32 | 0.31 | 0.32 | 0.31 | 0.03 |
| Gizzard | 2.37 | 2.52 | 2.50 | 2.57 | 2.24 | 0.09 |
| Small intestine weight | 2.21 ^{ab} | 1.96 ^b | 1.18 ^c | 1.60 ^b | 2.76 ^a | 0.17 |
| Small intestine length (cm) | 286.78 | 290.56 | 289.00 | 279.11 | 269.67 | 6.39 |
| Large intestine weight | 0.73 ^{bc} | 0.66 ^c | 0.74 ^b | 0.80 ^a | 0.93 ^a | 0.04 |
| Large intestine length (cm) | 31.13 ^c | 31.44 ^b | 32.30 ^b | 32.93 ^{ab} | 33.60 ^a | 0.39 |

^{abc}= mean with different superscripts on the same row are significantly different (P<0.05), SEM= Standard error of means,

The results of nutrient digestibilities are presented in Table 8. The results showed that there were no significant differences ($P>0.05$) in the dry matter and, crude protein, and ash. Crude fibre and nitrogen free extract digestibilities were significantly ($P<0.05$) affected by treatments. The crude fibre digestibility showed a decreasing trend with an increase in the dietary inclusion of toasted

ALBSM. Nitrogen free extract digestibility was highest at 15% toasted ALBSM diet. (29) reported that fibre increased the bulkiness of diets and limited the amount of feed taken by birds thereby imposing a physical limitation upon digestible nutrients. (30; 31; 32) also reported significant decrease in crude fibre digestibility with increasing level of fibre in the diet.

Table 8: Nutrient digestibility of broiler chickens fed toasted African locust bean seed meal diets

| Parameters | % Levels of inclusion of toasted ALBSM | | | | | SEM |
|---------------------------|--|--------------------|--------------------|--------------------|--------------------|------|
| | T1 (0%) | T2 (7.5%) | T3 (15.00%) | T4 (22.5%) | T5 (30%) | |
| Dry matter (%) | 85.01 | 84.28 | 85.58 | 75.49 | 75.95 | 3.06 |
| Crude protein (%) | 80.82 | 84.37 | 84.34 | 73.37 | 67.49 | 2.08 |
| Crude fibre (%) | 63.48 ^a | 62.20 ^b | 64.94 ^a | 57.62 ^b | 54.37 ^c | 2.70 |
| Ether extract (%) | 63.17 ^c | 79.89 ^a | 81.93 ^a | 80.56 ^a | 66.40 ^b | 2.89 |
| Ash (%) | 58.71 | 69.13 | 67.99 | 63.10 | 58.06 | 3.31 |
| Nitrogen free extract (%) | 83.30 ^b | 69.97 ^c | 87.53 ^a | 85.40 ^a | 72.75 ^c | 2.27 |

abc= mean with different superscripts on the same row are significantly different ($P<0.05$), SEM= Standard error of means

Conclusion and Applications

1. Based on this study, it was concluded that toasted African locust bean seed meal (TALBSM) can be included in the diet of broiler chickens up to 15% dietary level without any deleterious effect on performance and carcass yield.
2. This study will help feed milling industries, poultry farmers and nutritionist to make efficient utilization of African locust bean seeds which is unconventional and readily available in poultry diets for better performance, carcass yield with some reduction in the cost of production.

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