

# Growth Performance, Carcass Characteristics and Economic Analysis of Broiler Fed Processed *Faidherbia albida*

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**Abstract**—The research was conducted to compare the effect of raw, soaked and boiled *Faidherbia albida* pod meal (Fapm) based diet on the growth performance and carcass characteristics of broiler chickens. Eighty (80) broiler chickens were used for the study. The chicks were divided in to four (4) different groups and each group is replicated twice with 10 chicks per replicate in a completely randomized design. *Faidherbia albida* pod meal was treated (raw, soaked and boiled) and included at 15% in the diets as a replacement for ground nut cake from 1st to 7th week. Group I were fed with 0% Fapm diet and serve as control, Group II were fed with 15% raw Fapm, Group III were fed with 15% soaked Fapm and Group IV were fed with 15% boiled Fapm. The whole experiment lasted for a period of seven (7) weeks. The results of the analysis indicate that there was no significant difference ( $P>0.05$ ) in the feed intake, body weight gain, feed conversion ratio and protein efficiency ratio. All the organs were also not significantly affected. This study suggest that boiling could be employed as a treatment for Fapm in order to neutralize the toxic effects of anti-nutritional factors in it since the broiler chickens fed 15% boiled Fapm had least cost/kg body weight gain with higher net revenue.

**Index Terms**—*Faidherbia albida* pod meal, ground nut cake, broiler chicken diets

## I. INTRODUCTION

Poultry meat and eggs are used chiefly as human food. They are good sources of protein, minerals and vitamins [1]. The production cost per unit is low relative to other type of livestock and the return is high. Poultry meat is probably the most palatable of all meat and is easily digested [1]. The meat can be served in a variety of ways such as fried, roasted, stewed or combined with other foods as in salad, sandwich, sauces and soup. There is however ready acceptance of poultry meat by most ethnic groups, no taboos as against pork by the muslims or against beef by Hindus. Commercial poultry production began in Nigeria in the 1960s Awosanmi, [2]. Existing literatures indicated that poultry enterprise increased numerically in the early 1970s where the population accounted for 71.4% of the total livestock kept in Nigeria

in 1989 [3]. According to Awosanmi, [2] between 1984 and 1985 the poultry industry was brought to the verge of collapse, the most limiting factor then was unavailability of feed which accounts for more than 75% of the production cost in poultry enterprise. The high cost also as well as scarcity coupled with in adequate knowledge of possible alternative and cheap ingredients as a result of our dependence on importation of certain feed items have also contributed towards militating increased commercial poultry production in Nigeria. One of the possible options advocated to solve the present high cost of animal protein and protein intake deficit due to lack of adequate supply of feedstuffs at economic prices is the substitution of nonconventional feeds for conventional ones in animal rations [4]. Studies have indicated that seeds of many plants contain protein in high concentration e.g. seed of kernel of desert dates *Balanites aegyptica*, *Hyphaena thebacea*, *Moringa oleifera* are shown to be cheap source of protein for poultry and other livestock [5], [6]. Some of these alternatives are known to have better feeding quality [7]. *Faidherbia albida* (Gao) also called *Acacia albida* fruits usually available in dry season in semi-arid areas are good example of such nonconventional feedstuffs. Igwebuikie *et al.* [8], also reported that 20% of *Acacia albida* pod could be included in the diet of growing rabbit without adverse effect on nutrients digestibility and mineral availability. However, Olorede and Ajayi [4], also reported that broilers could be raised on diets containing 10 and 20% *Faidherbia albida* due to low feed cost per kg, higher total revenue, higher net revenue and economic efficiency of the feed. This study is aimed at revealing the effect of processing *Faidherbia albida* pod meal (Fapm) in growth performance, carcass characteristics, organ weights and economy of production of broiler chicken.

## II. MATERIALS AND METHODS

### A. Experimental Design and Location

A total of eighty (80) broiler day old chicks purchased from Zartech Nigeria Limited through Oju-Anu Agric Enterprise were used in a complete randomized design for the purpose of this study. There were four treatments

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each with two replicates. Three treatments were fed with Fapm replacing GNC at 15% inclusion level each. The experimental diets were fed to the birds for a period of eight (8) weeks. The birds were introduced to starter diet from day old and changed to finisher when they are five weeks old. Feed and fresh cool water were supplied ad libitum throughout the period of the experiment. This research work was conducted at Poultry unit of Department of Veterinary Public Health and Animal Production, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto. The experimental pens were cleaned, washed, disinfected and left to dry for 48 hours prior to the arrival of the experimental chicks. On arrival of the birds they were given vitalyte® (anti stress) in drinking water. At two weeks old Gumboro vaccine was given to the birds through drinking water. This was followed by vitamin and antibiotic drug at third week. At five weeks of age Lasota vaccine was also given through their drinking water. Water was withdrawn from them for about 12 hours prior to vaccination exercise to ensure that they would be thirsty enough to drink the vaccine. After any major operation like weighing or vaccination, anti-stress was given to the birds through their drinking water.

#### B. Diet Formulation

The diets whose compositions are shown in index (1 and 2) were compounded manually having made all the ingredients available. *Faidherbia albida* pod meal (Fapm) was used to replace groundnut cake (GNC) at 15% inclusion level in three different diets. In the first diet raw Fapm was used, in the second diet soaked Fapm was used while in the third diet boiled Fapm was used. The control diet had no Fapm in it. The formulation was done in such a way that all feed were isonitrogenous and isocaloric.

#### C. Statistical Analysis

The birds were weighed on weekly basis throughout the period of the experiment. There were eight replicates each containing ten birds. Each replicate were weighed collectively and divided by the total number of birds in the pen to determine the average weight per bird for the week. The weights were recorded every week. Weight gain per bird in a week was also calculated for each treatment group. At the end of the experiment, the birds were slaughtered and the internal organs including the liver, spleen, kidney, heart, small intestine, large intestine, gizzard and proventriculus were removed separately and weighed. Data for each parameter were meaned, and then subjected to analysis for significant differences by the analysis of variance procedure [9].

### III. RESULTS AND DISCUSSION

It is well known and believed that the body weight gain is directly highly sensitive to the amount of protein consumed. The treatment had significant effect on the live weight with the control diet having the highest live weight than those fed the experimental diet. Among the experimental diets, broiler fed boiled Fapm was also

significantly higher than those fed soaked and raw Fapm (Table I). The difference observed in boiled Fapm could however be due to boiling effect which makes the nutrients more available and the diet more palatable thereby enhancing the feed intake. It could also be due to the slightly lower energy content of the diet, which makes the broiler chicken to eat more in order to satisfy their energy requirement. Similarly the decrease in the live weight observed in soaked and raw Fapm could be due to the unpalatable nature of the diet due to the presence of saponins and alkaloids in Fapm which may subsequently reduce the digestibility and absorption of the diet. This is however in line with the findings of Emenalom and Udedibie, [10] that cooking tends to reduce the crude protein content of the diet possibly due to solubilization of some nitrogenous compounds.

Even though no significant effect occurred in the dietary treatment in terms of feed intake, the lowest treatment mean were observed in the diet containing raw and soaked Fapm. This however suggests the unpalatable nature of the diet due to the presence of high crude fibre and anti-nutritional factors in the diet. This goes in line with the report of Morgan and Trinder [11], anti-nutritional factors like tannins and saponins are known to decrease feed intake of broiler chickens.

The data on the body weight gain showed no significant difference in the dietary treatment using analysis of variance, however the highest treatment mean could be seen in the diet containing boiled Fapm apart from the control diet. Similarly, the data on feed conversion ratio and protein efficiency ratio showed no significant difference among the experimental diets even though sharp variation could be seen in their treatment mean. This is due to the fact that fibrous feed affects the availability of nutrients to birds such that the weight gain of birds in treatment with high feed intake did not alter the conversion ratio. This is in line with the report of Oluyemi and Roberts, [12] that fowls shows aversion to diets.

All the organ weight of broiler chickens were not significantly affected by the treatment diets (Table II). This agrees with the work of Olorede and Ajayi, [4] that broilers could be raised on 10-20% Fapm without adverse effect on growth performance and characteristics.

From the input-output analysis table (Table III) it is clear that the highest feed cost/kg body weight gain was obtained from diet 3 (Soaked Fapm) followed by diet 2 (Raw Fapm). Similarly the least feed cost/kg bodyweight gain was obtained from the bird fed diet 4 (Boiled Fapm) and diet 1 (Control). The prices per kg feed were the same in all the three treatment diets. On addition of the cost of day old chick, feed intake, veterinary care and miscellaneous expenses, the total cost per bird (₦) were 348.04, 290.66, 304.91 and 343.54 for treatments I, II, III and IV respectively. The net revenue (₦) was 401.96, 209.34, 195.09 and 306.46 for treatments I, II, III and IV respectively. Thus treatment IV with boiled Fapm had the highest revenue. This also agrees with the findings of Mousa, [13] who concluded that replacement of Acacia

up to 40% in growing lamb diet improved growth performance traits, economic efficiency, dressing percentage and decrease feed cost per kg body gain from weaning to marketing weight.

TABLE I. GROWTH PERFORMANCE PARAMETERS

	Diet 1	Diet 2	Diet 3	Diet 4
<b>Body Weight Gain (Kg)</b>	0.29 ± 0.22	0.188 ± 0.18	0.20 ± 0.17	0.24 ± 0.25
<b>Feed intake (kg/bird)</b>	0.36 ± 0.26	0.35 ± 0.32	0.41 ± 0.35	0.59 ± 0.41
<b>Feed Conversion Ratio (Kg)</b>	1.76 ± 0.68	1.87 ± 1.03	2.02 ± 0.88	3.06 ± 2.45
<b>Protein Efficiency Ratio (Kg)</b>	2.94 ± 1.63	3.36 ± 2.59	2.59 ± 1.29	2.06 ± 1.24

TABLE II. LIVE AND ORGAN WEIGHTS

	Diet 1	Diet 2	Diet 3	Diet 4
<b>Live weight (g)</b>	1472.5 ± 206.94	1002.5 ± 132.75a	1040 ± 140.71a	1262.5 ± 12.58abc
<b>Gizzard &amp; Proventriculus</b>	4.27 ± 0.46	5.00 ± 0.31	5.22 ± 0.25	4.99 ± 0.31
<b>Heart</b>	0.58 ± 0.13	0.57 ± 0.08	0.77 ± 0.25	0.48 ± 0.03
<b>Liver</b>	2.53 ± 0.56	2.82 ± 0.25	2.61 ± 0.36	3.75 ± 1.11
<b>Lungs</b>	0.78 ± 0.15	0.85 ± 0.11	1.03 ± 0.34	0.85 ± 0.08
<b>Small Intestine</b>	5.47 ± 0.81	6.13 ± 0.45	6.91 ± 1.43	7.13 ± 1.55
<b>Large Intestine</b>	2.60 ± 0.31	2.78 ± 0.47	3.32 ± 0.55	3.52 ± 0.52
<b>Crop</b>	0.58 ± 0.05	0.73 ± 0.07	0.81 ± 0.10	0.85 ± 0.24
<b>Spleen</b>	0.14 ± 0.03	0.15 ± 0.04	0.18 ± 0.05	0.11 ± 0.01
<b>Kidney</b>	0.41 ± 0.16	0.29 ± 0.03	0.51 ± 0.18	0.43 ± 0.03

TABLE III. ECONOMIC ANALYSIS OF THE EXPERIMENTAL DIETS

Economic Parameters	Diet 1	Diet 2	Diet 3	Diet 4
<b>Day Old chick (₦)</b>	190	190	190	190
<b>Feed Intake (Kg/Bird)</b>	3.772	2.459	2.992	4.173
<b>Price/Kg Feed (₦)</b>	35.27	30.77	30.77	30.77
<b>Feed Cost (₦)</b>	133.04	75.66	89.91	128.54
<b>Vet and Miscellaneous (₦)</b>	25	25	25	25
<b>Total Cost/Bird (₦)</b>	348.04	290.66	304.91	343.54
<b>Average Body Weight (Kg)</b>	1.5	1	1	1.3
<b>Net Actual Weight (Kg)</b>	1.41	0.92	0.92	1.21
<b>Feed cost/Body weight gain (₦)</b>	94.35	82.24	97.73	106.23
<b>Feed cost/Kg body weight gain (₦)</b>	66.91	89.39	106.23	87.79
<b>Total Revenue (₦)</b>	750	500	500	650
<b>Net Revenue (₦)</b>	401.96	209.34	195.09	306.46

#### IV. CONCLUSION AND RECOMMENDATION

This study revealed that boiling among other treatment could be employed in treating Fapm to be included in the diet of broiler chicken. Similarly in terms of cost benefit analysis of the experiment, boiling is still the best since the price per kg feed in all the treatment is the same but boiling gives the best result in terms of total revenue and net revenue of ₦650 and ₦306 respectively. However, further works are recommended to determine the carcass yield and meat quality of broilers fed with Fapm.

#### REFERENCES

- [1] B. R. Oloredo, "Non conventional feedstuff in poultry nutrition," 2005.
- [2] V. O. Awosanmi, "Nigeria needs to recover from its present state of poultry production," *Tropical Journal of Animal Science*, vol. 2, no. 1, 1999.
- [3] Food and Agriculture Organization of the United Nations (FAO), "The design of agricultural investment projects. Lessons from experience," Technical Paper No. 5, Investment Centre, FAO, Rome, Italy, 1990.
- [4] B. R. Oloredo and A. F. Ajayi, "Replacement of groundnut cake and maize with *Faidherbia albida* in the diet of broiler chicken," *Bull. of Anim. Hlth. and Prod. in Africa*, vol. 53, pp. 61-67, 2005.

- [5] A. Samuel, L. Tample, and O. Ladeji, "Chemical and nutritional evaluation of the seed kernel of *Balanites aegyptica*," *Nig. Journ. of Biotechl.*, vol. 8, no. 1, pp. 57-63, 1997.
- [6] I. K. Matazu, "Chemical and nutritional evaluation of the seed kernel of *Hyphaena thebaica*," *Nig Journ of Basic and Appld Sci.*, vol. 9, pp. 185-190, 2000.
- [7] L. G. Hassan and K. J. Umar, "Nutritional assessment of Moringa oleifera seeds as an alternative source animal feeds: Proximate and mineral compositions." *Sok Journ of Vet Sci.*, vol. 6, no. 1, pp. 6-7, 2004.
- [8] J. U. Igwebuike, F. O. I. Anugwa, O. A. Abu, and I. B. Shehu, "Nutrient digestibility and mineral availability in growing rabbits fed graded levels of *Acacia albida* pod," in *Proc. 26<sup>th</sup> Annual Conf, Nigeria Society for Animal Production*, Ilorin, Kwara State, Nigeria, 1999, pp. 161-163.
- [9] R. G. D. Steel and J. H. Torrie, *Principles and Procedures of Statistics. A Biometric Approach*, 2nd ed., New York: McGraw Hill Book Co. Inc., 1980.
- [10] O. O. Emenalom and A. B. I. Udedibie, "Effect of dietary raw, cooked and toasted *Mucuna pruriens* seeds (Velvet Bean) on the performance of finisher broilers," *Nigerian Journal of Animal Production*, vol. 25, no. 1, pp. 115-119, 1998.
- [11] D. C. Morgan and H. Trinder, "The composition and nutritional value of some tropical and subtropical by-products," *Occa. Pub. Br. Soc. Anim. Prod.*, no. 3, 1980.
- [12] J. A. Oluyemi and F. A. Roberts, *Poultry Production in Warm Wet Climates*, revised edition, London, United Kingdom: The Macmillan Press, 2000.
- [13] M. R. M. Mousa, "Effects of feeding *Acacia* as supplements on the nutrients digestion, growth performance, carcass traits and some blood constituents of Awassi Lambs under the conditions of North Sinai," *Asian Journ. of Anim. Sci.*, vol. 5, pp. 102-117, 2011.



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