

Effects of Feeding Roasted *Canarium schweinfurthii* Seed Meal on Performance and Carcass Characteristics of Broiler Chicken

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ABSTRACT

Aims: The study was conducted to determine the performance and carcass characteristics of broiler chickens fed diet with roasted *Canarium schweinfurthii* (atili) seed meal.

Materials and methods: One hundred and twenty (120) two weeks old chicks were randomly allotted to four dietary treatments containing 0% (control) T1, 2.5% (T2), 5% (T3), and 7.5% (T4) of roasted *Canarium* seed meal (RCSM) respectively, in a completely randomized design. Thirty birds per treatment with three replicate of ten birds each for six weeks. The parameters measured were performance indices (initial and final weight, weight gain, feed intake, and feed conversion ratio {FCR} was calculated). The carcass parameter include live weight, bled weight, carcass weight, breast weight, thigh weight, drumstick weight, wings weight, neck weight, back weight, spleen weight, gizzard weight, liver weight, heart weight and lungs weight. The abdominal fat weight was removed, weighted and grossly examined for any pathological changes. Data were analyzed using descriptive statistic and ANOVA at $\alpha_{0.05}$.

Results: There was a significant variation in final weight, weight gain and feed conversion ratio. There was no significant difference in the live weight, bled weight, carcass weight, breast weight, thigh weight, drumstick weight, wings weight, neck weight, back weight, spleen weight, gizzard weight, liver weight, heart weight, lungs weight and abdominal fat weight of the birds for all the treatments.

Conclusion: It can be concluded that roasted *Canarium schweinfurthii* (atili) seed meal inclusion in the diets of broiler chicken at 5% has no negative effect on the performance and carcass characteristics.

Keywords: *Canarium schweinfurthii*, roasted, broiler chicken, performance, carcass characteristics

1. INTRODUCTION

In poultry production, feed accounts for the largest single cost, making up approximately 60-80% of the total cost. [1]. Poultry industries in Nigeria are constantly experiencing shortage of feed resources and where these resources are available there are higher demands by man which make them too expensive to feed livestock. A possible way to reduce poultry feed costs is finding alternatives to conventional protein and energy sources that are inexpensive, efficient and locally available. Hence, various researches on sourcing alternative feed materials or non-conventional feed resources. Non-conventional feedstuffs refer to all those feed resources that have not been traditionally used in animal feeding or

27 are not used commercially in the production of rations for livestock [2]. There is therefore
28 need to research into the use of non-conventional feed resources. Example of such seed
29 used in this study is *Canarium schweinfurthii*, it belongs to the family *Burseraceae* and the
30 genus *Canarium* [3]; 4]. *Canarium schweinfurthii* are common in Bauchi, Southern Kaduna,
31 Niger, Oyo and Plateau States of Nigeria [5]. The fruit contains a hard fluted stone in which
32 is a seed, inside the seed are edible and oily nuts [6]. *Canarium* seed contains natural
33 flavors, high fat content, pigments, moisture, nutritionally valuable minerals, vitamins and
34 naturally occurring antioxidants [7]. The seed also contained appreciable amount of
35 nutritionally valuable minerals such as calcium, potassium, magnesium, sodium,
36 phosphorous, iron, zinc and copper while glutamic and aspartic acids dominated the amino
37 acid profile also appreciable amount of essential amino acids which was more than fifty
38 percent of total amino acid contents [8]. [9]noted that the fruit has considerable nutritional
39 value that makes it a useful supplement to both human food and animal feed. Therefore the
40 need to study effects of feeding roasted *Canarium schweinfurthii* seed meal on performance
41 and carcass characteristics of broiler chicken.
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43 2. MATERIAL AND METHODS

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45 2.1 Experimental Birds and their Management

46 In a completely randomized design a total of 120 unsexed two weeks broiler chicks was used
47 for the study. The chicks were randomly distributed into four dietary treatments containing
48 0% (control), 2.5%, 5% and 7.5% (Treatment 1 to 4, respectively) of roasted *Canarium*
49 *schweinfurthii* seed meal (RCSM), with each treatment having three replicates of ten birds
50 each. The feed was presented in mash form and water was provided *ad libitum*. The feed
51 was formulated to meet the [10] requirement for broiler chickens. The birds were raised on
52 deep litter system with standard management and hygiene maintained, the recommended
53 vaccines for broilers were administered accordingly. The parameters measured include the
54 performance indices (initial and final weights, weight gain, feed intake and feed conversion
55 ratio {FCR} was calculated) and the carcass characteristics (live weight, bled weight, carcass
56 weight, breast weight, thigh weight, drumstick weight, wings weight, neck weight, back
57 weight, spleen weight, gizzard weight, liver weight, heart weight, lungs weight and abdominal
58 fat weight). At the end of the six weeks feeding trials, two birds from each replicate were
59 randomly selected, fasted for sixteen hours and slaughtered by severing the throat with the
60 aid of sharp knife. The birds were allowed to bleed for five minutes and defeathered
61 manually by immersing in warm water. Determination of carcass characteristics was done
62 according to the method described by [11]; plucked and eviscerated to determine the
63 dressed weight and weight of the carcass components (thighs, drumstick, breast, back,
64 wings, and neck, internal organs were; heart, lung, liver, gizzard, spleen, abdominal fat)
65 were measured. Carcass, organs, and gut were weighed with the aid of laboratory electronic
66 scale (ACCULAB).

67 The cut parts were expressed as percentage of live weight. The dressing percentage was
68 calculated as a ratio of dress weight to live weight multiplied by hundred

69
$$\text{Dressing percentage} = \frac{\text{dress weight}}{\text{live weight}} \times 100$$

70 2.2 Statistical Analysis

71 Data obtained from the experiment were analysed using the statistical analysis of variance
72 (ANOVA) procedure of [12] and significant level of $p=0.05$ was used. The treatment means
73 were compared using the New Duncan multiple range test of the same software.

74 Table 1. Composition of the experimental diet

Ingredient	0%	2.5%	5%	7.5%
Maize	59.00	57.39	57.39	55.00
Soybean cake	19.00	18.50	16.00	15.89
Groundnut cake	19.39	19.00	19.00	19.00
RCSM	0	2.50	5.00	7.50
Bone meal	2.00	2.00	2.00	2.00
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Premix*	0.16	0.16	0.16	0.16
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated Nutrient Analysis				
CP%	22.61	22.06	21.04	20.75
ME Kcal/Kg	3023.14	2944.76	2877.04	2793.03
Calcium	0.79	0.79	0.78	0.78
Average phosphorus	0.50	0.49	0.48	0.48
Lysine	0.09	1.07	1.00	0.99
Methionine	0.42	0.42	0.40	0.40
Fibre	3.38	3.30	3.14	3.08

75 CP=crude protein, ME = Metabolisable energy *Composition of premix per kg of
76 diet: vitamin A:(12,000,000 i.u) ; vitamin D3 (2,500,000 i.u) ; vitamin E (30,000 mg); vitamin
77 K3 (2,000 mg); vitamin B1 (2250 mg); vitamin B2 (6000 mg); vitamin B6 (4,500 mg); vitamin
78 B12 (15 mcg); niacin (40,000 mg); pantothenic acid (15,000 mg); folic acid (1,500 mg); biotin
79 (50 mcg); choline chloride (300,000 mcg); manganese (80,000 mg); zinc (50,000 mg); iron
80 (20,000 mg); copper (5,000 mg); iodine (1,000 mg); selenium (200 mg); cobalt (500 mg);
81 antioxidant (125,000 mg)

82

83 **3. RESULTS AND DISCUSSION**

84

85 In Table 2, it was observed that final weight, weight gain and feed intake increased
86 significantly ($p < 0.05$) across the treatments. The final weight values ranges from T4 to T1
87 (1637.3, 1679.9, 1768, and 1868.9) increasing across the treatments. The average weight
88 gains increases from T1 to T4 (262.6, 245.0, 230.7 and 224.1) and the average feed intake
89 T1 (962.0), T2 (960.0), T3 (870.0) and T4 (730.0) respectively. There was no significant
90 variation ($p > 0.05$) in the feed conversion ratio across the treatments (T2 with value 3.92,
91 while T3 is 3.77, T1 is 3.69, and T4 is 3.26, respectively). The final weight value was
92 observed to reduce as the test ingredient value inclusion increases, also the average feed
93 intake was also observed to follow this same pattern but a variation was observed in the
94 feed conversion ratio; T4 with the highest value of the test ingredient had the lowest value
95 3.26. The RCSM contains natural flavors, high fat content, pigments, moisture, nutritionally
96 valuable minerals, vitamins and naturally occurring antioxidants [7] which may be
97 responsible for the proper utilization of the consumed feed. The average weight gain and
98 final weight of the broiler chickens were not significantly different between T1 and T2, while
99 T2 and T3 were also not significantly different. Hence, the RCSM can be included in broiler
100 diet at all stage because the seed contained appreciable amount of nutritionally valuable
101 minerals such as calcium, potassium, magnesium, sodium, phosphorus, iron, zinc and
102 copper while glutamic and aspartic acids dominated the amino acid profile also appreciable

103 amount of essential amino acids which was more than fifty percent of total amino acid
104 contents [8, 13].

105 Table 2: Growth performance of broiler chickens fed graded levels of roasted *Canarium*
106 *schweifurthii* (*atili* seed) meal.

Parameters	T 1	T 2	T 3	T 4	SEM
Initial weight (g)/bird	293.3	298.3	295.7	292.7	17.85
Final weight (g) /bird	1868.9 ^a	1768.3 ^{ab}	1679.9 ^{bc}	1637.3 ^c	59.38
Average weight gain (g) /bird/week	262.6 ^a	245.0 ^{ab}	230.7 ^{bc}	224.1 ^c	15.64
Average Feed intake (g) /bird	968.0 ^a	960.0 ^a	870.0 ^b	730.0 ^c	47.08
Feed Conversion Ratio	3.69	3.92	3.77	3.26	0.36

107 ^{abc} Means on the same row with different superscripts are significantly different ($p < 0.05$)

108 The results on carcass characteristics of broiler finisher fed graded levels of RCSM are
109 presented in Table 3. The results of carcass characteristics of broilers fed graded level of
110 RCSM revealed the live weight of the birds fed with T2 (1.83±0.02 kg) while the birds fed
111 with T1 (1.78±0.03), T3 (1.76±0.06), and T4 (1.68±0.03) but there was no significant
112 difference ($P > 0.05$). The bled weight of the birds fed with T2 is 1.70±0.10 kg while those fed
113 with T1 is 1.68±0.03, T3 is 1.65±0.05 and T4 is 1.55±0.05 but there was no significant
114 difference across the treatments ($P > 0.05$). The carcass weight of the birds fed with T2 is
115 1.30±0.01 while the birds fed with T1 is 1.25±0.05, T3 (1.18±0.03), and T4 (1.13±0.03) but
116 there was no significant difference ($P > 0.05$). The breast weight of birds fed with T3 is
117 0.38±0.02 while the birds fed T1 (0.35±0.05), T2 (0.28±0.02), and T4 (0.29±0.02),
118 respectively but there was no significant difference ($P > 0.05$). The results of thigh weight were
119 also not significant ($P > 0.05$) across the treatments, T1 (0.18±0.03) and T4 (0.18±0.03), T2
120 (0.16±0.01) and T3 (0.16±0.01), respectively. The drumstick weight of the birds fed with T3
121 (0.15±0.02), T2 (0.15±0.01) and T1 (0.15±0.01) had similar weight while birds fed T4
122 (0.14±0.01), respectively. The wings weight of the birds fed with T4 (0.15±0.01) while the
123 birds fed with T3 (0.13±0.03), T1 (0.13±0.03) and T2 (0.12±0.01), respectively with no
124 significant variation ($P > 0.05$). The neck weight of the bird fed with T4 (1.00±0.02), T3
125 (1.00±0.01) had similar weight likewise birds in T1 (0.95±0.05) and T2 (0.90±0.10) had no
126 significant difference ($P > 0.05$). The back weight of the birds fed with 5% (0.19±0.01) while
127 the birds with 7.5% (0.18±0.02), 2.5% (0.16±0.01) and 0% (0.14±0.02), respectively, with no
128 significant difference ($P > 0.05$). The organ weight of spleen fed with 7.5% (3.00±0.10) and
129 the birds with 5% (2.00±0.10), and 2.5% (2.00±0.10) had similar weight while the birds with
130 0% (1.50±0.50), respectively. The organ weight of gizzard fed with 5% (43.50±4.50) while
131 the birds with 7.5% (42.50±1.50), 2.5% (40.00±1.00) and 0% (31.00±2.00), respectively, but
132 had no significant difference ($P > 0.05$). The organ weight of liver fed with 7.5% (43.00±4.00)
133 while the birds with 3.5% (33.50±1.50), 0% (33.50±0.50) and 5% (33.00±6.00), respectively,
134 had no significant difference ($P > 0.05$). The organ weight of heart fed with 7.5% (11.00±2.00)
135 while the birds with 5% (9.50±1.50), 2.5% (9.50±1.50) are similar, and 0% (9.00±1.00) had
136 no significant difference ($P > 0.05$). The organ weight of lungs fed with 0% (13.50±1.50), 5%
137 (10.50±1.50), 2.5% (9.50±0.50) and 7.5% (8.50±0.50), respectively with no significant
138 difference ($P > 0.05$). The organ weight of abdominal fat fed with 0% is 18.50±12.50 while the
139 birds with 7.5% (12.00±6.00), 2.5% (12.00±5.00) and 5% (11.50±3.50), with no significant
140 difference ($P > 0.05$) respectively.

141 Table 3. Growth performance of broiler chickens fed graded levels of roasted *Canarium*
142 *schweifurthii* seed meal.

Parameters	T1	T2	T3	T4
Live weight (kg)	1.83±0.02	1.78 ±0.03	1.76±0.06	1.68±0.03

Carcass weight (kg)	1.70±0.10	1.68± 0.03	1.65±0.05	1.55±0.05
Carcass Component % of live weight				
Dressing %	1.30±0.01	1.25±0.05	1.18±0.03	1.13±0.03
Breast(kg)	0.28±0.02	0.35±0.05	0.38±0.02	0.29±0.02
Thigh(kg)	0.16±0.01	0.18±0.03	0.16±0.01	0.18±0.03
Drumstick(kg)	0.15±0.01	0.15±0.01	0.15±0.02	0.14±0.01
Wings(kg)	0.12±0.01	0.13±0.03	0.13±0.03	1.15±0.01
Neck(kg)	0.90±0.10	0.95±0.05	1.00±0.10	1.00±0.20
Back(kg)	0.16±0.01	0.14±0.02	0.19±0.01	0.18±0.02
Internal organs giblet				
Spleen(g)	2.00±1.10	1.50±0.50	2.00±0.10	3.00±0.10
Gizzard(g)	40.00±1.00	31.00±2.00	43.50±4.50	42.50±1.50
Liver(g)	33.50±1.50	33.50±0.50	33.00±6.00	34.00±4.00
Heart(g)	9.00±1.00	9.50±1.50	9.50±1.50	11.00±2.00
Lungs(g)	9.50±1.50	13.50±1.50	10.50±1.50	8.50±0.50
Abdominal fat(g)	12.00±5.00	18.50±12.5	11.50±3.50	12.00±6.00

143 Mean ± SEM, abc means on the same line with different superscripts are significantly
 144 different (p<0.05)
 145

146 4. CONCLUSION

147 Roasted *Canarium schweinfurthii* (Atili) seed meal inclusion in the diet of broilers at 5% has
 148 no detrimental effect on performance of the birds and the carcass characteristics were not
 149 significantly different across the treatments. The seeds are readily available and of no value
 150 to man, hence can serve as a cheap non-conventional feed ingredient in the diets of broiler
 151 chickens.
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