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Influence of Boiled *Cassia Tora* Seed Meal on Carcass and Internal Organs Characteristics of Starter Broiler Chickens

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ABSTRACT: An experiment was conducted to evaluate the effect of 30 minutes boiled *Cassia tora* seed meal in starter broiler chicken diets on carcass and internal organs characteristics, using one hundred and twenty day-old Hubbard broiler chicks. Five starter broiler chicken diets were formulated such that 30 minutes of boiled *Cassia tora* seed meal were included at 0%, 5%, 10%, 15% and 20% designated as treatments T_1, T_2, T_3, T_4 and T_5 respectively. The chicks were randomly divided into five groups of twenty-four (24) chicks each and allocated to the five dietary treatments replicated three times with 8 birds per replicate in a Completely Randomized Design (CRD). The parameters measured were live weight; dressed weight, carcass weight and internal organs weights. Feed and water were given *ad libitum* throughout the 28 days of the research period. The results showed that all the carcass characteristics parameters measured were not significantly different (P>0.05) across treatment means except for wings which had values ranging from 10.32kg for T_1 to 8.93kg for T_2. Live weights were 1165.00kg, 1298.67kg, 1206.60kg, 1158.67kg and 1006.33 kg for birds fed diets T_1, T_2, T_3, T_4 and T_5. The dressed weights were 1084.67kg, 1194.67kg, 1108.00kg, 1078.00g and 936.00kg for birds fed T_1, T_2, T_3, T_4 and T_5 diets. The values obtained from the dressing percentage were 93.13%, 91.90%, 91.70%, 93.06% and 92.96% for birds fed T_1, T_2, T_3, T_4 and T_5 respectively. The result of breast weight numerically showed that birds fed T_5 diet had the least value of 21.35kg while birds fed T_2 had the highest value 24.57kg.Thigh weight showed that birds fed T_5 diet recorded 11.05kgas the lowest value and T_2which was 12.24kg as the highest value. Drumstick evaluation showed birds fed T_5 as the poorest performed and T_4 as the best performed and the back cut values showed T_1 as the poorest performed with a weight of 14.12kg and T_4 as the best performed with the weight of 15.55kg. Small intestine, large intestine, proventriculus and pancreas had significant differences (P<0.05) among the treatments while supplementing 30 minutes of boiled CTSM in broiler feed at 5% to 20 % inclusion levels had no significant difference (P>0.05):on the heart, liver, kidney, lungs, spleen, empty gizzard and gall bladder across the respective treatments. It was concluded from the results obtained that 30 minutes of boiled *Cassia tora* seed meal (BCTSM) could be included up to 20% in broiler starter chicken diets without any adverse effects on the carcass and internal organs characteristics.

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KEYWORDS: *Cassia tora*, broiler chickens, carcass characteristics, internal organs parameters

INTRODUCTION

High cost of conventional feedstuffs, most especially protein and energy sources, has been one of the major challenges of intensive poultry production in developing countries (Ani, 2008). A possible solution to the escalating cost of these ingredients is to explore the potentials of alternative feedstuff as part of replacement for the expensive conventional feed ingredient. Non-conventional feed resources (NCFR) generally referred to all those feeds that have not been traditionally used in the production of livestock feed (Madu *et al.*, 2003). In composite broiler rearing, providing alternative novel, high quality, cheap and readily available feedstuff has become an important requisite as it helps to increase production. When it comes to adding novel feedstuff, there are different types of feedstuff which are of animal or plant origin. However, in order to achieve rich and highly nutritious feed for starter broiler birds

in cost effective way, *Cassia tora* stays a promising option. According to Assam *et al*, (2017), the results of the proximate analysis of *C. tora* are dry matter 88.50, crude protein 9.63, ether extract 2.00, crude fiber 10.00, ash 5.00 and Nitrogen free extract 73.37. Assam *et al, (*2017) further reported that raw seeds of *Cassia tora* are a valuable non-conventional energy feedstuff, which could be incorporated in broiler feeds even in starter diets at 5.0% level inclusion. Assam *et al.,* (2017) also reported that the raw seeds contain anti-nutrients, hence the need for processing.

MATERIALS AND METHODS

Matured *Cassia tora* seeds were obtained from Bauchi state, Nigeria. The seeds were boiled according to the procedures of Ukachukwu and Obioha (1997) reported by Assam *et al* (2017). Water was brought to boil and raw seeds added and allowed for 30 minutes. At the end of the boiling period, water was drained off and the seeds were dried in the sun for a period of three days until the seed turned coffee brown and became crispy to feel in the palm. The seeds were ground and use in formulating diets for the birds. Five experimental starter broiler chickens diets were formulated with different inclusion levels of boiled *Cassia tora* seed meal (BCTSM) which were 0%, 5%, 10%, 15% and 20% designated as T_1, T_2, T_3, T_4 and T_5. Other feed ingredients included; yellow maize, Soybean, palm kernel meal, fish meal, bone meal, salt lysine, methionine, vitamin and mineral premix. The composition of the experiment diets are presented in Table 1 below.

Table 1: Ingredients of Experimental Starter Broiler Chickens Diet

Parameters (%)	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)	T5 (20%)
Maize (9%CP)	49.35	44.97	40.59	36.16	31.76
BCTSM (12.70%CP)	0.00	5.00	10.00	15.00	20.00
Soybean meal (44%CP)	33.65	33.03	32.41	31.84	31.24
Fish meal (63%CP)	3.00	3.00	3.00	3.00	3.00
Palm kernel cake (18%CP)	10.00	10.00	10.00	10.00	10.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt (NaCl)	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Vitamins/TM premix*	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated nutrients					
Crude protein	22.93	22.90	22.87	22.85	22.83
ME (Kcal/kg)	2999	2833	2667	2301	2335

*Premix supplied per kg diet: Vitamin A 15, 000 I. U, vitamin D3 1300 out, thiamine 2mg, Riboflavin mg. Pyridoxine 4mg, Niacin 40mg, Cobalamine 0.05g, Biotin 0.08mg, Chlorine chloride 0.05g, Manganese 0.096g, Zinc 0.06g, Iron 0.024g, Copper 0.006g, Iodine 0.014g, Selenium 0.24mg, Cobalt 0.024m, and Antioxidant 0.0125g, BCTSM=Boiled *Cassia tora* seed meal, NFE =Nitrogen free extract.

The statistical model is given as:

$Y_{ij}= \mu+T_1+\sum_{ij}$

Where: Y_{ij}=Response to variables of the observation on the jth treatment

μ = Mean of the common effect of the whole experiment

T_1= Effect of the jth treatment

$\sum_{ij}$ = Random error present in the observation and the treatment

Proximate composition of the 30 minutes boiled *C. tora* was according to A.O.A.C. (2000). Data collected were subjected to Analysis of Variance (ANOVA), as described by Steel and Torrie (1980) and significant means were separated by Duncan's Multiple Range Test using SPSS (Soft Package for Social Sciences) statistics software version 25.

RESULTS AND DISCUSSION

Chemical Composition of 30 minutes boiled *Cassia tora* seed meal

The results of the proximate composition of boiled Cassia *tora* seed meal is presented in Table 2. The results showed that it contains 97.55% dry matter, 12.70% crude protein, 3.77% crude fiber, 9.33% ether extract, 3.33% ash, 2.45% moisture, 70.87% nitrogen free extract and 418.25 kcal/g energy. The crude protein value of boiled (CTSM) was higher than 9.63 % reported by Assam *et al.* (2017) for raw *Cassia tora* seed, but lower than 15.52 -20.74% reported for its close relative, *Cassia hirsuta* (Vadivel and Janardhanan, 2000) and another Nigerian legume, *Afzelia africana*, the difference could be due to the detoxification and the difference in variety respectively. The dry matter value of boiled (CTSM) was similar to values obtained for most raw seeds of legumes like *Milletia obanensis, Lablab purpuresus* and *Phaseolus aureus* (Umoren *et al*., 2005 and Osman, 2007) but was higher than 88.50% obtained by Assam *et al*, (2017). This will reduce the cost of handling and ensure long term storage. Crude fiber of boiled (CTSM) value was lower than 10.00% reported by Assam *et al* in the raw seed and 19.25% reported by Odura *et al*. (2008). The ether extract value of boiled (CTSM) was higher than 2.00 reported by Assam *et al*. (2017) for the raw seeds and 3.77-7.04% reported for *Cassia hirsuta, Milletia obanensis, Milletia utilis* and other African bean seeds and could be attributed to genetic differences as they affect the composition of seeds. High ether extract value of feed material contributes to high energy content of such feed. The energy value of boiled (CTSM) was higher than 3594kcal/kg reported by Assam et al but lower than 566.58 - 426.43 and 560-580kcal/kg reported for *Afzelia Africana* and other legumes (Maduibuike,1997) and that reported for maize (Aduku, 1993). This could be due to the high ether extract value which is one of the major contributors to the energy value of feeds beside nitrogen +free extract.

Table 2: Proximate Composition of 30 minutes boiled *Cassia tora* seed meal (% of DM)

Proximate Composition	(%)
Dry matter	97.55
Crude protein	12.70
Ether extract	9.33
Crude fiber	3.77
Ash	3.33
Nitrogen free extract	70.87
Moisture	2.45
Energy	418.25kcal/kg

CARCASS AND INTERNAL ORGANS CHARACTERISTICS OF BROILER STARTER CHICKENS FED 30 MINUTES BOILED *CASSIA TORA* SEED MEAL

The results of the cut parts of starter broiler chickens fed 30 minutes of boiled *Cassia tora* seed meal in their diet is presented in Table 4.1. It was observed that, live weight, dressed weight and dressing percentage were not significantly ($P<0.05$) different across the treatment groups. The result agreed with the findings of Assam *et al.,* (2017) in their work on nutritional evaluation of sickle pod (*Cassia tora)* seed meal in broiler diets, who reported no significant difference ($P>0.05$) in their control (0%), 2.5% and 5.0% live weight at starter and finisher phases. This could be attributed to the absence of anti-nutritional factors in boiled *Cassia tora* seed meal. It also agreed with the report of Yakubu *et al.,* (2017) who observed no significant difference in carcass characteristics when they fed *Cassia obtusifolia* leaf meal to broiler chickens.

The dressing percentage however ranged from 91.90 – 93.13% and is contrary to the range of 67.32 – 71.59% reported by Onunkwo and George (2015) in their research on effects of *Moringa Oleifera* meal on the growth performance and carcass characteristics of broiler birds. There was no significant difference ($P<0.05$) in breast cut, thigh, drumstick and back cut across treatment means. This is in agreement with the report of Infante-Rodrigues *et al*., (2016) in their research on effect of diets with different energy concentrations on growth performance, carcass characteristics and meat chemical composition of broiler chickens in dry tropics due to enhanced feed conversion efficiency of broiler chickens. However, the result on cut parts revealed that the dietary treatment had a significant effect ($P>0.05$) on wings and intestine which ranges from 8.93 -10.32 and 5.62 – 8.35, respectively. According to Smith and Annison (1996), this may be due to the increase in its absorptive area. It is well known that the birds intestine responds to the stresses caused by the presence of fibrous substance in the diet in terms of length, weight, absorptive area and the rate of turnover of enterocytes, and this also agrees with the report of Brenes *et al., (*1993) who found that feeding diets based on viscous grains resulted in significant increases in the relative size of the digestive tract of broiler chickens.

CONCLUSION/RECOMMENDATION

It could be concluded from the results of this study, that 30 minutes boiled *Cassia tora* seed meal can be included up to 20% inclusion level in broiler chicken diet without adverse effect on the carcass and internal organs characteristics. It is therefore recommended that livestock farmers can include up to 20% of 30 minutes boiled *Cassia tora* seed meal in their starter broiler diets for optimum results.

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