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## Chemical composition of differently processed *cajanus cajan* seed meal and its effect on growth performance of broiler starter chicks

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**ABSTRACT:** A study was conducted to assess the chemical composition of differently processed *Cajanus cajan* seed meal (CCSM) and the effect on growth performance of broiler starter chicks for 42 days. One hundred day-old Anak were group into five dietary treatments (control, raw, toasted, cooked and soaked CCSM diets) at 20 birds per treatment in two replicates. Each proximate analysis revealed that Crude Protein, Ash, Crude Fibre of cooked and toasted CCSM were lower and the ether extract and Nitrogen free extract higher than in raw CCSM. The cooked CCSM diet was similar ( $P > 0.05$ ) but better than the control diet in growth performance, feed intake, feed conversion ratio, and protein efficiency ratio, while toasted CCSDM diet was inferior ( $P < 0.05$ ) to raw CCSM diet. The conclusion is that boiling and soaking *Cajanus cajan* seeds improves the feeding value of CCSM for broiler chicks than using the raw or toasted seeds in CCSM.

**Keywords:** *Cajanus cajan*, Broiler starter, Growth performance, Feed intake.

### Introduction

The level of animal protein in most developing countries of the world, including Nigeria, has remained a major human nutritional problem. Amaefule and Obioha (2001) had identified exorbitant prices of commercial poultry feeds, arising mainly from high cost of conventional feed stuffs (maize, soyabean meal, groundnut cake and fish meal) as the major to constraint towards increased animal protein supply. It is imperative therefore, to look inwards for alternatives cheaper sources of feed ingredients to enable the average Nigerian have easy access to poultry meat and egg.

*Cajanus cajan* (Pigeon pea) seeds are one of the non-conventional feed stuffs that is being developed as an alternative to conventional feeds in pullet (Amaefule and Onwudike, 2000, Amaefule and Obioha, 2001; Amaefule and Obioha, 1998) have also reported that pullet chicks could be fed 10% raw, toasted, cooked or soaked CCSM in the diet, without adverse effect on the performance of the pullets. Raw *Cajanus cajan* seeds contain 26.25% crude protein; (Amaefule and Obioha, 1998), 11.10 MJ kg<sup>-1</sup> ME (Nwokolo, 1987), 7 – 10% crude fibre (Borget, 1992).

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Cooking and soaking of raw *Cajanus cajan* seeds in water have been reported to improve its crude protein contents (D' Mello, 1995) while toasting the seeds reduced the CP and ether extract contents due to vitalization during dry heat application (Amaefule and Obioha, 2001), however, formulation of feed with *Cajanus cajan* seed meal for broiler chicks have not been fully worked out. Secondary, there is no published information on the use of *Cajanus cajan* seed meal for broiler chicks. It may be necessary therefore, to assesses the chemical composition and growth performance of broiler chicks fed different processed *Cajanus cajan* seed meal diets.

## **Materials and Methods**

### *Study Site*

The study was conducted in the poultry unit of the Delta State Polytechnic, Ozoro Livestock Research Farm. The farm is located within the Polytechnic, which is on Latitude 5° 30' and 5° 45'N and Longitude 5° 40' and 6°E of the Greenwich meridian. The area has an annual rainfall of between 2500-3000mm and mean temperature at the poultry unit was 27.4°C with range of 25°C to 30°C all through the period of the study.

### *Processing of Seeds*

The three processing methods for the Pigeon Pea (*Cajanus cajan*) were boiling in water, toasting and soaking in water. Raw seeds were put into boiling water, boiled for 30 minutes and sun dried before milling. Toasting the raw seeds was for 30 minutes with a frying pan normally used in frying local tapioca. After toasting, the seeds were poured out on a clean-cemented floor and allowed to cool. Soaking of raw seeds in water was for 24 hours in a 200 litre capacity plastic container. The seed: Water ratio was 30kg: 100 litres. After 24 hours, the seeds were removed from the container with a basket and sun dried. Unprocessed (raw) seeds were milled with the coat and used to formulate one of the diets. The pigeon pea seeds were milled with a local grinding mill by powered by a 2.0hp diesel lister engine.

### *Experimental Diets*

Commercial broiler starter (vital products) calculated composition of the mash was 16.20% crude protein and 2606 kcal/kg ME. 25% (6.25kg), of raw, boiled, toasted or soaked *Cajanus cajan* seed meal (CCSM) each was included into a bag of broiler starter after 25% (6.25kg) mash was removed from each bag.

### *Animals, Feeding, Housing and Management*

A total of hundred (100) broiler birds of commercial Anak breeds of day-old chicks. The experiment lasted for six weeks. Chicks in each replicate were brooded in a deep litter (wood shavings) pen in an open-sided poultry house whose sides and demarcations between pens were covered with wire-gauze measuring 3m X 1.5m each. Heat was provided with kerosine, stoves and sometimes electric light under galvanized metal hoods. Feed and water were provided to the birds *ad libitum* while additional light was supplied at night using kerosine lanterns. The open sides of the poultry house were covered with black tarpulin cloth during the brooding (1-5 weeks) period to conserve heat and prevent draught. The birds were vaccinated against Newcastle disease at day-old and at the 4 weeks (Lasota). Gumboro disease vaccine was given at the 9 and 21days, while broad spectrum antibiotics and coccidiostat were administered to the chicks between the ages of 2-3 weeks and 5-6 weeks.

### *Experimental design and Data Collection*

The experimental design was a completely randomized design (CRD). There were 20 birds per treatment and two replicates of 10 birds per replicate. Feed consumption was determined by subtracting the quantity of feed left over from the total quantity offered on weekly basis. The birds were weighed as replicate groups and the group weight was divided by the number of birds to obtain the average live weight per bird. Weighing of the bird was at the beginning of the experiment and subsequently on a weekly basis usually in the morning (8.00-9.00am) hours when the birds had empty crops. Weight gain was calculated as final weight minus initial weight, feed conversion ratio (FCR) as feed intake divided by weight gain, and protein efficiency ratio (PER) as protein intake divided by weight gain, feed cost per kg weight gain was calculated as FCR X cost per kg feed

### *Chemical and Data Analysis*

Feed and CCSM samples were analyzed for proximate composition according to methods of AOAC (1990). The gross energy of CCSM and diets were determined using an Adiabatic oxygen Bomb calorimeter (1241) Adiabatic calorimeter, PARR instrument Co; Illinois, (USA). All data collected were subjected to analysis of variance (ANOVA) and differences between treatment means were determined using Duncan's New Multiple Range Test (Duncan 1955). All statistical procedures were according to Steel and Torrie (1980).

## **Results and Discussion**

The result of the proximate composition of *Cajanus cajan* seed meal (CCSM) is presented in Table 1. The Dry matter (DM) value of (89.3%) obtained for Boiled was slightly higher than the value for toasted (88.2%), Soaked (87.5%) and raw (86.5%). The DM obtained by Amaefule and Obioha, (1998). The crude protein value of toasted (21.90%), Boiled (25.7%) and raw (24.5%). The reduction in the CP and ether extract of the toasted CCSM may have been due to loss of water, nitrogen and volatilization during dry heat application (Amaefule and Obioha, 1998) The effect of processing in the proximate composition of the raw and processed CCSM.

The results obtained showed no significant differences ( $P>0.05$ ) between broiler chicks fed the CCSM diet or control in all parameters measured (Table 2). However, chicks fed boiled CCSM diet attained the lowest final live weight (Figure 1) and daily weight gain at the end of 6 weeks of age (Figure 2). The boiled CCSM also had the highest feed conversion ratio (FCR), While chicks feed raw CCSM diet attained the highest final live weight and weekly weight gain (Figures 1 and 2) and also the highest mortality. Daily feed intake of the chicks (Figure 3) followed almost the same trends as weekly weight gain (Figure 2) especially the 5<sup>th</sup> week of age.

The inclusion of 25% raw, boiled, toasted or soaked *Cajanus cajan* seed meals (CCSM) in chick diet from day-old supported chick growth and development. The rate of growth and development obtained with this CCSM diets was not inferior to that obtained with the control diet. This result revealed that the response of broiler chicks to CCSM diets could be different from that of pullets, a situation that could be attributed to differences in genetic make up (Amaefule and Obioha, 1998).

The feeding raw or processed CCSM diets to broiler chicks did not show any difference (unanalyzed in kg ) Feed cost (Table 3) between the CCSM diets and control diet. Indeed, the difference between the cheapest CCSM diets (raw and soaked) and the control was only ₦ 1.25 per kg. However, chicks feed the control diets had a significantly higher ( $p< 0.05$ ) total feed cost per bird than the chicks fed raw, boiled or soaked CCSM diets. Cost per kg weight gain was not significantly different ( $P>0.05$ ) among the chicks fed the various CCSM and control diets.

### *Conclusion*

Processing of *Cajanus cajan* seed significantly improved CCSM utilization and CP retention of the broiler chicks, especially boiled and toasted CCSM. Broiler Chicks could be fed 25% CCSM in the diet as raw, toasted, boiled or soaked CCSM without any adverse effect on the performance of the broiler chicks.

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## References

- Amaefule K.U. and Obioha F.C. (1998) The substitution of Pigeon pea seed (*Cajanus cajan*) for groundnut cake and maize in broiler finisher ration. *Ring. J. Anim. Prod.* 25:9-12
- Amaefule K.U. and Obioha F.C (2001) Performance and nutrient utilization of broiler starters feed diet containing raw, boiled or dehulled pigeon pea seeds *Nig. J. Anim Prod.* 28:31-39
- Amaefule K.U. and Onwudike O.C (2000) Comparative evaluation of the processing methods of pigeon pea seeds (*Cajanus cajan*) as protein sources of broilers. *Journal of sustainable Agriculture and the Environment* 1:134-136.
- AOAC (1990) Official methods of Analysis Association of official Analytical Chemists, Washington D.C . U.S.A.
- Borget M. (1992) Food legumes, Macmillain Press Ltd London.
- D'Mellon JPF (1995) Anti-nutritional substances in legume seeds in D' Mellon JPF and Devendra C Editors) tropical legumes in animal nutrition CAB international walling ford, UK.
- Duncan, D.B. (1955) Multiple range and multiple test. *Biometrics* 11: 1-42.