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Proximate Composition of *Aframomum melegueta* Seeds, *Garcinia kola* Seeds and Growth Performance of Broiler Chicks Treated with Powders from These Seeds

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Abstract: This study was designed to evaluate the nutritive value of powdered seeds of two important medicinal plants in West Africa. The proximate analysis of these two set of seeds were carried out prior to bird's treatment so as to throw more light on their nutritional potential. A total of 18 broiler chicks of Anak 2000 strain were used in this study. Treatment one (control) received 0% inclusion of these seeds whereas treatment two and three received 10% *Aframomum melegueta* and *Garcinia kola* seeds respectively. The treatment was terminated after 5 weeks and live body mass of birds taken. The result obtained showed a non-significant ($p>0.05$) reduction in the body mass of broiler chicks reflecting their poor proximate composition. This finding may be an indication that these seeds should not be used as non-conventional feed source for poultry production. It however lends credence to their medicinal uses without compromising the body mass of birds.

Key words: Proximate composition, *A. melegueta*, *G. kola*, growth performance, broilers

INTRODUCTION

Aframomum melegueta and *Garcinia kola* seeds are reputable for their medicinal values (Okwu, 2005). Both have antibacterial as well as anti-inflammatory properties.

Aframomum melegueta (Alligator pepper) seeds are spicy seeds obtained from *Aframomum melegueta* plant commonly grown in rain forest zone of West Africa (Cheryl, 2007). It is a plant with both nutritive and medicinal values (Agoha, 1974). It is an aromatic plant cultivated for its spicy fruit (Iwu, 1993). This seeds has been used medicinally for treatment of measles, leprosy (Iwu, 1993), as purgative, galactogogue, anthelmintic and haemostatic agent (Tane *et al*., 2006). The seeds are used for treatment of dysmenorrhea broncho-pulmonary disorders, sexual asthenia, female sterility, hay fever, migraines and wound. The cytoprotective, antinuclear, antimicrobial and analgesic properties have been reported (Umukoro and Ashoro, 2001). *Garcinia kola* (bitter kola) are obtained from the fruit which are obtained from the plant commonly grown in southern Nigeria. A great number of these plants are traditionally noted for their medicinal and pesticide properties (Okwu, 2003). The major active constituents (alkaloids and flavonoids) stimulate an increase in gastric acid secretion (Oluwole and Obtatomi, 1991), exhibit antihepatotoxic effects (Iwu *et al*., 1990; Akintonwa and Essien, 1990; Braide, 1991; Adegoke *et al*., 1988; Adaramoye and Akinloye, 2000). Antidiabetic effect (Iwu, 1985) and antipyretic and antiinflamatory (Braide, 1993) have been reported. These plants have wide range of medicinal values but their nutritional values in poultry production have not been explored. There is generally dearth of information on medicinal values and specifically in broiler production.

The proximate analysis of the seeds of these plants and attendant effect on growth performance of broiler chicks fed with the powdered seeds of these plants will throw more light on their nutritional values.

This study is therefore carried out to determine the proximate composition as well as evaluating the effects of feeding 10% of *Aframomum melegueta* and *Garcinia kola* seeds to broiler chicks.

MATERIALS AND METHODS

Seeds procurement and preparation. Five (500 g) hundred grams each of *Aframomum melegueta* and *Garcinia* kola seeds were purchased from Apiapum market in Obubra Local Government Area of Cross River State. One hundred gram of each sample was taken for dry matter determination while the remaining sample were dried at 60°C for 24 h in a Gallen kamp oven USA grade. The seeds of *Aframomum melegueta* were ground to powder in a motor powered milling machine and stored in a 500 milliliters conical flask which was tightly covered to prevent air penetration. *Garcinia kola* seeds were sun dried for 48 h and the testa removed before milling.

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Preparation of seed diet: Ten percent (10%) of both seed's powder were mixed separately with 90% vital grower's mash and used to feed the birds in this experiment.

Proximate analysis (Adapted from AOAC, 1990): Fifty (50 g) grams of seeds of *Aframomum melegueta* was dried in an oven in a controlled temperature of 80°C for 4 days. The loss in weight due to loss of moisture is calculated as percentage of original weight of sample before oven drying. This gives the percentage moisture content of the sample. The same procedure was adopted to determine the percentage moisture content of *Garcinia kola* seeds.

The percentage crude ash was determined by igniting 50 g of milled *Aframomum meleguata* seed in a crucible inside a muffled furnace having a temperature of 600°C. The ashing was terminated on formation of the while ash from the sample. The ash formed was cooled in a desiccator and weighed. The weight after ashing is expressed as percentage of sample before ashing and this gives the percentage crude ash of the sample. The same procedure was repeated to determine the percentage crude ash in *Garcinia kola* seeds. The crude protein content of both seeds was estimated by kjeldahl method. Five (5 g) grams of each sample was digested with concentrated tetraoxosulphate vi acid using lithium tetraoxosulphate vi as catalyst. This helped to oxidize the organic matter and nitrogen present in the form of ammonium tetraoxosulphate vi $(NH_4)_2 SO_4$ were distilled with the aid of excess caustic soda (NaOH) during which ammonia (NH_3) was released. The ammonia released was allowed to react with 0.1 MHCl in the presence of methylred and bromo-cresol green indicator. The percentage crude protein was estimated by multiplying the titre with 6.25 and expressed as percentage of weight of sample before digestion.

The ether extract or crude lipid content of these seeds was determined using soxhlet extractor. Five (5 g) grams of the powdered sample each was weighed and placed into a dry soxhlet thimble suspended in a beaker. The beaker was placed in soxhlet condenser attached to a flask containing sufficient ether to fill the thimble. Heat was supplied to the flask by means of electric hot plate so as to keep the ether gently boiling. The ether vapour passes up the side tube of the extractor to the reflux condenser where it is condensed and returned back into the sample in a thimble. When the thimble is practically full, the ether is returned back into the flask by an automatic siphoning device carrying with it some of the fat from the sample. The siphoning process was terminated after the 24th time just before the next lot of ether entered the point of siphoning over. The flask was dried up in the air and the fat washed out of the soxhlet flask by chloroform. This was dried and weighed again. The percentage crude lipid was estimated by expressing the weight of lipid as percentage of sample weight before extraction.

The crude fibre (structural carbohydrate) was determined in both samples by defatting 20 g of powdered seed with petroleum ether. The sample was boiled first with 1.25% dilute tetraoxosulphate vi acid and washed with distilled water. The same sample was again boiled with 1.25% potassium hydroxide (KOH) with each boiling lasting for 30 min. The insoluble residue was separated by filtration, washed, dried, weighed and ashed. The loss of weigh resulting from ashing was expressed as percentage of sample weight before ashing. The Nitrogen Free Extract (NFE) was determined by subtracting the sum of different proximate fraction from one hundred percent.

Broiler chicks procurement and feeding trials: A total of 18 broiler chicks of Anak 2000 strain was purchased from Atu street Calabar in Cross River State of Nigeria. The chicks were brooded for 14 days and there after assigned into three treatment groups of six broiler chicks each. Each bird in every treatment was identified with a tag. Treatment one (control) received basal feed (vital growers mash) only containing 89.59% dry matter, 10% crude protein, 7% crude fibre, 7.20% ether extract, 1.2% crude ash, Nitrogen free extract 64.10% and (2800 kcal/g) metabolizable energy. Treatment groups two and three received 10% of *Aframomum meleguata* and *Garcinia kola* seeds respectively mixed with 90% basal feed. The feeding trials lasted for 5 weeks with the weekly live body mass determined by use of 5 kg standard loading balance. The mean weekly body mass of the birds were recorded for statistical evaluation.

Statistical analysis: The data collected were subjected to analysis of variance for evaluation and significant mean differences separated by Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The result of proximate analysis of the feed samples was presented in Table 1. There was generally low percentage proximate fractions of *Garcinia kola* seeds in terms of crude protein, crude fiber, either extract relative to control (basal feed). This same trend applies when *Aframomum melegueta* seeds were compared with the control treatment. *Aframomum melegueta* seed proximate analysis revealed a general decrease in crude protein. 4.81%, ether extract 6.17% and an increase in Nitrogen Free Extract (NFE) 72.53% relative to control with crude protein 10.0%, ether extract 7.20 and NFE 64.10%. The high content of NFE proximate fraction in *Aframomum* and *Garcinia kola* seeds is a reflection of their low content of crude protein, ether extract and crude fiber and hence their poor nutritional potential (Ibekwe *et al*., 2007). The low levels of crude

Table 1: Proximate composition of feedstuff (%)

Proximate composition (%)	Treatment groups		
	Basal feed	*A. melegueta*	*G. kola*
Moisture content	10.50	3.37	14.50
Crude protein	10.00	4.81	0.58
Crude fiber	7.00	13.88	0.10
Ether extract	7.20	6.17	3.00
Crude Ash	1.20	2.61	5.00
Nitrogen free extract	64.10	72.53	72.72

Values obtained from means of 3 determinations

Table 2: Mean final live body mass of birds (kg)

Individual tagged birds	% inclusion level of feeding materials		
	0% (control)	10% (*A. melegueta*)	10% (*G. kola*)
1	2.6	2.0	2.3
2	2.4	2.5	2.4
3	2.4	1.9	2.1
4	2.0	1.8	2.0
5	2.3	2.0	2.1
6	1.9	2.1	1.8
Mean	2.27±0.26^{c}	2.05±0.27^{c}	2.12±0.23^{c}

Means on the same row with different super-scripts are significantly ($p<0.05$) different

protein, crude fiber and ether extract (indices of nutritional value) in *Garcinia kola* seeds lends credence to their being used as anti-obese agent (Iwu *et al*., 1990). This was further supported by the finding of Noboru (2001) who reported anti adipogenic effect of *Garcinia kola* seed extract which inhibits the accumulation of lipid droplets in fat cells.

The nutritional evaluation of these medicinal plants was backed up by feeding trial conducted in this study. The result presented in Table 2 showed the mean live body mass of broiler chicks fed with 10% *Aframomum melegueta* and *Garcinia kola* seed powder. The result obtained showed a non-significant ($p>0.05$) difference in live body mass of broiler chicks relative to control group. Although there was no statistically significant ($p>0.05$) difference in the live body mass of broiler chicks fed with 10% *Aframomum melegueta* and *Garcinia kola* seed powder, yet there was slight decrease in live body mass of broiler chicks fed with these seeds. This finding was backed up by Braide and Grill (1990) who reported massive erosions of intestinal mucosa and Udoh (1998) who reported testicular degeneration of rats exposed to chronic ingestion of *Garcinia kola* seeds and *Piper guinense* leaves. This was further supported by the report of Uko *et al*. (2001) on depressive effect of *Garcinia kola* on appetite and water intake of rats administered with 220 mg/ml of *Garcinia kola* seed extract. This finding is in consonance with the report of Ibekwe *et al*. (2007) on reduction in organ weight of wistar male albino rats fed with *Garcinia kola* diet. Ibekwe *et al*. (2009) further reported a decrease in body mass of broiler chicks challenged with graded does of aqueous extract of *Garcinia kola* seeds.

Another plausible explanation for this slight decrease in live body mass of broiler chicks in this study may be due to the presence of unidentified inhibitors of digestive or metabolic processes (Gerspacio, 1978). Garcinia kola as well as *Aframomum melegueta* seed contains tannins (Etkin, 1981; Okwu, 2005) which may likely contribute to poor nutritional potential of these seeds. Ebana *et al*. (1991) reported the presence of cardiac glycoside in *Garcinia kola*. Tannins and glycosides when hydrolysed bind to almost any available protein making this nitrogenous sources indigestible or unpalatable to animals maintained on them (Peter and Richard, 1999). One may be right to suggest that these anti-nutritional factors in the seeds under study delimit their nutritional values.

However, the non-significant decrease in live body mass of broiler chicks in this study presumes that there numerous medicinal benefits could be tapped from without compromising the body mass seeing that broiler enterprise is for meat production.

Conclusion: The result of proximate analysis of the seeds under study and the feeding trial point to the tact that these seeds have poor nutritional value and should not be proposed for feed replacement purposes. The levels of inclusion even for medicinal uses should not exceed 10% so as to avoid drastic reduction in live body mass of such birds.

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