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NUTRITIONAL EVALUATION OF BAOBAB (*Adansonia digitata*) SEED MEAL WITH RATS

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ABSTRACT

Twenty-one day trial was conducted to determine the nutritive value of baobab seed meal processed by soaking in cold water for twenty-four hours. Four diets were formulated. Diet 1 contain 0% baobab seed meal and Diet 2-4 contained baobab seed meal at 33.33%, 66.67% and 100% replacement levels for soybean meal. Sixteen albino rats were used in the study in which four rats were allotted to each dietary treatment. The results showed that the diets have significant effect ($P < 0.05$) on the performance characteristics. Rats fed 33.33% baobab seed meal had significantly ($P < 0.05$) better growth response with value of 64.54g for weight gain, feed conversion ratio of 0.34 and protein efficiency ratio of 0.15. Rats fed 66.67% baobab seed meal with values of 45.00g for weight gain, 0.45 for feed conversion ratio and 0.11 for protein efficiency ratio. The least performance was recorded at 100% inclusion level with rats having a weight gain of 22.00g, feed conversion ratio of 0.89 and protein efficiency ratio of 0.05. The dietary treatments had no significant effect ($P > 0.05$) on the haematological parameters. Rats fed diet 2 have higher numerical values for Hb, RBC, total protein, albumin and urea. The results indicated that soybean meal could be replaced with baobab seed meal at 33.33% level of replacement without any deleterious effect on the performance characteristics and haematological parameter of albino rats.

Keywords: Rats, Nutritional evaluation, Baobab seed

INTRODUCTION

Inadequate feed supply and nutrition has been recognized as major constraints to livestock production in Nigeria (Fagbohun,1988). Both animal and vegetable protein supplement are used as protein source in livestock rations and this include fish meal, blood meal, groundnut cake, soybean meal, cotton seed meal, etc. In Nigeria, like other developing countries of the world, protein of animal origin is quite expensive and often not within the reach of the ordinary man. Thus, efforts to alleviate the inadequacy in protein supply have been directed towards the utilization of readily available and inexpensive feed stuffs, which are plant proteins. As search for alternative source of plant protein continues due to high cost and scarcity of feed which militate against increased commercial livestock production, there is need to explore the potentials of lesser-known, ignored and under-exploited trees and shrubs that are native to Africa (Igboeli *et al.*,

1997). Baobab (*Adansonia digitata*) is widespread in Africa and its seed is one of the lesser-known, ignored and under-exploited vegetable that has high protein and caloric content (Igboeli et al., 1997). Although used in many homes in the northern part of Nigeria as a condiment, the potential of baobab seeds remain untapped. Baobab seed has been shown to contain about 30% protein (FAO/WHO, 1968).

Every part of the Baobab is reported to be useful. In the northern part of Nigeria, the leaves are used in the preparation of soup commonly called "miyan kuka" in Hausa. The seeds are used as thickening agent in soup.They may also be fermented and used as flavouring agent or they can be roasted and eaten as snacks or made into a drink. The bark which produces a strong fibre is also used in making ropes (Igboeli et al., 1997). Concotion made from the leaves, bark, roots and flowers are recommended for colic, asthma and intestinal infections (Hugues and Philippe, 1989).

The acceptability and optimal utilization of baobab seed as a protein source is limited by the presence of anti-nutrients such as protease inhibitors, tannins, phytic acid and amylase inhibitors (Igboeli et al., 1997). This study is, therefore, designed to determine the nutritional value of baobab seed meal on the performance and haematological parameters of albino rats.

MATERIALS AND METHODS

Processing of baobab seeds

The baobab seeds used for the experiment were gotten from Baobab fruits collected from trees around the premises of Forestry Research Institute of Nigeria, Jericho, Ibadan. Oyo State. The seeds were soaked in cold water for 24 hours and were later sundried and milled.

Management of experimental rats

The experiment was carried out in the Micro-livestock Unit of the College of Animal Science and Livestock Production, University of Agriculture, Abeokuta. A total of sixteen albino rats of winster strain obtained from the Rat Unit of the Department of Veterinary Physiology and Pharmacology of the University of Ibadan were used for the experiment which lasted for 21 days. Four rats on weight equalization basis were randomly allotted to each experimental diet.

The rats were housed in well ventilated individual houses while feed and water were supplied *ad libitum* . The rats were fed once daily and in the morning. Anti-stress was given for the first three days of the experiment. A good hygienic environment was maintained throughout the experimental period. Mortality, daily feed intakes and weight gain were recorded. Four experimental diets were formulated using processed baobab seed meal to replace soybean meal at 0, 33.33, 66.67 and 100% level in diets 1, 2, 3 and 4, respectively (Table 1).

Data were collected on daily feed intake, weekly weight gain and haematological parameters. All data collected was subjected to one-way analysis of variance (ANOVA) using a completely randomized design (Steel and Torrie 1980). Means that were significantly ($P < 0.05$) different were separated using the least significant difference.

RESULTS AND DISCUSSION

Table 1: Composition of experimental diets (%)

Ingredients	Levels of Inclusion			
	1	2	3	4
	0%	33.33%	66.67%	100%
Maize	35.00	35.00	35.00	35.00
Corn offal	20.00	20.00	20.00	20.00
Soybean meal	25.00	16.67	8.33	-
Baobab seed meal	-	10.50	21.50	30.50
Fish meal	2.00	2.00	2.00	2.00
Rice husk	15.50	13.33	10.67	10.00
Bone meal	1.25	1.25	1.25	1.25
Oyster shell	0.75	0.75	0.75	0.75
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Cal. M.E (MJ/g)	9.00	9.92	10.96	11.67
Determined (DM basis)				
Crude Protein %	18.75	18.43	18.23	17.65
Crude fibre %	4.96	4.75	4.54	4.33

Table 2: Proximate composition of baobab seed (undehulled %)

PARAMETERS	LEVELS
Crude Protein	32.50
Crude Fibre	5.73
Ether Extract	29.60
Ash	8.50
Moisture	9.45
NFE	14.23

Mean of three (3) readings

Table 3: Performance characteristics of rats fed experimental diets (g)

Parameters	LEVELS OF INCLUSION				SEM
	1	2	3	4	
	0%	33.33%	66.67%	100%	
Average initial weight	66.90	70.90	66.50	72.75	
Average final weight	121.50	135.44	111.50	94.75	18.33
Daily feed intake	22.34[a]	21.99[a]	20.64[b]	19.49[c]	1.14
Average weight gain	54.60[b]	64.54[a]	45.00[b]	22.00[c]	18.89
Feed conversion ratio	0.41[a]	0.34[a]	0.45[a]	0.89[b]	0.23
Protein efficiency ratio	0.13	0.15	0.11	0.05	0.06
Protein intake	4.19[b]	4.05[b]	3.76[c]	4.47[a]	0.25
Mortality (%)	0.00	0.00	0.00	0.00	0.00

a – d - Means in the same row having different superscripts are significantly different ($P < 0.05$)

Table 4: Haematological parameters of rats fed experimental diets

Parameters	LEVELS OF INCLUSION				SEM
	1	2	3	4	
	0%	33.33%	66.67%	100%	
PCV %	38.50	41.00	36.00	35.50	2.19
Hb (g/dl)	12.84	13.67	12.00	11.84	0.73
RBC (mil/mm3)	4.30	4.65	4.10	3.95	0.26
WBC (No/mm3)	6.700	6.600	6.700	7,000	150
MCV (µg)	87.57	88.20	87.80	89.95	0.90
MCH (µg)	29.86	29.40	29.27	29.99	0.30
MCHC (%)	33.35	33.34	33.33	33.35	0.01
Total Protein (mg/dl)	61.50	65.50	57.50	56.50	3.56
Albumin (mg/dl)	37/00	39.00	35.00	34.00	1.94
Urea (mg/dl)	32.50	38.00	31.50	30.50	2.90

Table 1 shows the composition of experimental diets fed to the albino rats. Diet 1 has the highest crude protein which decreases as the inclusion level of the Baobab seed meal increases

Table 3 shows the performance characteristics of rats on the various experimental treatments. The highest feed intake for the experimental period was recorded at 0% level of inclusion. Similar results were obtained for the 33.33% level of inclusion and the least were recorded at 100% level of inclusion of baobab seed meal.

There were significant differences ($P < 0.05$) in the feed intake, weight gain, feed conversion ratio and protein intake while there was no significant difference ($P > 0.05$) in the protein efficiency ratio among the various dietary treatments.

The weight gained varied with experimental diets with animals on the 33.33% level of inclusion of baobab seed meal having the highest weight gain of 64.54g while the control diet recorded the least. This is in line with what was reported by Sklan *et al* (1975) that ingestion of higher percentage of raw soybean meal diet did not affect feed intake but caused growth inhibition. The poor feed conversion ratio obtained at diet 4 (100%) might be due to anti-nutrients such as protease inhibitors, tannins, phytic and amylase inhibitors present in baobab seed (Igboeli et al, 1997) which may not have been removed considerably by the processing method employed.

Table 4 summarizes the haematological and serum parameters of the experimental animals. There were no significant differences ($P > 0.05$) among all the haematological parameters and serum metabolites with respect to treatment effect on the diet. It therefore implies that there are no appreciable diagnostic clinical changes in the blood parameters as a result of different levels of inclusion of *Adansonia digitata* seed meal in the rats' diets. The result of the experiment is in line with what was reported by Kirchgessner (1977) in his work with rats and Fagbohun (1988) that blood haemoglobin, haematocrit and erythrocyte were all positively correlated with protein quality and protein level as their value decreases with increased levels of baobab seed meals.

CONCLUSION AND RECOMMENDATION

Considering the results obtained from this experiment, it can be concluded that it is possible to include baobab seed meal as a protein source at 33.33% inclusion level
It is, therefore, recommended that baobab seed meal at 33.33% level can replace soybean meal without any deleterious effect on the growth rate of rats.

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