Cost Benefit Analysis of Broiler Chickens Fed African Locust Bean (*Parkia biglobosa*) Seeds as Affected by Different Processing

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Abstract
An experiment was conducted to determine the cost benefit analysis of broiler chickens fed differently processed African locust bean seeds (ALBS). Two hundred and fifty day seven days old Anak 2000 broiler chicks were randomly allotted to different processing methods which include raw ALBS, sprouted ALBS, salt treated ALBS, cooked ALBS and roasted ALBS. There were 50 birds per treatment replicated five times (10 birds per replicate) in a randomized completely block design (RCBD). Economic analysis was conducted based on the prevailing price of ingredients in the study area. Results showed feed cost were lower in raw ALBS (₦ 75.78) and highest in sprouted ALBS (₦/84.54). The total feed cost was highest in sprouted ALBS (₦ 412.56). The total gain was highest in salt treated ALBS (2.42kg). The cost per kg gain was lowest in salt treated ALBS (₦160.18) and highest in raw treated ALBS (₦258.96). The salt treated ALBS is the least cost ration.
Key words: African locust bean seeds, broilers, economic analysis, processing

Introduction

Parkia biglobosa known as African locust bean, a tropical tree which is native to Africa and widely is attributed in the savanna region (Adewusi, 1992). The tree is usually and carefully preserved by inhabitants of the areas where it grows because they are valuable source of reliable food, especially the seeds which serve as source of useful ingredients for consumption as Daddawa in Hausa and Iru in Yoruba (Campbell-Platt, 1980). Locust bean is a spreading tree of medium size with compound leaves and numerous leaflets. The fruit represented by bunches of pods which form the nutritive part of the plant. Each pod, which may vary between 5 and 11 inches in length, contains a yellow dry powdery pulp inside which is embedded a number of dark brown and black seed (Oyenuga, 1978). About 20% of the seeds are made up of semi liquid of which 54% of the fat is unsaturated with linoleic acid predominating, while 32% consist of palmitic acid. It is low in sulphur amino acid, methionine and Cystein and similarly low in histidine but high in lysine (Oyenuga1978; Ogundun, 2007). *Parkia biglobosa* has high protein and better amino acid profile that recommends it for use as a protein substitute for human food and animal feed (Alabi, 1993; Ekap, 2006: Obun, 2007)). However, it has some Anti-Nutritional Factors (ANFs) such as trypsin inhibitor, tannins, oxalate hydrogen cyanide, phytic acid (Alabi *et al*., 2005: Akande and Fabiyi, 2010: Ijarotimi and Keshinro, 2012)). Some of these ANFS are capable of inducing adverse effects especially in monogastric animals when consumed without adequate processing (Liener, 1980: Apata, 2003) ANFs had been reported (Akande and Fabiyi, 2010) to be eliminated/reduced to a tolerable limit application of heat, sprouting and fermentation, extrusion, salt treatment, micronising, enzyme treatment etc. This study is therefore design to determine the cost and returns of feeding different processed African locust bean seeds.

Materials and methods

Experimental site:

An Experiment was conducted at Teaching and Research Poultry Unit of School of Undergraduate Studies College of education Azare. Azare is located in Katagum Local Government Area of Bauchi State. It is located between latitudes $11^{o}30'N$ and $11^{o}45'N$ and longitude $10^{o}10'E$ and $10^{o}10'E$. It is 250km north of the capital. It covers an area of 915,045km with a population of 293,970.00 people (NPC, 2006). The mean monthly temperatures ranges from 20.10-22.50oC in December and January to 30.0 – 32.5oC in April and May. The temperature of the rainy season remains steady 25oC – 27oC for the month of June to October. The area is characterized by 5months of rainy season (April – September,) and seven months of dry season (October to March) (Bura, 2000).

Sources and processing of Ingredients:

The African locust bean seeds were purchased in Gamawa Central Market. The collected seeds were cleaned by winnowing and hand picking of stones and debris. Roasting was achieved (sand roasted) by making a bed of alluvial sand in a half drum and heating the sand to about $100^{o}C$. Sufficient quantities of the ingredients to cover two third of the area of sand will be placed on the sand. Stirring of the ingredients will be done constantly until they are roasted for the duration of twenty to thirty minutes (20-30). Roasted African locust bean seeds are produced. Cooking (boiling) of African locust bean seeds was done by bringing water in a half drum to boiling point and poured the ingredients in the boiling water for thirty minutes (30) to produced fullfat cooked African locust bean seeds bean seeds they are then sun dried for 3-4 days. Salt treatment was prepared by solution of salt was prepared by adding 3% salt of total weight of sample, dissolved in water and soaked the protein sources for twenty four hours (24 hours) they are then sun dried for 3-4 days and stored in bags. Salt treated African locust bean seeds will be produced. Sprouting of African locust bean seeds was prepared by soaking the seeds in water for twenty four hours (24). The seeds are removed and germinated by spreading the seeds on jute bags and covered them with the same material and apply water on jute bags twice daily until the seeds begin to sprout The sprouts were sun dried for 3-4 days. The different processed African locust bean seeds were used to formulate five experimental diets which are isonitrogenous and isocaloric, the composition of the experimental diets are shown in Table 1.

Experimental diets and management:

Two hundred and fifty seven (7) days old unsexed broiler chickens were randomly allotted to five experimental diets, there were fifty (50) birds per treatment replicated five times (10 birds per replicate) in a randomized completely block design (RCBD). Each replicate was housed in a floor pen measuring 2.4m2 equipped with feeders and drinkers and the floor covered with litter materials. The birds were vaccinated as when due. Economic analysis was carried out based on prevailing market price in Azare using the input output analysis according to procedures of Sonaiya *et al.* (1986).

Results and discussion:

Table 1 showed the percentage composition of the experimental diets for broiler starter and finisher, the crude protein and Metabolizable energy is adequate for broilers chickens in the tropics (Oluyemi and Roberts, 2000). Table 2 showed the cost benefit analysis of broilers fed differently processed African locust bean. The feed cost is relatively lower in raw ALBS (~~N~~

75.78) this is because no value addition is involve in the raw African locust bean seeds. The highest feed cost was observed in sprouted ALBS (₦84.54) because of the cost involves during processing. The total feed cost was relatively lower in raw ALBS because of low cost of feeds (₦ 328.88) several authors reported increase in feed cost and total feed cost as a result of processing of feed ingredients for livestock production; Maidala *et al*., 2011 on rabbits and Akintunde *et al*., 2015 on Japanese quails) Total weight gain of the birds ranged between 1.27kg in raw African locust bean seeds to 2.42kg in sprouted African locust bean seeds. Feed cost (₦/kg gain) was better in salt treated African locust bean seeds (₦ 160.18) and highest in raw African locust bean seeds (₦ 258.96). The cheapest diet was salt treated ALBS because of the low feed cost (₦ / ₦ kg gain)(₦ 160.18) Igbinosun and Robert,1988 followed by roasted ALBS (₦ 196.21) followed by sprouted ALBS (₦234.41) followed by cooked ALBS (₦249.87) and raw ALBS (₦258.96)(Table 2). The salt treated African locust bean is the least cost ration as such it is recommended to farmers for processing African locust bean seeds.

References

Adewusi, S.R.A., Orisadare, B.A. and Oke, O.L. (1992). Studies on weaning diets in Nigeria. Two protein sources. *Plant Food for Human Nutrition* **42**: 183-192.

Akande, K.E. and Fabiyi, E.F. (2010). Effect of processing methods on some Antinutritional factors in Legumes seeds for poultry feeding. *International Journal of Poultry Science* **9** (10):996-1001

Akintunde, A.R., Omage, J.J. and Bawa, G.S. (2015). Effect of Differently Processed Pigeon Pea (*Cajanus cajan*) Seeds on the Performance of Japanese Quails. Proceedings of the 40th Annual Conference of the Nigerian society for Animal Production. 15-19th March, 2015, NAPRI/ABU, Zaria. Pp 675-678

Alabi, D.A. (1993). Parkia biglobosa "An endangered species". International conference proceedings on lost crops and Trees in Africa. **3:** 265-285.

Alabi, D.A. Akinsulire, O.R Sanyaolu, M.A. (2005) Quantitative determination of chemical and nutritional Composition of Parkia biglobosa (Jacq.) Benth. *African Journal of Biotechnology*. **4**: 812-818.

Bura, A.B. (2000).The Role Small Scale Industries on Socio-economic Development of Azare Nigerian Certificate in Education Project College of Education, Azare, Bauchi State.

Campbell-Platt, G. (1980). African Locust bean (Parkia spp). And West African fermented food products, Daddawa. *Ecology of Food Nutrition* **3**:123-132

Ekap, A.S. (2006). Changes in amino acid composition of African locus beans (*Parkia biglobosa*) on cooking. *Pakistan Journal Nutrition* **5**: 245-256.

Igbinosun,J.E. and Robert, O.O. (1988).Studies on nutrition of brakish water cat fish. Effects of Processing on the nutritive quality of soya bean meal in cat fish nutrition.NIOMR Technical paper No. **1**:41

Ijarotimi, O.S., and Keshinro, O.O., (2012). Comparison between the amino acid, fatty acid, mineral and nutritional quality of raw, germinated and fermented African locust bean (*Parkia biglobosa*) flour. *Acta Scientiarum Polonorum Technology Aliment*. **11**(2):151-165

Khan, T.A. and Zafar, F. (2005). Heamatological study in response to varying doses of estrogen in broiler chicken. *International Journal of Poultry Production* **4**(10):748-751

Liener, I.E. (1980). Heat labile anti-nutritional factors in: *Advances and legume Science*. Summer field, R.J. and Bounding, A. H. (Eds). Kew London, Royal Botanic Gardens.

Pp. 157-170

Maidala, A., Doma, U.D. and Ajighjigh, D.T. (2011) .Growth performance of weaner rabbits fed Diets containing different processed soybean (Glycine max (L) Merrill) product. Proceedings of 36th of Nigerian society of Animal production 13-16th March 2011 University Abuja.

National Population Commission (2006).National Population Commission Bulletin.

Obun,C.O. (2007).Performance and Some Heamatological Response of Finisher Broilers Fed Graded Levels of Fermented Locust Bean (*Parkia biglobosa*) Seeds Meal. *Asian Journal of Agricultural Research, **1**: 125-130.*

Ogundun, N.J. (2007). Replacement of maize with locust bean seed as energy sources in the diet of rabbit. 32th Annual Conference of the Nigerian society for Animal Production. University of Calabar.

Oyenuga, V.A. (1978). Nigeria feed and feeding stuffs. Ibadan University press, Ibadan.

Oluyemi, J.A. and Robert, F. A. (2000). **Poultry Production in Warm wet Climates**. McMillan Publishers Limited, London.

Table 1: Ingredients and nutrient compositions (%) of different processed African locust bean seed diets fed to broiler chickens at the starter phase (1-5 weeks)

	Diets	
	Broiler starter	**Broiler finisher**
Ingredients		
Maize	37.52	39.93
African locust bean seeds	26.10	29.42
Soybeans (full fat)	17.48	6.75
Wheat offal	10.00	15.00
Fishmeal	5.00	5.00
Limestone	1.00	1.00
Bone meal	2.00	2.00
Sodium chloride	0.25	0.20
lysine	0.20	0.20
Methionine	0.20	0.25
Vitamin/mineral premix	0.25	0.25
Total	**100.00**	**100.00**
Nutrient composition (Calculated)		
Crude protein %	23	21
Metabolisable energy (Kcal/kg)	2800	3000
Crude fibre	5.25	5.07
Ether extract	10.83	8.97
Calcium	1.42	1.43
Available phosphorus	0.92	0.92

Table 2: Economics of production of broiler chickens fed diets containing differently Processed African locust bean seeds (ALBS)

	Diets				
	1	2	3	4	5
Parameters	Raw ALBS	Sprouted ALBS	Salted ALBS	Cooked ALBS	Roasted ALBS
Initial weight (g)	97.58	98.71	99.08	96.25	98.37
Final weight (g)	1720.00	2100.00	2140.00	2300.00	2140.00
Total feed intake (kg)	4.34	4.88	4.59	4.88	4.92
Cost per kg (₦ /kg)*	75.78	84.54	84.45	82.44	82.95
Total feed cost (₦)	328.88	412.56	387.63	402.30	408.11
Total weight gain (kg)	1.27	1.76	2.42	1.61	2.08
Cost per kg (₦/kg gain)	258.96	234.41	160.18	249.87	196.21

*Calculated based on the prevailing price of ingredients at the time of study