

EFFECT OF GRADED LEVELS OF SOAKED AND FERMENTED AFRICAN LOCUST BEAN SEED MEAL ON THE PERFORMANCE AND NUTREINTS DIGESTIBILITIES BY BROILER CHICKENS AT STARTER PHASE

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ABSTRACT

A feeding trial was conducted to determine the performance and nutrients digestibilities by broiler chickens fed diets containing soaked and fermented African locust bean (*Parkia biglobosa*) seed meal (SFALBSM). Five diets were formulated in which SFALBSM was included at graded levels of 0, 7.5, 15, 22.5 and 30% designated as T1, T2, T3, T4 and T5 respectively. Two hundred and twenty five (225) broiler chickens (Marshall Strain) were fed these diets in a completely randomized design and each treatment was replicated three times with 15 birds per replicate. The experiment lasted 4 weeks. Faecal samples were collected, weighed and evaluated for proximate composition. The results of performance showed significant differences ($P < 0.05$) in the final body weight (734.25- 919.89g), total weight gain (679.13 – 898.31g) and total feed intake (1572.39-1708.56g). The feed conversion ratio (1.87 - 2.31) were significantly ($P < 0.05$) better for 15% ALBSM diet compared to others. There were significant differences ($P < 0.05$) in the crude protein, crude fibre and ash digestibilities. The feed cost per kilogram gain was better for treatment 3 (₦137.51/ kg gain) compared to others. It was concluded that 15% SFALBSM can be included in the diet of broiler chicks without any depression on performance and digestibility of nutrients.

Keywords: Soaked and fermented African locust bean seeds, broiler chicks, performance and nutrients digestibility.

INTRODUCTION

Feed is the most important input in a profitable poultry production. It represents 70-80% of the total cost of production (Ogundipe, 1987). The high cost of conventional feeds and feedstuffs brought about the need to have alternative feedstuffs that can replace the expensive ones to reduce the cost of livestock production (Longe, 2006). The use of unconventional feed ingredients in compounding poultry feed in order to reduce cost of production is well documented in literature (Duru, 2010). Non conventional feedstuffs offer the best alternatives in our environment for reducing feed cost and therefore reduction in the cost of meat and animal products (Dwafwang *et al.*, 2001). The search for cheaper feedstuff continues to be the central focus to the research efforts of animal nutritionists. The locust bean tree is a perennial leguminous plant. It produces seeds and is readily available in the savannah region of Nigeria (Oyenuga, 1968). The seed is rich in protein and usually fermented to tasty food condiment called dawadawa. However, it contains some anti-nutritional factors which may have detrimental effects in the body

systems (Odunfa, 1985). This research is aimed at investigating the processing by soaking and fermentation to reduce anti-nutrients and

determine the effect of SFALBSM on the performance and nutrient digestibilities by broiler chickens.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Teaching and Research Farm of the Department of Animal Science, Kano University of Science and Technology, Wudil. It is located within Sudan savannah region of Nigeria. The farm is located on latitude 11° 37'N and longitude 8° 58'E at an altitude of 403m above sea level (Olofin *et al.*, 2008).

Experimental Diets and Design

African locust bean seeds (ALBSM) were soaked for 1 day and fermented for 3 days, oven dried and subjected to proximate analysis (A.O.A.C., 1990). The crude protein of soaked and fermented ALBSM was found to be better than raw ALBSM (28.56% and 24.31% respectively). Similarly, the crude fibre was also better for SFALBSM than the

raw ALBSM (10.27% and 13.55%, respectively). Five diets were formulated using Soaked and fermented ALBSM at graded levels of 0, 7.5, 15, 22.5 and 30% designated as T1, T2, T3 T4 and T5 (Table 1). Diets were allocated to two hundred and twenty five (225) day old broiler chicks (Marshall Strain) in a completely randomized design. Each treatment was fed 45 birds in 3 replications consisting of 15 birds per pen. The experiment lasted 4 weeks.

Experimental Animal management

Birds were weighed and randomly allocated into experimental units. The birds were raised on deep litter room which was partitioned into pens. Feeds were offered and the leftovers were recorded on weekly basis. Water was supplied daily *ad libitum*. The birds were treated with Keprocyll and Amprolium to maintain healthy growth and against pathogenic organisms. Routine operations such as cleaning of the house and checking of the physical condition of birds were executed daily.

Experimental procedures and Data Collection

The initial weights of birds were recorded immediately at the beginning of the study. The birds were subsequently weighed on weekly basis to determine the weekly weight gains. The feed conversion ratio was also determined by calculated as ratio of daily feed consumed to daily weight gain. The feed samples (diets) and faecal samples from each replication were collected for 2 weeks, weighed, oven dried and evaluated for proximate compositions. The amount nutrients digested by birds were then determined.

Data Analysis

Data generated was subjected to Analysis of variance (ANOVA) in a statistical analysis system package (SAS, 2002).

RESULTS AND DISCUSSION

The performance of broiler chickens during the starter phase (0-4 weeks) was presented in Table 2. The results showed there were significant differences ($P<0.05$) in the final weight again and total weight gain of broilers fed soaked and fermented diets. The final weight gain was better for chicks fed control diets and 15% having 919.89g and 937.81g respectively. While, the lowest value of final body weight was recorded for birds fed 30% SFALBSM diet (734.25g). This is in line with report of Simovic *et al.* (1972) who

stated that soaking and fermentation facilitates microbial and enzymes action on certain anti-nutritional factor in grain legumes thereby enhancing better utilization of nutrients. The chicks fed T1 and T3 had significantly ($P<0.05$) higher total weight gain compared to others. This agreed with Walter *et al.* (1984) who reported that fermentation improved palatability besides upgrading the nutrient composition of the fermented material. Birds fed T3 gave better feed cost per kilogram gain (N137.5/Kg gain) compared to other treatments. The best feed conversion ratio was observed for birds in T3 (1.87), while poor value was recorded for those fed T5 (2.31). Feed conversion ratio of birds and feed cost per kilogram gain (N/kg gain) were better for chicks fed 15% ALBSM diets compared to other. Ologhobo *et al.* (1993) reported that soaking and fermentation reduced the level of toxic compound in legume seeds and also improved the nutrients availability. The results of nutrient digestibilities of the starter diets by broiler chicks (Table 3) indicated that crude protein and crude fibre digestibilities were better for fed 15% SFALBSM diet compared to those fed 22.5% and 30% SFALBSM diets. This agreed with Reddy and Pierson (1999) who reported that soaking and fermentation improved digestibility, nutritive value and flavors of the raw ALBSM. No significant differences observed for digestibility of ether extract and nitrogen free extract among the treatments

CONCLUSION

Based on this study, It was concluded that soaked and fermented African locust bean seed meal can be included in broiler starter chicken's diets without any adverse effect on growth and nutrients digestibilities.

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Table 1: Composition of broiler starter diets containing graded levels of Soaked and Fermented African locust bean Seed meal (SFALBSM)

Ingredients (%)	Inclusion levels				
	T1 (0%)	T2 (7.5%)	T3 (15%)	T4 (22.5%)	(30%)
Maize	53.00	48.50	45.00	42.60	39.00
Groundnut cake	25.00	22.00	18.00	13.50	9.00
SFALBSM	0.00	7.50	15.00	22.50	30.00
Soya bean Full-fat	10.00	10.00	10.00	10.00	10.00
Fish meal	3.00	3.00	3.00	3.00	3.00
Wheat offal	5.00	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.25	0.25	0.25	0.25	0.25
Vitamin+mineral premix	0.25	0.25	0.25	0.25	0.25
	100	100	100	100	100
Calculated analysis (%)					
Crude protein	23.00	23.00	23.00	23.00	23.00
M. E Kcal/kg	2944	2945	2954	2987	2980

M.E = Metabolizable Energy

Table 2: Performance of broiler chicken fed soaked and fermented African Locust Bean Seed Meal Diets at starter phase (0-4 weeks)

Parameters	Treatments					SEM
	T1	T2	T3	T4	T5	
Initial body weight (g/bird)	39.50	39.50	39.50	39.50	39.50	0.00
Final body weight (g/bird)	919.89 ^a	881.87 ^b	937.81 ^a	895.89 ^b	734.25 ^c	19.96
Total weight gain (g/bird)	880.39 ^a	842.37 ^a	898.31 ^a	723.81 ^b	679.13 ^b	23.98
Total feed intake (g/bird)	1708.56 ^a	1696.99 ^a	1672.72 ^b	1625.40 ^c	1572.39 ^c	6.24
Feed conversion ratio	1.94 ^b	2.02 ^b	1.87 ^c	2.23 ^a	2.31 ^a	0.06
Feed cost ₦/kg gain	148.19 ^b	152.20 ^b	137.51 ^c	163.44 ^a	168.71 ^a	4.72
Mortality rate (%)	2.22	4.00	4.33	4.44	0.00	3.08

abc= mean with different superscripts on the same row are significantly different (P<0.05),

Table 3: Nutrients digestibilities by broiler chickens fed soaked and fermented ALBSM diets during starter phase (0-4 weeks)

Parameters	Diets					SEM
	T1	T2	T3	T4	T5	
Dry matter (%)	85.10 ^a	76.82 ^c	80.1 ^b	80.13 ^b	78.20 ^c	1.01
Crude protein (%)	68.72 ^c	70.10 ^b	86.58 ^a	78.89 ^b	67.02 ^c	1.13
Crude fibre (%)	70.20 ^b	74.05 ^a	76.18 ^a	67.16 ^c	65.20 ^c	1.02
Ether extract (%)	71.13	74.76	75.22	70.51	71.14	2.09
Ash (%)	68.47 ^b	72.08 ^a	75.96 ^a	67.51 ^b	65.62 ^c	2.25
Nitrogen free extract (%)	70.28	70.28	77.20	77.34	66.25	4.89

abc means within the same row with different superscripts are significantly different (P <0.05)