Journal of Agriculture and Veterinary Sciences
Volume 6, Number 2, 2014
ISSN: 2277-0062

Performance and Economic Approach to Broiler Finisher for Sustainable Poultry Venture

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ABSTRACT

The research was conducted to reveal the performance and economic approach to broiler chickens fed agro-by product incorporated into conventional diet of broiler finisher. The trial was performed with one hundred and twenty (120) Anak 2000 broiler chickens of four (4) weeks old. The birds were allocated to four (4) dietary treatments, with five (5) replicates of six (6) birds per each replicate in a completely randomized design type of equipment. Diets T_1, T_2, T_3, and T_4 contained 0%, 20%, 40% and 60% Bambara nut shell meal (*Vigna Subterranean*) respectively. The experiment lasted for five (5) weeks. The performance results such as average daily body weight gain, average final body weight gain, average daily feed intake and feed conversion ratio were significant ($P<0.01$) and ($P<0.05$) respectively in ascending order. The result of economic of production was best in treatments T_4 and T_3 with cost savings of ₦103.66k/kg and ₦79.26k/kg respectively, and poorest in treatments T_1, and T_2, with cost savings of ₦0.00k/kg and ₦40.07k/kg. Birds performed well on diets T_3 and T_4 with the best cost savings as compared to diet T_1 (control).

Keywords: Poultry Farmers, Feed Cost Reduction, Legume By-product, Sustainability

INTRODUCTION

As feed cost increases with the scale of production, animal production in Nigeria has not been able to satisfy the protein needs of the populace (Ekumankama, 2000). High cost of feed is a serious limitation to poultry production in Nigeria which has been rated at 70-80% of the total cost of production (Oluyemi and Robert, 2000). There are readily available high quality alternative agro-by products of leguminous plants that are non or less cost and are able to minimize the cost of production of meat (Madubuike and Ekenyem,

2001). The utilization of some of the tropical legume waste will be of great help to that effect (Iyayi *et al*, 2006). This is because grain feed is limited and costly and has militated against adequate animal protein production and intake in the country (Aruna, *et al*, 2007). To expand the poultry industry in Nigeria, efforts be directed to the use of non-conventional feed ingredients. One amongst the ingredients is the Bambara nut shell been available at none or less cost. The use of agro-by products in poultry nutrition represents valuable means of indirect production of food from waste (Elboshy and Vanderpoel, 2000). To provide adequate poultry protein for the populace, to abridge the major obstacle to development of poultry industry in Nigeria (Adejuro, 2004).

MATERIALS AND METHODS

The Study Area

The experiment was performed in Taraba State College of Agriculture, Jalingo from June to July 2014. Jalingo the site of the experiment is located at latitude 8° 50'North and 11°25' East with annual rainfall ranges of 1000-1500mm from May – November. The temperature range is between 30°C and 38°C depending on the season. It has an undulating topography with complete group of mountains and hills. The soil type range from sandy to loam which makes the rural inhabitants mostly farmers.

Experimental Design

One hundred and twenty (120) Anak broiler chickens of four (4) weeks old with average weight of 33.598kg were used. They were randomly allocated to four (4) treatment groups with five (5) replicates of six (6) birds each in a completely randomized design arrangement. Diets T_1, T_2, T_3 and T_4 contained 0%, 20%, 40%, and 60% Bambara nut shell respectively been incorporated into broiler finisher. Before the commencement of the experiment, the poultry house was thoroughly disinfected with Diazintol ® and allow to dry. Each pen was provided with feed and water troughs for daily provision of water and feed.

Experimental Diets

Two experimental diets were used for the finisher period with Bambara nut shell as the test ingredients. The Bambara nut shell was used to replace 0%, 20%, 40%, and 60% of the broiler finisher portion of the experimental diets of T_1, T_2, T_3 and T_4 respectively.

Animal Management
The birds were assigned to each pen, the initial weight of individual bird were taken and the average weight of each treatment were also taken to ensure that the difference among the treatments were negligible (insignificant).
Adjustment period of two (2) weeks was allowed to enable the birds to pass out the previous feed eaten and get accustomed to the feed and the environment. After the adjustment period, the experiment proper started. The birds were fed twice a day (Morning and Evening) and water was offered freely.

Data Collection
The quantities of feeds supplied were weighed every morning and evening. The feeds refusal were collected and weighed every morning and evening to compute daily feed intake before the commencement of next feeding.

Weight Measurement and Gain (g)
The initial weight of each bird and the average weight of each treatment were taken and subsequently at weekly intervals for the final live weight of the birds and weight gain. The experiment ended in seven (7) weeks.

Economic Analysis
The cost per kg feed and cost of feed per unit weight gain were also computed. Ultimately, cost savings (₦kg) were analyzed to indicate which among the treatments had the highest and lowest cost savings (₦kg).

Carcass Characteristics
After the termination of the seven (7) weeks experiment, three (3) birds from each treatment were randomly selected and starved overnight to clear the guts. Live weights were recorded before bleeding by cutting the jugular veins with a sharp knife. Eviscerations of the birds were also carried out with a sharp knife and all internal organs, heads and feet were weighed separately with citizen electronic balance. The lengths of the large intestine, small intestine and caecum of the birds were measured with a rule to know the differences in length.

Chemical Analysis
The proximate analysis of the diets were determined by Association of Official Analysis Chemists (A.O.A.C, 1990) to evaluate the feed sample components such as dry matter (DM), crude protein (CP), Crude fibre (CF), Ether Extract (EE), Ash and Nitrogen Free Extract (NFE).
Metabolizable energy (ME) was estimated according to Pauzenga (1985) method.

Statistical Analysis

The data on performance and carcass characteristics obtained during the experimental period were subjected to analysis of variance (ANOVA) (Steel and Torrie, 1980) significant means were compared using least significant difference (LSD) to determine which means were different from others.

RESULTS AND DISCUSSION

The vital ingredients noticed during and after the experimental period were that of average daily feed intake, average daily weight gain, which were significant ($P<0.05$),($P<0.01$) respectively. And also the cost savings (₦kg) been best on treatments T_4 60% BNS (₦103.66k/kg) and $T_3$40% BNS (₦79.26k/kg). This is an indication that agro-by products of leguminous type are very vital in the diets of poultry which could reduce the high cost of purchasing conventional feeds for poultry feeding.

Table 1: Proximate composition and Energy Values

Nutrients %	$T_1$0%BNS	$T_2$20%BNS	$T_3$40%BNS	$T_4$60%BNS	BNS
Dry Matter (DM	90.24	89.49	89.87	89.68	88.73
Crude Protein (CP)	19.00	17.15	18.08	17.62	15.30
Crude Fibre (CF)	10.00	12.59	11.29	11.94	15.19
Ether Extract (EE)	10.00	6.76	8.38	7.57	3.52
Ash	5.20	4.67	4.94	4.81	4.13
Nitrogen Free Extract (NFE)	51.23	52.99	52.12	52.55	54.72
ME (kcal/kg)	3337.17	3034.36	3168.54	3101.45	2756.00

ME= Metabolizable energy, estimated according to Pauzenga (1985) method as follows,
ME (kcal/kg) = 35 x CP% + 81.8 x EE% + 35.5 x NFE%
BNS = Bambara nut shell

The experimental diet has crude protein contents of 17.62-19.00%CP which is similar to recommended 20%CP for broiler finisher (Saskatchewan, 2000). The crude fibre contents varied between 11.29-12.59%CF. The Ether Extract content (EE) was observed to range between 6.76-10.00%EE. The Ash contents of the feed varied from 4.67-5.20%Ash.

Table 2: Performance of Broiler Finisher fed graded levels of Bambara nut shell

Parameters	$T_1$0%BNS	$T_2$20%BNS	$T_3$40%BNS	$T_4$60%BNS	LSD
Total initial weight (g)	42,000	42005	41995	41990	NS
Average initial weight (g)	8400	8401	8399	8398	NS
Total final weight (g)	$75,000^a$	$70,000^b$	67500^c	65000^d	11.16**
Average final weight (g)	15000^a	14000^b	13500^c	13000^d	5.53**
Total daily body weight (g)	942.86^a	799.29^b	727.14^c	656.00^d	6.00**
Average daily body weight (g)	188.57^a	159.86^b	145.43^c	131.20^d	3.11**
Total daily feed intake (g)	3428.57^a	2857.14^b	2285.71^c	1857.14^d	15.12*
Average daily feed intake (g)	685.71^a	571.43^b	428.57^c	371.43^d	7.90*
Feed conversion Ratio	3.00^a	3.08^b	3.11^c	3.21^d	5.01*

a,b,c,d = with different superscript on the same rows are significantly different
**** = P=0.01 (Means significant at 0.01%)**
*** = P<0.05 (Means significant at 0.05%)**
NS = P<0.05 (Means not significant at 0.05%)
LSD = Least significant difference
BNS = Bambara nut shell

Average Daily Weight Gain (ADWG)

Birds on the four dietary treatments advanced on weight (Table 2). The highest ADWG of 188.57g/day was observed with birds on diet one (1) accompanied by diet two (2) 159.86g/day and were significant (P<0.01). Diets 3 and 4 had values of 145.43g/day and 131.20g/day respectively, also (P<0.01%).

Average Daily Feed Intake (ADFI)

Birds on vital feed diet had the highest value (685.71g) of average daily feed intake been significant (P<0.05%) followed by birds on diet 2(571.43g) at same level of significant.

Average Final Weight Gain (AFWG)

Treatment T_1 had the highest final weight gain, followed by treatments T_2, T_3 and T_4 respectively (P<0.01) level of significant.

Those birds on diets 3 and 4 had the less values (80.14g) and (54.43g) respectively (P<0.05%).

Table 3: Economic of Production of Broiler finisher fed graded levels of Bambara nut shell

Parameters	$T_1$0%BNS	$T_2$20%BNS	$T_3$40%BNS	$T_4$60%BNS
Total feed intake (g)	3428.57	2857.14	2285.71	1857.14
Total feed intake (kg)	3.43	2.86	2.29	1.86
Feed cost (₦kg)	200	150	115	100
Total feed cost (₦kg)	11759.99	8171.42	5234.26	3454.28
Total weight gain (₦kg)	75.00	70.00	67.50	65.00
Feed cost (₦kg) gain	156.80	116.73	77.54	53.14
Cost saving (₦kg)	-	40.07	79.26	103.66

Economic Performance (EP)

The results of the economic performance are presented on table 3. The indication of the results shows that the cost per kg feed and cost of feed per unit weight gain were less on $T_4$60%BNS followed by $T_3$40%BNS, interpreted as (₦100.00k/kg), (₦115.00k/kg) of feed cost and (₦53.14k/kg), (₦77.54k/kg) of feed cost per unit weight gain respectively. The cost per kg feed and cost of feed per unit weight gain were highest on $T_1$0%BNS followed by $T_2$20%BNS, which corresponds to (₦200k/kg), (₦150k/kg) of feed cost per unit weight gain respectively. The cost saving was best on $T_4$60%BNS (₦103.66k/kg), followed by $T_3$40%BNS (₦79.26k/kg). The poor cost savings was recorded on $T_1$0%BNS (₦0.00k/kg), followed by $T_2$20%BNS (₦30.07k/kg) as against $T_3$40%BNS (₦79.20k/kg) and $T_4$60%BNS (₦103.66k/kg).

Table 4: Carcass Characteristics of Broiler finisher fed graded levels of Bambaranut shell.

Parameters	$T_1$0%BNS	$T_2$20%BNS	$T_3$40%BNS	$T_4$60%BNS	LSD
No. of birds slaughtered	3	3	3	3	NS
Final weight (g)	770	840	760	800	NS
Weight of breeded birds (g)	760	800	740	770	NS
Weight of feathered bird (g)	740	780	720	730	NS
Carcass weight (g)	480^a	460^b	420^c	400^d	14.72*
Dressing percentage (%)	62.34^a	54.76^b	55.26^c	50.00^d	17.80*
Heads weight (g)	65.70	60.00	55.60	52.11	NS
Shanks weight (g)	200	220	230	260	NS
Liver weight (g)	50.00	40.25	41.00	46.32	NS
Gizard weight (g)	40.60	41.22	43.00	41.80	NS
Length of small intestine (cm)	120	110	121	115	NS
Length of large intestine (cm)	91.00	89.00	74.50	76.50	NS
Length of Caecum (cm)	42.40	40.50	37.00	36.35	NS

a, b, c, d means with different superscript on the same rows are significantly different
*** = P<0.05 (Means significant at 0.05%)**
NS= P<0.05 (Means not significant at 0.05%)
BNS= Bambaranut shell

Carcass Characteristics

The results of carcass analysis were presented on table 4. The final weight of the birds on all the dietary treatments (T_1, T2, T3 and T_4), did not differ significantly (P<0.05%). Alternatively, carcass weight and dressing percentage were significant (P<0.05%) affected by the dietary treatments in increasing order. While the organs and offals on all the dietary treatments were not significant (P<0.05%).

CONCLUSION

Agro-by Products are available in Nigeria with less or no financial implication, which could be utilized as partial part of poultry feed to maximize profit. The birds on all the four diets gained weight. Therefore, Bambaranut shell could be incorporated into conventional poultry feed to reduce cost.

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