EVALUATION OF GROWTH TRAITS AND COST BENEFITS OF BROILER CHICKENS FED MAIZE COB AS SOURCE OF FIBRE AT GRADED LEVELS OF INCLUSION

IBRAHIM, H
Department of Animal Production,Faculty of Agriculture
Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria
Corresponding Author's E-mail: ihadiza080 @gmail.com **Tel.: 08036101761**

ABSTRACT

A research was conducted to evaluate the growth traits and cost benefits of broiler chickens fed maize cob as source of fibre at graded of levels inclusion using 150 day old broiler chicks and they were allotted into five treatments designated Diet 1 (T1) contained 100% maize as control, diet 2 (T2) contained 25% maize cob inclusion level, diet 3 (T3) contained 50% maize cob, diet 4 (T4) contained 75% maize cob and diet 5 (T5) contained 100% maize cob inclusion level and three (3) replicate containing ten (10) birds in a completely randomized design (CRD)Data were generated on the growth traits and cost benefit of the broiler chicken The experiment lasted for eight (8) weeks Result obtained revealed significant ($p<0.05$) differences in all the treatment groups Except the initial body weight that was not significant ($p<0.05$) differences of the growth traits, also cost benefit revealed significant ($p<0.05$) differences across the parameters measured . Thus it was concluded that birds in T2 (birds fed diet incorporated with 25% of maize cob) had the best growth performance and (₦1637.58) for the cost of feed and total cost of feed per bird respectively in the parameter as compared to birds on T3, T2 and T4and also recorded the least mortality rate as compared to the control diet in T1 and as such, 25% of maize cob can be incorporated in broilers diet as a replacement for energy source without any negative effect on the birds.

KEYWORDS traits. Growth, cob. Broiler. Fiber

INTRODUCTION

Corn (*Zea mays*) compared with other cereal grains is the preferable primary source in poultry diets. The continuous increase in human population worldwide, particularly in developing countries, is often associated with increasing the relative price of competitive animal and human feed- and foodstuffs, including corn, barley, rice and others. Corn is the most common energy source used in commercial animal diets, especially in African, American, Southern European and Asian countries, where corn grain is the primary cereal for all poultry feed (Dei, 2017). Nutrition is about the most important consideration in livestock management due to its high contribution to the total cost of production and its importance in determining the success of the enterprise; According to FAO (2012) the increasing cost and decreasing supply of conventional feed stuffs, especially energy sources (required in relatively large amounts compared to protein sources) are expected to limit the future expansion of the livestock and feed industry. The excessive demand for animal feeds and a change in animal husbandry are prompting the feed industry to produce quality feeds to maintain animal production (Banglapedia, 2021; Sarker, 2019).

Aim and Objectives of the study

The aim of the study is to investigate the effect of substituting maize with maize cob meal on the performance and cost benefit of broiler chicken.

The specific objectives are to:

i. determine the effect of substituting maize with maize cob on the growth performance of broiler chicken,
ii. determine the cost of broiler production fed different levels of maize cob meal

MATERIAL AND METHOD

Location of the experiment

The study was conducted in the Poultry unit of the Teaching and Research Farm of the Faculty of Agricultural Sciences – Ibrahim Badamasi Babangida University, Lapai, Niger State, (The area is located between longitude 6" 34'E and latitude 9" 02'N). The area receives an annual rainfall that range between 1100 - 1600mm. The temperature varies between 21 and 36.5^{o}C.

Source (s) of test ingredient Experimental diet

The maize cob and other ingredients used for this experiment were obtained from Lapai market Five diets were formulated and designated as TI, T2, T3,T3, T4 and T5 with their inclusion as 25%, 50%, 75% and 100%..

Processing of Maize Cob

The maize cob was sun dried for one week then crushed and grinded. Samples of the milled maize cobs were analyzed using the method AOAC (2000) and stored in sacks incorporated into broiler's diet at different inclusion levels, replacing maize.

Table 1: Gross composition of experimental broiler starter diet

Ingredient (%)	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**
Maize	54.00	40.50	27.00	13.50	–
Maize cob	–	13.50	27.00	40.50	54.00
Wheat offal	15.00	15.00	15.00	15.00	15.00
Fish meal	2.00	2.00	2.00	2.00	2.00
GNC	24.07	24.07	24.07	24.07	24.07
Bone meal	2.50	2.50	2.50	2.50	2.50
Limestone	1.00	1.00	1.00	1.00	1.00
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated values					
Crude protein (%)	23.23	23.01	23.24	22.85	22.64
Crude fiber(%)	4.16	4.40	4.64	4.88	5.12
Metabolizable energy (kcal/kg)	2814.01	2804.97	2813.32	2801.32	2808.22

Key:

T_1: 0% of maize cob was incorporated
T2: 25% of maize cob was incorporated
T_3: 50% of maize cob was incorporated
T_4: 75% of maize cob was incorporated
T_5: 100% of maize cob was incorporated

Table 2: Gross composition of experimental broiler Finisher diet

Ingredient (%)	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**
Maize	48.00	36.00	34.00	12.00	–
Maize cob	–	12.00	14.00	36.00	48.00
Wheat offal	13.00	13.00	13.00	13.00	13.00
Fish meal	3.00	3.00	3.00	3.00	3.00
GNC	31.70	31.70	31.70	31.70	31.70
Bone meal	2.50	2.50	2.50	2.50	2.50
Limestone	1.00	1.00	1.00	1.00	1.00
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated values					
Crude protein (%)	20.15	20.20	20.27	19.80	19.78
Crude fiber(%)	4.15	4.42	4.69	4.96	5.23
Metabolizable energy (kcal/kg)	2836.88	2810.94	2800.15	2802.16	2802.19

Key:

T_1: 0% of maize cob was incorporated
T2: 25% of maize cob was incorporated
T_3: 50% of maize cob was incorporated

T_4: 75% of maize cob was incorporated
T_5: 100% of maize cob was incorporated

Experimental Birds and Management Experimental diet

A total of one hundred and fifty (150) mix-sex day old commercial broiler birds, with an initial body average weight of 37.57g, were allotted randomly to the five dietary treatments, in a completely randomized design. Each treatment group, consisting of fifty (30) birds, and were replicated in three deep litter pens of ten (10) birds per pen. the experimental house was washed thoroughly using detergent and disinfectant (Izal) and allowed to dry. The feed troughs and drinkers were also washed pen. On arrival of the birds, anti-stress was administered and feed was also served. The chicks were brooded using kerosene lanterns and charcoal pots as sources of light and heat respectively. The trial lasted for fifty six (56) days (8 weeks). Feed and water were served *ad libitum*. Drinkers were washed daily while feed remnants in the feeding troughs were removed and the troughs were cleaned cleaning of the liter was done from time to time and topped with fresh litter materials to reduce disease build-up when liters cake and also ensure that the birds are comfortable.

Experimental Design

A total of one hundred and fifty ` (150) birds were allocated to each replicate group. Experimental unit consist of five (5) treatment designated as T_1, T_2, T_3, T_4 and T_5 with ten (10) birds each in a Completely Randomize Design (CRD).

Data Collection

Performance Evaluation

Data on growth performance were taken and calculated as follow

Total Feed Intake (g) = Total Feed supplied (g) – Total feed left over(g)

$$\text{Mean Feed intake (g/bird)} = \frac{\text{weight of the feed - left over}}{\text{No. of the birds per replicate}}$$

$$\text{Average feed intake (g/bird)} = \frac{\text{total feed intake}}{\text{No. of the birds}}$$

Total weight gain = Final weight – initial weight

$$\text{Mean body weight} = \frac{\text{weight of the bird in a replicate}}{\text{No. of the birds per replicate}}$$

Feed conversion ratio (FCR)) was obtained by dividing the mean feed intake per bird in grams by the mean live weight gain per bird for each treatment group.

$$\text{Feed conversion ratio} = \frac{\text{total feed intake(g)}}{\text{total weight gain (g)}}$$

Mortality was recorded as it occurs throughout the trial.

$$\text{\% Mortality} = \frac{\text{No. of dead birds}}{\text{Total number of stocked birds}} \times \frac{100}{1}$$

Cost benefit

All the feed ingredients purchased at the current market price and processing activities involved were monetized and price per kg of each ingredient were determined for economic analysis.

Economic Analysis Determination

Key

Cost of feed/kg/N = cost of ingredient
Total feed intake per bird (g) = total feed intake
Total cost of feed intake/birds (N/g) – cost of feed ingredient × Total feed intake
Total weight gain =initial weight gain (g) - final weight gain (g)
Cost of feed intake/(N) weight gain (g) = Cost of feed intake/Total weight gain
Cost of feed intake/Total weight gain × 1000 = g to Kg

Statistical Analysis

The data collected were subjected analysis of variance (ANOVA using SPSS computer package(Version 20). Duncan Multiple Range Test (DMRT) was carried out to compare the group means.

RESULTS AND DISCUSSION

Table 3: Growth performance of broilers fed test ingredients (maize cob)

Parameters	Treatment					SEM	LSD
	T1	T2	T3	T4	T5		
Initial weight(g)	37.33	38.47	37.87	37.60	37.93	1.23	0.91
Final weight(g)	1066.70^{c}	1400.00^{a}	1233.30^{b}	1000.00^{c}	1033.30^{c}	51.64	0.00
Body weight gain(g)	1029.70^{c}	1361.50^{a}	1195.50^{b}	962.40^{c}	995.40^{c}	51.41	0.00
Feed intake(g)	3016.70^{b}	3263.30^{a}	3110.00^{ab}	3163.30^{ab}	3046.70^{b}	70.26	0.04
Feed conversion ratio	2.95^{ab}	2.39^{c}	2.60^{bc}	3.28^{a}	3.07^{a}	0.17	0.00
Mortality (%)	10.00	3.33	10.00	13.33	16.66	0	0

Means in the same row with different superscript are significantly different ($p<0.05$), means with the same superscript are not significantly different ($p>0.05$). SEM=Standard error of mean LSD= Least significant difference

KEY:

T_1: 0% of maize cob was incorporated

T2: 25% of maize cob was incorporated

T_3: 50% of maize cob was incorporated

T_4: 75% of maize cob was incorporated

T_5: 100% of maize cob was incorporated

The performance of broiler chicken fed diet containing maize cob at graded level as source of fiber (Table 3). The result showed that there were significant ($p<0.05$) differences in the growth parameters. This could be as a result of higher inclusion of maize cob which might have affected the growth of the birds. This result is in line with a similar study carried out by Donkoh *et al*., (2003) who reported that diets containing up to 7.5% ground maize cobs fed ad libitum to commercial broiler chickens did not alter growth performance, carcass yields, health and biochemical indices. Birds on T2 diet had the highest feed intake and recorded the best feed conversion ratio across the treatments and the least feed intake was recorded in birds fed T1 which was the control diet. Birds on T4 diet recorded the poor feed conversion ratio at 3.28. This could be due to the reason that, the higher the inclusion of maize cob, the poorer the feed conversion by the birds. This implies that maize cob incorporated in broiler chicken diets by 25% level of inclusion recorded the best outcome and can therefore be used as an alternative source of fiber

Table 4: Cost benefit of broilers fed test ingredients (maize cob)

Parameter (₦)	Treatment					
	T1	T2	T3	T4	T5	SEM
Cost of feed	542.84^{a}	362.90^{c}	406.56^{b}	333.61^{d}	`287.19^{e}	0.00
Total cost of feed /bird	1637.58^{a}	1066.67^{c}	1264.40^{b}	1055.21^{d}	874.78^{e}	0.00
Total cost per weight gain	1544.89^{a}	761.90^{e}	1027.97^{c}	1055.21^{b}	849.30^{d}	0.00

Means in the same row with different superscript are significantly different ($p<0.05$)

SEM=Standard error of mean

KEY

T_1: 0% of maize cob was incorporated

T2: 25% of maize cob was incorporated

T_3: 50% of maize cob was incorporated

T_4: 75% of maize cob was incorporated

T_5: 100% of maize cob was incorporated

Table 4. revealed significant ($p<0.05$) differences in the cost of feed, total cost of feed/bird and total cost per weight gain across the treatment means. T1 diet had highest values of (₦542.84) and (₦1637.58) for the cost of feed and total cost of feed per bird respectively across the treatment means birds on T3, T2 and T4. The recorded the least expensive, economical and most affordable value were recorded in birds fed T5 diet. This low feed cost of the maize cob could translate to higher profit than

the control diet and is in agreement with (Cheeke 1992).that stated that Economic utilization is one of the major reasons advanced for the use of alternative feeds .

CONCLUSION AND RECOMMENDATION

Conclusion

From the result obtained it can be concluded that birds in T2 (birds fed diet incorporated with 25% of maize cob) had the best growth performance and least mortality rate as compared to the other treatment groups .

Recommendations

From the conclusion of this research work, the following recommendation can made:

i. Maize cob should be included in broiler chicken diets by up to 25% level inclusion.

REFERENCES

Ajayi, H. I. and Iyayi, E. A. (2014). Ileal nutrient digestibility and performance in broiler chickens fed graded levels of feather meal. *Ibadan Journal of Agricultural Research*. 10 (2): 136 -147.

Banglapedia, H.K (2021a). Farming Systems. National Encyclopedia of Bangladesh. https://en.banglapedia.org/index.php/Farming_System (Accessed 19, June 2021).

Cheeke, P. R. (1992). Feeding systems for tropical rabbit production emphasizing roots, tubers and bananas in: Roots, tubers, plantains and bananas in animal feeding. Proceedings of the FAO Expert Consultation, held in CIAT, Cali, Colombia, 21st -25th January, 1991. FAO Animal Production and Health Paper No. 95, FAO, Rome, Italy. Pp., 235- 249

FAO, (2012). Food and Agricultural Organization of the United Nations Online statistical database, Rome, Italy. www.fao.org

Gehring, C. K., Cowieson, A. J., Bedford, M. R., and Dozier,W. A. (2013). Identifying variation in the nutritional value of corn based on chemical kernel characteristics. Worlds. Poult. Sci. J. 69:299–312.

Kanengoni, A. T., Chimonyo, M., Ndimba, B. K. and Dzama, K. (2015). Potential of Using Maize Cobs in Pig Diets. A Review. *Asian Australian Journal of Animal Science*, 28 (12): 1669. https://doi.org/10.5713/ajas.15.0053

Kazi, A. A. F. (2017). Market Insight: Bangladesh Feed Industry. Light Castle Partners. https://www.lightcastlebd.com/insights/2017/06/marketinsight-bangladesh-feedindustry. (Accessed 7, May 2021).

Kibrom, G. (2017). Effect of Increasing Level of Supplementation on Feed Intake, Nutrient Utilization, Growth and Carcass Characteristics of Begait Sheep Fed a Basal Diet of Grass Hay. MSc Thesis. School of Graduate Studies of Haramaya University, Ethiopia. 65 pp.

Naderinejad, S., Zaefarian, F., Abdollahi, M.R., Hassanabadi, A., Kermanshahi, H., and Ravindran, V.(2016). Influence of feed form and particle size on performance, nutrient utilisation, and gastrointestinal tract development and morphometry in broiler starters fed maize-based diets. Anim. Feed Sci. Technol. 215:92–104.

Sarkar, S., Milan, S., Akbar, H., and Marian, B. (2020). Management of Crop Residues for Improving Input Use Efficiency and Agricultural Sustainability. *Sustainability*, 12: 9808; https://www.mdpi.com/journal/sustainability.

Sarker, N. (2019). Feeds and Fodder Trend in Bangladesh- AHCAB-2017. (Accessed 9, June 2021). https://www.banglajol.info/index.php/BJAS/article/view/363 17/24456