

GROWTH PERFORMANCE AND VISCERAL ORGANS CHARACTERISTICS OF BROILER CHICKENS FED DIETS CONTAINING GRADED LEVELS OF MAIZE COB AS A FIBRE SOURCE

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ABSTRACT

This article evaluate the performance traits and visceral organs of broiler chickens fed with maize cob as source of fiber. A feeding trial was conducted using 150day old broiler chicks (Agrited) allotted into five treatments of three replicates each with 10 chicks per replicate in a completely randomized design (CRD). Diet 1 contain wheat offal as the control, Diets 2, 3, 4 and 5 contains 25, 50, 75 and 75 % Maize cob, respectively. Data Collection were processed and analyzed using SPPS version 20.0 and means that were significantly different were separated using Duncan's New Multiple Range Test (Duncan, 1955). The results obtained showed that there were no significant (p>0.05) differences in the initial weight among the treatment, from the feed intake, birds fed with 25% of maize cob had the highest average values in the parameters (3263.30g). The final weight of the birds fed the test ingredients showed that there was statistically significant difference between birds in T1 and T5 group but T2 had the highest value (1400.00g) and the least final weight gain was recorded in T4 (1000.00g). Birds fed with (100%) of maize cob T5 recorded the highest percentage of mortality at 16.66% followed by T4 (13.33%) and T3 (10%) while T2 (25%) of maize cob recorded the least mortality at 3.33%. Also most of the parameters of visceral organs revealed no significant difference in the treatment groups. It was thus concluded that birds fed with (25%) of maize cob had the highest final weight gain and lowest mortality rate and as such can be used as an alternative source of fiber in broiler chicken's diets.

Keywords: Broiler, Evaluation, Fibre, Maize Cob, Performance, Visceral organs

INTRODUCTION

There is need to improve the scientific knowledge of utilizing low cost locally available agroindustrial by-products in poultry feed in order to reduce the feed cost. As feed constitutes 60 to 70 per cent of the total cost of production, any attempt to reduce the feed cost may lead to



a significant reduction in the total cost of production (Ogunfoworola and Oluyemi, 2008). Poultry being monogastric animal lack fibre degrading enzyme for breakdown of complex carbohydrates like cellulose, hemicellulose and lignin. Since, the complex carbohydrate is a major component of fibrous by-products, there is need to find ways and means for improvement in the utilization of these fibrous materials so as to incorporate these materials in the poultry feed without any adverse effect on their health and production (Owusu-Asieduet et al., 2006). Soybean meal, groundnut cake etc. are becoming expensive in developing countries. Hence, the search for alternative feed sources has become inevitable to reduce the feed cost (Swain et al., 2014). Therefore, more careful approaches to sustain the poultry industry in the competitive market should be the reduction of cost of production, production of safe and quality products to meet the consumer's demand and also to ensure the birds welfare to satisfy consumers. (Chandrasekaran, 2014) Carbohydrates represent the biggest constituent of poultry diets and are one of the least understood feed components in broiler diets; this is especially for dietary fiber (DF). Different reports regard DF either as a functional component for normal digestive organ functioning (Hetland et al., 2004, Jiménez-Moreno et al., 2009) or as an anti-nutrient (González-Alvarado et al., 2008, Matoeset al., 2012, Sadeghiet al., 2015). This is likely due to the complexity and variability of DF from a nutritional perspective.

There is a rapid increase in world population coupled with a decrease in cereal production especially in developing countries. (Oluyemi, 2008) This has created a great competition between man and animals for food especially grains such as maize, Sorghum and wheat means that raising poultry birds will demand a greater monetary input from farmers with most of it going into feeding. This cost of feeding was estimated to be about 70% of the total cost of raising birds to market weight (Ogunfoworola and Oluyemi, 2008). The growing fluctuation in feed cost and price of poultry meat as a result of the rising cost of conventional feed ingredients has therefore led to the search for alternative sources of feed ingredients



particularly those energy and protein origin. It is with this in mind that the authors set out to investigate the effect of replacing maize with cornflakes waste in broiler diets as well as the cost implication of the replacement. It is against this background this study attempt to replace wheat offal with maize cob on performance and visceral organs of broiler chickens.

The specific objectives of the study are to determine performance of broiler chicken fed with maize cob as source of fibre at graded levels and also to assess the visceral organs of the broiler chicken fed with maize cob as source of fibre at graded levels.

MATERIALS AND METHODS

Experimental Location

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm of Ibrahim Badamasi Babangida University, Lapai, Niger State. Lapai is located between the equatorial latitude of 9°02N and the longitude of 6°34E (Tsado and Martins 2021). The area is located in a savanna vegetation zone in southern Guinea, Nigeria. The average rainfall is between 1100-1600 mm and the average temperature is between 21°C and 36°5C (Tsado and Martins, 2021).

Source and Processing of the Test Ingredients

Maize, Wheat offal, Groundnut cake (GNC) Lime stone, bone meal, Vitamin mineral premix (VPM) and Salt were obtained from Kure market in Minna Niger state.

Maize cobs where sourced at Abdulkaderi farm in lapai.

The maize cobs were cut into smaller pieces, sun dried and ground into powder by means of engine.

Experimental Diets

Five experimental (T1-T5) diets were formulated. The diet contained test ingredients replaced maize cob at different graded level.



Ingredients	Treatments(%)					
	T1	T2	T3	T4	T5	
Maize	54.00	40.50	27.00	13.50	0.00	
Maize Cob	0.00	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	
Groundnut cake	24.07	07 24.07 2		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:						
СР	23.23	23.01	23.24	22.85	22.64	
CF	4.16	4.40	4.64	4.88	5.12	
ME (Kal/kg)	2814.01	2804.97	2813.32	2801.32	2808.22	

 Table 1: Gross Composition and Calculated Energy values of Experimental Broiler Starter Diets

Key: Diet 1 (T1) Contained 0% of maize cob inclusion level as control, Diet 2 (T2) Contained 25% maize cob inclusion level, Diet 3 (T3) Contained 50% maize cob inclusion level, Diet 4 (T4) Contained 75% maize cob inclusion level, Diet 4 (T5) Contained 100% maize cob inclusion level.



 Table 2: Gross Composition and Calculated Energy values of Experimental Broiler

 finisher diets

Ingredients	Treatments (%)					
	T1	T2	Т3	T4	T5	
Maize	48.00	36.00	14.00	12.00	0.00	
Maize Cob	0.00	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	
Groundnut cake	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:						
СР	20.15	20.20	20.27	19.80	19.78	
CF	4.15	4.42	4.69	4.96	5.23	
ME (Kal/kg)	2836.88	2810.94	2800.15	2802.16	2808.19	

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Chemical analysis of maize cob was done at Federal University Technology Minna. Maize cob samples were analyzed for Moisture content (MC), Crude Fiber (CF), Crude protein (CP), Ash, Fat and FEF/CHO. Maize cob has high amount content of crude fiber (28.50 %) and less Fat/Ash (1.5%). (Abubakar *et al.*, 2016).



Management of Experimental Birds

A total of one hundred and fifty (150) day old broiler birds were placed on the experimental diet on their arrival. Prior to the arrival of the birds, all necessary scrubbing, cleaning and disinfecting of the pen with Izal and Dettol was carried out. The pen was prepared and the floor was well littered with fresh wood shaves (the litter material) and covered with newspaper. The chicks were brooded on deep litter using charcoal pot and kerosene lanterns as sources of heat and light respectively. Anti-stress was given immediately they arrived and feed was also served. The birds were vaccinated with Gumboro vaccines at the age of one week, Newcastle disease vaccine (Lasota) at two weeks and Gumboro disease vaccine (booster) at three weeks. Similarly, all the necessary routine management practices were duly observed. The experiment lasted for eight weeks.

Experimental Design

Complete Randomized designed was adopted in this experiment. A total of one hundred and fifty (150) birds were randomly allocated to each of the five treatments. A total of five treatments with three replicates was used. Each of the experimental unit (treatment) had three replicates designated as R1, R2, and R3 with 10 birds each in replicates making a total of 15 slots.

Data Collection

Data were collected at weekly intervals based on the following parameters: -

Growth Performance traits

Feed consumption from each treatment was determined on weekly basis by subtracting leftover from served feed given per group. Adequate measures were taken to safeguard against spillage and related wastage. The mean daily feed intake was calculated by dividing the amount consumed by the number of birds in the group.



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Experimental birds were weighed weekly using a weighing balance and the weights were recorded.

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

The body weight gain of each of the treatment group was obtained by calculating the difference between the mean live weights of the current week from the mean live weight of the preceding.

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

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

Total weight gain = Final weight – initial weight

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

 $FCR = \frac{Feed intake}{Body Weight Gain}$

Mortality was recorded as it occurs throughout the feeding trial.

Mortality= Number of dead birds X 100

Number of initial birds



Visceral Organs Evaluation

At the end of the trial the chickens were starved for eight hours, one chicken was randomly picked from each replicate and three chickens per treatment a total of fifteen chickens were slaughtered for carcass analysis. Blood were allowed to bleed completely, weight of spleen, proventiculus, small and large intestine, lungs, crop, kidney, pancreas, liver, abdominal fat, gizzard and heart were weighed with a digital balance and recorded

Statistical Analysis

Data collected were processed and analyzed using SPPS version 20.0 and means that were significantly different were separated using Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Results

The initial body weight of the birds were T1 (37.33g), T2 (38.47g), T3 (37.87g), T4 (37.60g), T5 (37.93g). The final weight gain of the birds were 1066.70g (0% maize cob), 1400.00g (25% maize cob), 1233.30g (50% maize cob), 1000g (75% maize cob), 1033.30g (100% maize cob) for T1, T2, T3, T4, and T5 respectively. Body weight gain was higher in T2 (1361.50g), and the least body weight gain was recorded in T4 (962.40g).

Feed intake of birds fed T2 (25%) of maize cob was at the highest (3263.30g) but show significant (p<0.05) differences with other treatments. Birds fed with 100% maze cob (T5) recorded the highest mortality (16.66%) while the lowest were recorded in (T2) 25% of maize cob (3.33%).



Parameter	Percentage (%)			
Moisture content	2.7			
Crude fiber	28.50			
Crude protein	4.20			
Ash	1.50			
Fat	1.50			
NEF/CHO	61.60			

Table 3: Proximate composition of maize cob

Source: Audu, Yohanna (2022)

Table 4: Growth performance traits of broiler chickens fed test ingredients

Parameter	Treatments						
	T1	T2	Т3	T4	T5	SEM	LSD
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 (g)	1029.70 ^c	1361.50 ^a	1195.50 ^b	962.40 ^c	995.40 ^c	51.41	0.00
Feed intake (kg)	3016.70 ^b	3263.30 ^a	3110.00 ^{ab}	3163.30 ^{ab}	3046.70 ^b	70.26	0.04
Feed conversion	2.95 ^{ab}	2.39 ^c	2.60 ^{ab}	3.28 ^a	3.07 ^a	0.17	0.00
ratio							

a,b,c,= Means with different superscripts along the same row are significant (p>0.05)

Key: T1 Contained 0% of maize cob inclusion level as control, T2 Contained 25% maize cob inclusion level, T3 Contained 50% maize cob inclusion level, T4 Contained 75% maize cob inclusion level, T5 Contained 100% maize cob inclusion level, LSD = Least significant different, SEM = Standard error mean



Parameter Treatments T1 T2 T3 T4 T5 SEM LSD Liver (g) 14.33^b 28.66^{a} 27.33^a 21.33^{ab} 30.00^a 4.77 0.043 60.00^{bc} 95.33^{ab} 76.66^{abc} Intestine (g) 105.67^a 113.33^a 48.98 0.098 1.00^{b} 2.67^a 2.67^a 2.33^a 2.67^a 9.46 0.56 Pancreas (g) Gizzard (g) 45.33 0.04 48.00 55.00 40.00 52.66 1.01 0.52 Heart (g) 6.00 8.00 8.00 5.67 6.67 0.12 Spleen (g) 1.33 3.00 2.33 2.00 2.00 0.78 0.37 Abdomin fat (g) 83.50 26.66 29.00 6.00 7.00 48.24 0.52 Proventric (g) 13.00 8.67 8.67 5.33 6.67 4.95 0.62 0.50^{b} 3.00^{ab} 2.67^{ab} 3.33^{ab} 4.33^a 1.21 0.09 Kidney (g)

Table 5: Visceral organs of broiler chickens fed test ingredients

a,b,c,= Means with different superscripts along the same row are significant (p>0.05)

Key: T1 Contained 0% of maize cob inclusion level as control, T2 Contained 25% maize cob inclusion level, T3 Contained 50% maize cob inclusion level, T4 Contained 75% maize cob inclusion level, T5 Contained 100% maize cob inclusion level, LSD = Least significant different, SEM = Standard error mean

DISCUSSION

The results of growth (Table 4) indicate that, there were no significant (p<0.05) differences in the initial weight, within the treatments means.. Final weight and feed intake were significant (p>0.05) difference, in birds fed T2 (25% maize cob) and had the highest average values (1400.00g) compared to T1 (1066.70g), T3 (50% maize cob), T5 (100% of maize cob) and the least values were obtained in T4 (1000.00). This implies that, (25% maize cob) could replace wheat offal in broiler chickens diet without affecting parameters. Birds on T2 (25% of maize cob) again had the highest feed intake, compare to other treatment groups. The



results in agree with Koo *et al.*, (2001) who, in their separate research used corncob as source of fibre and had no significant (p<0.05) differences.

The results of visceral organs (Table 5) indicate that, there were no significant (p<0.05) differences in gizzard and heart, birds fed (100%) of maize cob fed T5 diet that had the highest values in the parameters (52.66g, 6.67g) as compared to T3 (50%) of maize cob, T4 (75%) of maize cob and T2 (25%) of maize cob and the least values were obtained in T1 (0%) of maize cob (45.33g,6.00g). The liver and pancreas were significant (p>0.05) difference within the treatments means, birds feed with 100% of maize cob (T5) had the highest value (113.33g), compare to T1, T2, T3 and T4. This implies that, at 100% of maize cob inclusion level could replace wheat offal in broiler chickens diet without affecting the visceral organs. The results agreed with Wissing and Graney (1968) who, in their separate research used corncob as source of fibre and had no significant (p<0.05) differences.

CONCLUSION AND RECOMMENDATION

Conclusion

From the result obtained, it can be concluded that the broilers fed with 25%(T2) of maize cob had the highest final weight gain and lowest mortality rate, had no detrimental effect on growth parameters and visceral organs and as such can be used as alternative source of fibre in the broiler chickens diet.

Recommendation

From the conclusion of this trial. It can be recommended that Maize cob should can be included in broiler chicken diets by with 25% (12kg) level of inclusion as alternative source of fibre (12kg) of maize cob also Further research on usage of maize cob is recommended on other poultry birds



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