Nig. J. Anim. Prod. 2023, 49(5):24 - 29 https://doi.org/10.51791/njap.v49i5.3566. Nigerian Journal of Animal Production

Effect of maize replacement with coconut cake on growth performance, carcass characteristics and cost analysis of Noiler strain of chicken

Ayoola, M. A., Ogunsipe, M. H. and Dada O. A.

Animal Production Unit, Department of Agriculture, Adeyemi Federal University of Education, Ondo.

Corresponding author: *mayoola1@yahoo.co.uk ; 0803 377 2499*

Abstract

Maize is one of the major ingredient and preferred cereal used in poultry ration formulation. It is preferred because of its high energy and low fibre content. However, the huge competition between man and livestock for maize has led to increase in its price and consequently necessitated a search for alternative feedstuffs that could adequately supply nutrients and at the same time reduce cost. The research was conducted to evaluate the effect of replacing maize with varying levels of coconut cake meal (CC) in the diet on the performance, carcass characteristics and economics of production of Noiler strain of chicken. Five treatment diets were formulated in which CC replaced maize at 0, 10, 20, 30 and 40% levels using a completely randomized design with two replications of ten birds per replicate. The study lasted for 8 weeks during which growth performance, carcass characteristics and economics of production were assessed at the end of the experiment. Feed intake was significantly higher (P<0.05) in Noiler fed 30-40% levels of maize replaced with CC when compared with the control. Also, test diets had no significant effect on the final weight, total and daily weight gain of birds fed the 40% level of maize replacement with CC when compared with the control. Price/Kg feed reduced with increased level of CC in the diet. Also, Price (₦/Kg) processed weight of bird produced was significantly (P<0.05) lower in birds fed 40% level of maize replacement when compared with those fed 10% CC. Test diets exert no significant difference (P>0.05) on the percentage weight of primal parts and vital organs of the Noiler birds. It could therefore be suggested that maize could be replaced with CC up to 40% level in Noiler diet as this will reduce both the Price (₦/Kg) of feed and the competition for maize between man and livestock.

Keywords: Carcass characteristics, Coconut Cake Meal, Growth performance, Maize, Noiler.

Effet du remplacement du maïs par du tourteau de noix de coco sur les performances de croissance, les caractéristiques de la carcasse et l'analyse des coûts de la souche de poulet Noiler

Résumé

Le maïs est l'un des principaux ingrédients et céréale préférée utilisée dans la formulation des rations de volaille. Il est préféré en raison de sa haute énergie et de sa faible teneur en fibres. Cependant, l'énorme concurrence entre l'homme et le bétail pour le maïs a entraîné une augmentation de son prix et a par conséquent nécessité la recherche d'aliments alternatifs qui pourraient fournir de manière adéquate les nutriments et en même temps réduire les coûts. La recherche a été menée pour évaluer l'effet du remplacement du maïs par des niveaux variables de tourteau de noix de coco (TN) dans l'alimentation sur les performances, les caractéristiques de la carcasse et l'économie de la production de la souche de poulet Noiler. Cinq régimes de traitement ont été formulés dans lesquels le TN a remplacé le maïs à des niveaux de 0, 10, 20, 30 et 40 % en utilisant une conception entièrement randomisée avec deux répétitions de dix oiseaux par répétition. L'étude a duré 8 semaines au cours desquelles les performances de croissance, les

caractéristiques de la carcasse et l'économie de la production ont été évaluées à la fin de l'expérience. La consommation d'aliments était significativement plus élevée (P < 0,05) chez les Noiler nourris avec 30 à 40 % de maïs remplacé par du TN par rapport au témoin. En outre, les régimes testés n'ont eu aucun effet significatif sur le poids final, le gain de poids total et quotidien des oiseaux nourris avec le niveau de remplacement de 40 % de maïs avec TN par rapport au témoin. Prix/Kg d'aliment réduit avec un niveau accru de TN dans la ration. De plus, le prix (₦/Kg) du poids transformé de la volaille produite était significativement (P<0,05) inférieur chez les volailles nourries avec 40 % de substitut de maïs par rapport à celles nourries avec 10 % de TN. Les régimes d'essai n'exercent aucune différence significative (P>0,05) sur le pourcentage de poids des parties primaires et des organes vitaux des oiseaux Noiler. On pourrait donc suggérer que le maïs pourrait être remplacé par du TN jusqu'à 40 % dans le régime Noiler, car cela réduira à la fois le prix (₦/Kg) des aliments pour animaux et la concurrence pour le maïs entre l'homme et le bétail.

Mots-clés : Caractéristiques de la carcasse, Tourteau de Noix de Coco, Performances de croissance, Maïs, Noiler.

Introduction

Poultry is one of the fastest means to achieving appreciable improvement in the nutritional standard of the populace because of its short generation interval, quick turnover rate and relatively low capital investment (Ani and Okeke, 2011). In Nigeria, where the production of animal protein falls far short of meeting the demands of a rapidly growing population, poultry remains a viable livestock to meet the protein demand of the increasing population (Obi, 2003). Thus, there is the need to fast track the process of poultry production especially meat and egg so as to meet up with protein needs of the population. To achieve this, the use a dual-purpose chicken breed like Noiler looks a viable option. Noiler is a hybrid of broiler and cockerel, having the high resistant quality of cockerel and meat characteristics of broilers (Agricinfo.com, 2018). Feed remains the most expensive input in poultry production with cereal grain constituting more than 40% of the feed cost (Oyedeji *et al.,* 2007). Several studies have emphasized the need to utilize alternative feed ingredients of no competition between human and livestock industry (Fanimo *et al.,* 2007; Nsa *et al.,* 2007).

Coconut meal is a by-product of coconut oil extraction. It is relatively high in residual oil which makes it a valuable energy source with high potential to serve as alternative to maize in diet formulation (Daghir, 2008) for poultry. Sundu *et al.* (2009) reported possible utilization of coconut meal in broiler diet, however, little or no information is available on the utilization of coconut cake meal as partial replacement for maize in Noiler diet. This research was therefore conducted to assess the effect of replacing maize with coconut cake meal on growth performance, carcass characteristics and economics of production of Noiler strain of chicken.

Materials and Methods

Experimental site

The study was carried out at the Poultry unit of Teaching and Research Farm, Adeyemi Federal University of Education, Ondo, Ondo state.

Experimental birds

A total number of 100, 5-week old Noilers were used for this experiment. The birds were randomly allotted to five experimental groups, replicated twice with 10 birds per replicate in a completely randomized design. The initial weights of the birds were taken before the

commencement of the trial and ranged between 460.50g and 477.50g.

Experimental diets and feeding

Experimental diets (Table 1) were formulated such that maize was replaced with coconut cake meal at 0, 10, 20, 30, and 40% levels.

Table 1: Percentage composition of experimental diet

Ingredients	Levels				
	0	10	20	30	40
Maize	65.0	58.5	52.0	45.5	39.0
Coconut Cake	0.0	6.5	13.0	19.5	26.0
Concentrate	27.5	27.5	27.5	27.5	27.5
Wheat Offal	7.5	7.5	7.5	7.5	7.5
Total	100	100	100	100	100

Birds were fed twice daily for a period of 56 days. Feeds were weighed before given to birds and the weight of leftover was also taken on daily basis to determine the feed consumption. Weekly weight gain was determined throughout the experimental period.

Carcass evaluation

At the end of the eight weeks feeding trial, four birds were selected per treatment making a total of 20 birds for carcass and organ evaluation. The birds were slaughtered following the conventional method (Ahmed, *et al*., 2015) and allowed to bleed. The birds were later scalded by dipping in warm water (50-55ºC) before being defeathered. The defeathered birds were eviscerated, the head, shank and neck were also separated from the carcass and the dressed weight was taken. Each dressed carcass was cut into parts as reported by Ojewola and Longe (1999) for the purpose of cut parts evaluation. All parts were weighed and expressed as percentage of dressed weight.

Cost analysis

Cost of diets was calculated by summing up the cost of each ingredient that make up 100kg of each treatment diet, which was thereafter reduced to cost (in Naira) per kg/diet.

Data analysis

Data collected were analyzed using Analysis of Variance (ANOVA) and the significant differences between treatment means were separated using Duncan Multiple Range Test with the aid of Statistical Package for Social Sciences (SPSS, 2012).

Results and Discussion

The result shows that there is no significant ($P>0.05$) difference in the initial weight of birds used for this experiment and thus has no influence on final live weight gain. There is no significant difference in the final live weight, total and daily weight gain of birds fed 40% level of maize replaced with coconut cake meal when compared with those fed the control. This result is contrary to the observation of Bernade *et al,* (2001) who reported that the final live weight of the broiler birds fed coconut meal-based diet was significantly higher when compared with those fed the control diet. Result shows that the total feed intake of Noiler fed maize replaced with coconut cake diet at 30-40% level of replacement were significantly higher when compared with those on the control. This result is similar to that of Bawa *et al.* (2006) who reported that feed intake is significantly higher in rabbit fed 40% levels of graded palm kernel cake when compared with those fed control while feed efficiency is significantly lower at these levels of replacement when compared with those on the control diet. Price (₦/Kg) of feed decreased significantly ($P<0.05$) with increased levels of coconut cake meal fed in place of maize in the diets. The cost of the diets was influenced by the low cost of CC when compared with maize that was replaced.

Table 2: Effect of replacing maize with coconut cake on the growth performance and cost analysis of Noiler strain of chicken.

Parameters	0	10	20	30	40	SEM
Initial Weight (g)	460.50	466.25	472.0	455.5	477.5	6.20
Final Weight (g)	1881.0^{b}	1746.0^{ab}	1885.0^{b}	1673.0^{a}	1768.0^{ab}	24.09
Total Weight Gain (g)	1419.5^{b}	1279.75^{ab}	1414.15^{ab}	1233.5^{a}	1290.5^{ab}	23.81
Daily Weight Gain (g)	25.35^{b}	22.85^{ab}	25.23^{b}	21.69^{a}	23.05^{ab}	0.43
Total Feed Intake (g)	5223.2^{a}	5425.85^{b}	5538.5^{c}	5571.0^{c}	5657.50^{d}	16.17
Daily Feed Intake (g)	95.10^{a}	96.65^{a}	98.87^{b}	99.49^{b}	100.10^{c}	0.026
FeedGain Ratio	3.88^{a}	4.39^{abc}	4.04^{ab}	4.66^{c}	4.54^{bc}	0.08
Price/Kg Feed (₦)	126.1^{e}	118.93^{b}	111.78^{c}	104.64^{b}	97.68^{a}	1.01
Feed /Kg Bird (₦)	489.90^{ab}	522.10^{b}	451.37^{ab}	485.59^{ab}	443.47^{a}	9.08

abc:*Means value within row carrying different super scripts differed significantly (P<0.05)*.

Price (₦/Kg) of processed weight produced was significantly (P<0.05) lower in birds fed 40% level of maize replacement when compared with those fed 10% CC. This result is in conformity with that of Onunkwo *et al.* (2018) when they fed duck with maize replaced with Palm Kernel Cake. They reported significant low reduction in the price of feed and that of duck eggs produce with maize replace with Palm kernel cake diets.

Table 3: Effect of replacing maize with coconut cake on carcass characteristics of Noiler strain of chicken.

Parameters	0	10	20	30	40	SEM
Live Shrunk weight (g)	1812.50^{a}	1853.75^{ab}	1950.00^{b}	1750.00^{a}	1980.00^{b}	36.27
Defeathered weight (g)	1705.00^{c}	1740.00^{b}	1785.00^{bc}	1582.50^{a}	1725.00^{ab}	30.45
Dress Carcass weight (g)	1319.26	1273.52	1313.87	1169.12	1310.37	28.26
Thigh weight (%)	16.75	16.65	16.24	14.59	14.60	0.41
Drumstick weight (%)	16.34	14.06	15.03	15.38	16.51	0.39
Breast weight (%)	26.39	25.10	23.17	26.24	24.34	0.55
Back weight (%)	18.24	17.32	19.80	19.74	20.21	0.52
Wingweight (%)	17.49	17.71	16.40	15.81	15.73	0.49
Neckweight (%)	8.31	8.70	9.33	8.24	8.17	0.26
Gizzard weight (%)	2.97	2.56	2.48	3.25	3.11	0.17
Liverweight (%)	1.80	2.01	1.80	1.85	1.93	0.08
Heartweight (%)	1.30^{b}	0.51^{a}	0.46^{a}	0.47^{a}	0.47^{a}	0.17^{a}
Shankweight (%)	4.06	4.49	4.50	5.53	4.75	0.22
Pluckweight (%)	0.59	0.58	0.50	0.41	0.44	0.02
Heartweight (%)	3.23	3.50	3.61	3.78	3.44	0.11
Fatweight (%)	1.38	1.80	1.98	2.39	2.38	0.22
Intestine weight (%)	3.93	4.28	4.77	4.23	3.90	0.16

abc:*Means within a row carrying different super scripts differed significantly (P<0.05).*

The result shows that there is no significant (P<0.05) difference in the percentage weight of primal parts of Noiler fed maize replaced with coconut cake meal across the treatments. Test diets exert no significant differences on the internal and external offals of the experimental birds, suggesting that coconut cake meal does not possess any anti-nutrients or toxic compound that

impacts negatively on the assessed primal parts This result is in agreement with Medegu, (2010) who reported no significant difference in the fat weight of broiler placed on varying levels of coconut cake meal diet. Percentage weight of vital organs like heart and liver were not influenced by the diets suggesting that inclusion of coconut cake meal in Noiler diet does not result in the hypertrophy of these organs.

Conclusion

Coconut cake inclusion in Noiler diet significantly increased bird feed intake at 30-40% levels of maize replacement. However, the diet exerts no significant differences on the final, total and daily weight gain of birds at 40%level of maize replacement when compared to the control. The primal parts and offals percentage weights were not influenced by the test diets. It could therefore be suggested that coconut cake meal could be incorporated into Noiler's diet up to 40% level of inclusion. This will reduce the Price per Kg of feed and the Price/Kg of processed Noiler chicken, particularly in Nigeria where the waste is of no economic value in human diet.

Recommendation

The following recommendations are suggested: Coconut cake may replace maize up to 40% with satisfactory results in the diets of Noiler. Maize replaced with coconut cake at 40% gave the satisfactory result economically. Coconut cake to be used should not be stored for long time before use to avoid rancidity of the feed ingredient.

References

Agricinfo.com 2018. LIFA's Livestock Industry Foundation for Africa's Acess on January 20, 2018. http:/blog.lifango.org/2018/01/noiler-suitable-breed-for-lifas-livestock-mixed-portfolio-concept/.

Ahmed, H. O., Zaiton, H. and Mohd, N. A. M. 2015. Effect of slaughtering methods on meat quality indicators, chemical changes and microbiological quality of broiler chicken meat during refrigerated storage. *J. of Agri. and Vet. Sci*., 8(9): 12-17

Ani, A. and Okeke O. 2011. Feed particle size, whole wheat inclusion and Xylase supplementation in broiler diets: Influence on performance, Digesta Characteristics and digestive tract development. PhD Thesis Massey University, Palmerston North, Newzealand.Pp 11-17

Bawa, G. S., Adeyinka F. D. and Daudu, O. M. 2006. Effect of graded levels of palm kernel cake on performance of grower rabbits.*Pakistan Journal of Nutrition,* 5 (1) 71-74

Bernade, B, Cocjin, F. E.,Evangelio C. and Rola B. S. 2001. Fresh coconut meal in poultry rations. West Vishay UniversityIloilo City. Pp 189-198.

Daghir, N. J. 2008. Poultry Production in Hot Climates.(N.J. Daghir, Ed) 2nd Edition. CAB International, Wallingford, UK. Pp.133-179.

Duncan, D. B., 1995. New Multiple Range and Multiple Test. *Biometrics* 11: 1-42.

Fanimo, A. O., Adebayo, A. J., Oduguwa, O. O. and Biobaku, W. O., 2007. Feeding value of cashew testa for broiler chickens. *Nigerian Journal of Animal production*, 34(1): 83–93.

MedeguI., Kwari, I. D., Nkama, I, Mohammed I. D. and Hamakes, B. 2010. Performance and economics of production of broiler chicken fed millet of sorghum as replacement for maize in the semi-arid zone of Nigeria. *Agriculture and Biology* 11(4): 445-450.

Nsa, E. E., Okereke, C. O. and Okon, B., 2007. Effects of supplementary green feed stuffs on growth performance internal organs development and abdominal fat deposition in finisher broiler chickens. Proceedings of the 32rd Annual conference of Nigerian society for Animal production (NSAP), 18th – 21st March, 2007

Obi, C. I. 2003. Game production: An alternative beef cattle production in Southern Nigeria. *Academic Forum 4*:36-40.

Ojewola, G. S. and Longe, O. G. 1999. Comparative response and carcass composition of Broiler chickens fed various protein concentration. ASANConference Proceedings. Pp.9-12

Onunkwo, D. N., Ugwuene, M. C., Eze, J. C. and Okpechi, F. C. 2018 Replacement Value of Palm Kernel Meal for Maize on Growth, Egg Quality and Economic Parameters of Local Duck Hens. *Nigerian J. Anim.Sci.*20 (1) 145-151

Oyedeji, J. O., Orheruata, A. M., Omatsuli, M. 2007. Effects of feed rationing on the laying performance of 40 weeks in lay hens. *J Food Agri Environ* 5: 301-303

Sundu, B., Kumar, A., Dingle, J. 2009. Feeding value of copra meal for broilers. *World Poult. Sci. J.,* 65 (3):481-491

Statistical Package for Social Science (SPSS) (2012). 20 versions. SPSS user's guide.

Date received: 15th June, 2022

Date accepted: 9th January, 2023.