



ECONOMIC VIABILITY OF CORN HOMINY MEAL AS A PARTIAL REPLACEMENT FOR MAIZE IN COMMERCIAL BROILER PRODUCTION IN NIGERIA

Izebu, P. O. and Omoikhoje, S. O.

Department of Animal Science, Faculty of Agriculture,
Ambrose Alli University, Ekpoma, Edo State, Nigeria
Corresponding Author's Email: richestlogic@gmail.com

ABSTRACT

This study evaluated the economic viability of replacing maize with corn hominy meal (CHM) at graded levels in broiler diets. One hundred and forty-four (144) day-old Anak 2000 broiler chicks were assigned to four dietary treatments in a completely randomised design (CRD), with CHM replacing maize at 0% (Diet 1, control), 20% (Diet 2), 40% (Diet 3) and 60% (Diet 4). Each treatment had three replicates of twelve birds. Prevailing market prices of feed ingredients and live birds were used for cost-benefit analysis. At the starter phase, feed cost per kilogram weight gain decreased progressively as CHM inclusion increased, with the lowest value recorded in Diet 3 (₦93.30/kg). At the finisher phase, Diet 3 also recorded the lowest feed cost per kilogram weight gain (₦95.73/kg) and lowest total feed cost per bird (₦417.20). Overall, birds fed 40% CHM generated the highest income (₦2,860.00/bird) and net profit (₦2,182.80/bird), representing a 12.84% improvement in net profit over the control. Birds fed 60% CHM performed worst economically despite having the lowest diet cost per kilogram, due to poor live weight at slaughter. It is concluded that 40% CHM inclusion is the economically optimal level for maize replacement in commercial broiler production in Nigeria.

Keywords: Broiler, Production, Cost-benefit, Maize, Replacement, feed-cost

INTRODUCTION

Broiler production is widely regarded as the fastest route to increasing animal protein supply in developing countries, owing to the short generation interval and efficient feed-to-meat conversion of broiler chickens (Hatab *et al.*, 2019; Mottet and Tempio, 2017). In Nigeria, however, the profitability of commercial broiler enterprises is severely constrained by the high and volatile cost of feed, which accounts for over 70% of recurrent production costs (Akinmutimi, 2004). Maize, which constitutes 50–65% of standard broiler rations as the primary energy source (Durunna *et al.*, 2006), is subject to intense competition from human consumption and industrial uses including brewing, starch production and ethanol processing, driving its market price to levels that erode farm profitability. This economic pressure has catalysed research into agro-industrial by-products as affordable alternatives to conventional feed ingredients. Several studies have demonstrated that strategic inclusion of by-products such as indomie waste (Eniolorunda *et al.*, 2007), cassava root meal (Okereke, 2012) and cornflakes waste meal (Omoikhoje *et al.*, 2010) can reduce feed cost per unit weight gain without adversely affecting bird performance. Onuh (2005) reported feed cost savings of 7.22–15.22% when agro-industrial by-products were incorporated into finishing broiler diets.

Corn hominy meal (CHM) is a dry milling by-product of maize comprising approximately 35% of the grain by dry weight, consisting of an inseparable mixture of germ, pericarp and endosperm fractions (Stock *et al.*, 2000). Its nutritional profile — crude protein 15.0–16.5%, crude fibre 6.5–6.9%, ether extract 4.0–7.9% and metabolisable energy 2,450–3,300 kcal/kg DM (Feedipedia, 2023; Kaczmarek *et al.*, 2009) — positions it as a potentially cost-effective and nutritionally adequate partial replacement for maize in broiler rations. Despite this potential, economic analyses of CHM inclusion in Nigerian broiler production are sparse in the published literature.

This study therefore evaluated the cost and returns of feeding broiler chickens diets in which CHM replaced maize at 0, 20, 40 and 60% inclusion levels, with the aim of identifying the economically optimal substitution level for commercial application.



MATERIALS AND METHODS

Experimental Animals, Design and Diets

One hundred and forty-four (144) day-old Anak 2000 broiler chicks were used in an eight-week feeding trial conducted at the Teaching and Research Farm, Ambrose Alli University, Ekpoma, Edo State, Nigeria (latitude 6.44°N, longitude 6.80°E). Birds were assigned to four dietary treatments in a completely randomised design (CRD), with three replicates of twelve birds per treatment. Corn hominy meal replaced maize at 0% (Diet 1, control), 20% (Diet 2), 40% (Diet 3) and 60% (Diet 4) in broiler starter (weeks 1–4) and finisher (weeks 5–8) diets. All diets were formulated to be isonitrogenous (22% CP starter; 19% CP finisher) and isocaloric (2,800 and 3,000 kcal ME/kg, respectively). Birds were managed on deep litter with *ad libitum* access to feed and water throughout the study period.

Table 1: Percentage Composition and Calculated Nutrient Content of Experimental Broiler Starter Diets

Ingredient (kg/100 kg)	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)
Maize	58.79	46.99	35.19	23.39
Corn hominy meal	0.00	11.80	23.60	35.40
Soyabean meal	31.27	31.64	31.69	31.74
Wheat bran	2.64	2.14	2.13	2.12
Palm kernel cake	2.44	2.33	2.29	2.25
Fish meal	1.74	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Broiler premix	0.30	0.30	0.30	0.30
Salt	0.30	0.29	0.29	0.29
Total	100.00	100.00	100.00	100.00
Calculated composition (%)				
Crude protein	23.00	23.37	22.51	22.64
Crude fibre	3.50	3.82	4.17	4.51
Ether extract	3.30	3.49	3.67	3.84
Calcium	1.00	1.00	1.00	1.00
ME (kcal/kg)	2800	2846	2885	2824



Table 2: Percentage Composition and Calculated Nutrient Content of Experimental Broiler Finisher Diets

Ingredient (kg/100 kg)	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)
Maize	61.30	49.04	36.78	24.52
Corn hominy meal	0.00	12.26	24.52	36.78
Soyabean meal	28.16	28.23	28.27	28.31
Wheat bran	3.00	3.00	3.00	3.00
Palm kernel cake	2.41	2.37	2.33	2.29
Fish meal	1.97	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Broiler premix	0.30	0.30	0.30	0.30
Salt	0.30	0.29	0.29	0.29
Total	100.00	100.00	100.00	100.00
Calculated composition (%)				
Crude protein	21.00	21.16	21.30	21.44
Crude fibre	3.38	3.74	4.09	4.45
Ether extract	3.36	3.55	3.73	3.92
Calcium	1.00	1.00	1.00	1.00
ME (kcal/kg)	2819	2755	2692	2628

Cost and Returns Analysis

The prevailing market prices of all feed ingredients and day-old chicks at the time of the study were used to compute feed costs. The cost of corn hominy meal was lower than that of maize, reflecting its by-product status in the local market. Feed cost per kilogram of diet, feed cost per kilogram weight gain, total feed cost per bird, total cost of production (feed cost plus cost of day-old chick), gross income and net profit per bird were estimated. Gross income was calculated from the live market weight of each treatment group multiplied by the prevailing market price of live broilers. Net profit was computed as gross income minus total cost of production. A net profit index was derived by expressing the net profit of each treatment as a percentage of the control diet net profit, to facilitate comparison across treatments.

RESULTS AND DISCUSSION

Starter Phase Feed Costs

The cost and returns analysis at the starter phase is presented in Table 1. The cost of day-old chicks was uniform at ₦260.00/bird across all treatments. Feed cost per bird at the starter phase was highest in Diet 2 (₦117.65) and lowest in Diet 4 (₦111.76), while Diet 3 recorded ₦112.76. This pattern reflects the lower unit cost of CHM relative to maize, with savings becoming more pronounced at higher inclusion levels. Notably, the cost of feed per kilogram weight gain was lowest in Diet 3 (₦93.30/kg), followed by Diet 4 (₦96.98/kg), Diet 2 (₦113.50/kg) and highest in the control (₦115.21/kg). The superior feed cost efficiency of Diet 3 at the starter phase indicates that 40% CHM replacement confers an economic advantage without compromising feed utilisation efficiency, consistent with the performance data reported separately.



The cost of feed per kilogram of diet declined progressively from ₦121.27/kg in Diet 1 to ₦103.92/kg in Diet 4 — a reduction of approximately 14.3% — demonstrating the direct cost-reduction effect of substituting maize with the cheaper CHM. Extrapolated to a commercial scale, this translates to savings of approximately ₦1,823/100 kg of diet formulated, a meaningful margin for smallholder producers operating on thin profit margins.

Table 1: Cost of Feed at the Starter Phase (weeks 1–4) for Broiler Chickens Fed Graded Levels of Corn hominy Meal

Parameter	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)
Cost of day-old chicks (₦/bird)	260.00	260.00	260.00	260.00
Cost of feed consumed (₦/bird)	115.69	117.65	112.76	111.76
Cost of feed/kg weight gain (₦)	115.21	113.50	93.30	96.98
Cost of feed/kg diet (₦)	121.27	113.50	109.76	103.92
Cost of feed/25 kg (₦)	3,031.80	2,836.45	2,743.95	2,597.90
Cost of feed/100 kg (₦)	12,037.10	11,232.00	10,823.20	10,214.20

Finisher Phase Feed Costs

At the finisher phase (Table 2), feed cost per bird was highest in Diet 1 (₦362.89) and lowest in Diet 3 (₦304.44), with Diet 4 recording ₦310.39 slightly higher than Diet 3 despite its lower diet unit cost. This apparent anomaly is explained by the higher daily feed intake of birds in Diet 4 (108.53 g/bird/day) compared to Diet 3 (100.46 g/bird/day), reflecting compensatory eating behaviour associated with the elevated fibre content at 60% CHM inclusion.

Feed cost per kilogram weight gain at the finisher phase followed a similar trend to the starter phase, with the lowest value in Diet 3 (₦95.73/kg), followed by Diet 4 (₦100.30/kg), Diet 2 (₦118.40/kg) and highest in the control (₦120.10/kg). The consistently superior feed cost efficiency of Diet 3 across both phases underscores the economic advantage of 40% CHM inclusion. The cost savings of ₦24.37/kg weight gain relative to the control (20.3% reduction) represent a substantial improvement in production economics, particularly relevant in a context where feed cost pressure is the primary threat to broiler enterprise viability.

Table 2: Cost of Feed at the Finisher Phase (weeks 5–8) for Broiler Chickens Fed Graded Levels of Corn hominy Meal

Parameter	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)
Cost of feed consumed (₦/bird)	362.89	332.05	304.44	310.39
Cost of feed/kg weight gain (₦)	120.10	118.40	95.73	100.30
Cost of feed/kg diet (₦)	120.37	112.32	108.23	102.14
Cost of feed/25 kg (₦)	3,009.25	2,808.00	2,705.80	2,553.53

Overall Profitability

The overall profitability summary is presented in Table 3. Total feed cost per bird was lowest in Diet 3 (₦417.20), followed by Diet 4 (₦422.15), Diet 2 (₦449.70) and highest in the control (₦478.58). Total cost of production — which includes the cost of day-old chicks — was also lowest in Diet 3 (₦677.20), compared to ₦682.15, ₦709.70 and ₦738.58 for diets 4, 2 and 1 respectively.

Gross income was highest from birds fed Diet 3 (₦2,860.00/bird), reflecting the superior live weight achieved at that inclusion level (2.60 kg/bird), and lowest from Diet 4 birds (₦2,046.00/bird), whose depressed live weight at the finisher phase (1.85 kg/bird) severely limited slaughter income. This



finding illustrates the critical point that low diet cost alone does not guarantee profitability — production performance must be maintained at a level sufficient to generate adequate slaughter weight and income.

Net profit per bird was highest in Diet 3 (₦2,182.80), representing a 12.84% improvement over the control (₦1,934.42) as reflected in the net profit index. Diet 2 also outperformed the control by 4.34% (₦2,018.31/bird). Diet 4, despite having the lowest diet cost per kilogram, generated the lowest net profit (₦1,363.85/bird) — a 29.5% reduction relative to the control — due entirely to the live weight penalty at 60% CHM inclusion. These results affirm that the optimal economic outcome is achieved at 40% CHM replacement, where reduced feed cost and maintained growth performance converge to maximise profitability.

These findings are consistent with those of Onuh (2005), who reported feed cost savings of 7.22–15.22% when agro-industrial by-products were included in finishing broiler diets, and with Eniolorunda *et al.* (2007), who demonstrated that maize substitution with indomie waste at 50% reduced production cost and enhanced net profit. The present study extends these findings to CHM under Nigerian tropical conditions, providing a practically actionable recommendation for producers.

Table 3: Overall Profitability of Broiler Production fed Graded Levels of Corn hominy Meal Inclusion

Parameter	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)
Total feed cost (₦/bird)	478.58	449.70	417.20	422.15
Total cost of production (₦/bird)	738.58	709.70	677.20	682.15
Income (₦/bird)	2,672.00	2,728.00	2,860.00	2,046.00
Net profit (₦/bird)	1,934.42	2,018.31	2,182.80	1,363.85
Net profit index (%)*	100.00	104.34	112.84	70.52

*Net profit index = (Net profit of treatment / Net profit of control) × 100

CONCLUSION AND RECOMMENDATION

This study demonstrates that replacing maize with corn hominy meal at 40% inclusion level in broiler diets is economically optimal under Nigerian production conditions. At this level, feed cost per kilogram weight gain was reduced by over 20% relative to the maize control, total production cost was minimised, and net profit per bird was maximised at ₦2,182.80, representing a 12.84% improvement over the control. Inclusion at 60% CHM, while achieving the lowest diet unit cost, resulted in depressed live weight and significantly reduced profitability. Poultry farmers, especially smallholders, are encouraged to adopt 40% CHM as a strategic maize substitute to improve the economic viability of broiler enterprises in Nigeria. Future studies should validate these findings under varying CHM market price scenarios and across different production seasons to assess robustness of the economic advantage.

ACKNOWLEDGEMENTS

The authors thank the technical staff of the Teaching and Research Farm, Ambrose Alli University, Ekpoma, for assistance during the study. The institutional support of the Department of Animal Science, Faculty of Agriculture, Ambrose Alli University is gratefully acknowledged.

REFERENCES

- Akinmutimi, A. H. (2006). Evaluation of sword bean as an alternative feed resource for broiler chickens. PhD Thesis, Michael Okpara University of Agriculture, Umudike, Nigeria.
- Durunna, C. S., Udedibie, A. B. I. and Anyanwu, G. A. (2006). The replacement value of sun-dried cassava peel for maize in the diets of broiler chicks. *Journal of Animal and Veterinary Advances*, 5(1): 14–18.
- Eniolorunda, O. O., Dada, E. O. and Afolabi, A. O. (2007). Replacement of maize with indomie waste in layer diets: effect on performance and egg quality. *Nigerian Journal of Animal Production*, 34(1): 92–98.



- Feedipedia (2023). Maize bran and hominy feed. Animal Feed Resources Information System. INRAE, CIRAD, AFZ and FAO. Available at: <https://www.feedipedia.org/node/712> [Accessed April 2025].
- Hatab, A. A., Cavinato, M. E. R. and Lagerkvist, C. J. (2019). Urbanization, livestock systems and food security in developing countries: a systematic review of the literature. *Food Security*, **11**(2): 279–299.
- Kaczmarek, S., Bochenak, M., Jozefiak, D. and Rutkowski, A. (2009). Effect of enzyme supplementation of diets based on maize or hominy feed on performance and nutrient digestibility in broilers. *Journal of Animal and Feed Sciences*, **18**(1): 113–123.
- Mottet, A. and Tempio, G. (2017). Global poultry production: current state and future outlook and challenges. *World's Poultry Science Journal*, **73**(2): 245–256.
- Okereke, C. O. (2012). Utilisation of cassava, sweet potato and cocoyam meals as dietary sources for poultry. *World Journal of Engineering and Pure and Applied Science*, **2**(3): 63–68.
- Omoikhoje, S. O., Obasoya, D. O., Osifo, B. A. and Iwaloye, K. M. (2010). Blood constituents of broiler chickens as affected by cornflakes waste-based diets. *Journal of Research and Policies*, **5**(1): 54–58.
- Onuh, M. O. (2005). Performance characteristics of finishing broilers fed different agro-industrial by-products. *Nigerian Journal of Animal Production*, **32**(1): 53–58.
- Stock, R. A., Lewis, J. M., Klopfenstein, T. J. and Milton, C. T. (2000). Review of new information on the use of wet and dry milling feed by-products in feedlot diets. *Proceedings of the American Society of Animal Science*, pp. 1–12.