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Performance and Economic of Production of Broiler Chickens fed Maize and Yam Peels based Diets supplemented with Xylanase, Amylase and Protease Multi-enzymes at starter phase Target audience: Nutritionist, researchers, feed millers and poultry farmers

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Abstract

*This study was conducted to investigate the effect of maize and yam peels meal based diets with and without enzyme supplementation on the growth performance and economic of production of broiler chickens at starter phase**.** One hundred and eighty (180) day old broiler chicks were fed six diets in two groups. The first group of diets contained: maize replaced with yam- peel (YPM) at 0%, 15% and 30 % levels without enzyme supplementation designated as T1, T2 T3 respectively. The second group of diets contained maize replaced with YPM at 0%, 15% and 30% with enzyme supplementation of 50g/kg designated as T4, T5 T6 respectively. Birds were allotted to 6 dietary treatments in a completely randomized design. Each treatment was replicated 3 times consisting of10 chicks per replicate. The experiment lasted for 4 weeks. The results of growth performance showed significant differences (P<0.05) in final weight, weight gain, daily weight gain and feed intake. . Higher l values were recorded for birds fed T1 (control diet) and T6 (diet containing 30% yam peel meal with enzyme supplementation) across the treatments. . Birds fed control diet (T1) and diet containing 30% yam peel meal with enzyme (T6) had higher values of 909.93g and 903.21g respectively for final weight at comparative level to others. However, lower significant (P < 0.05) values were obtained for birds fed T4 (diet containing 0% yam peel meal with enzyme) and T5 (diet containing 15% yam peel meal with enzyme supplementation) across the parameters measured. No significant differences (P > 0.05) in feed conversion ratio. However, operation cost and cost of DOC interaction of yam peel meal and enzyme showed significant difference (P < 0.05) in determining for economic production. The economic analysis revealed that cost in ₦/kg of diet decreased linearly with increased of level of yam peel meal with and without enzyme supplementation in the diet. Birds fed control diet (T1) and diet contained 0g yam peel meal with enzyme (T4) had higher values for cost of feed consumed per bird, cost of production, feed cost percentage and total cost. The profit margin ranged from ₦154.80 - ₦ 178.40 for birds fed diet contained 30% yam peel meal with enzyme (T6) having the highest gross margin. Based on the results of this study, it was concluded that yam peel meal can replace maize up to 30% in broiler starter ration with or without enzyme for improved performance with some reduction in the cost of production. .. From economic point of view in term of profit margin, 30% yam peel meal with enzyme supplementation is recommended.*

Key words: Yam peel meal, enzyme, performance, economic production, broiler chicks

Description of problem

The problem of animal protein scarcity in Nigeria and other developing nations has attained a deplorable status which calls for an urgent remedy to avert malnutrition. This problem has been blamed on high cost of conventional ingredients for feed making which has made higher cost of monogastric animal feeds leading to increase the cost of production (1). Madubuike and Ekenyem (2) had rated feeds to constitute 70 - 80% of the cost of poultry production and maize in particular account for the major costs of feed production in monogastric animal feeding. The

increased human population and livestock feed companies as resulted in an escalating price of maize in Nigeria. This high price of maize has forced farmers to seek for alternative by utilizing yam-peel for its replacement in livestock feeding. Several scientists in Nigeria have shown that yam peel can be used in diets of livestock (3).

However, sub-optimal production of the pulses and cereals causes stiff competition between man and his livestock in feed consumption. There is therefore urgent need to explore cheaper alternative feed resources to reduce the competition. Several effort were made by using some agro by-products in the diets of broiler chicks these include wheat offal and citrus pulp in broiler diets (4), palm kernel cake to replace soya bean meal as a protein source in broiler chicken production and the results were indicating some encouragement in reducing the cost of production.

Constraints on the use of by-products and crop residues according to (5) include: bulkiness, location in areas with lower animal population density, poor nutritive value and unsuitability for direct animal use. In Nigeria today, the issue of the bulkiness and location in areas far from those where the materials are needed has been partially solved by the development of a good network of roads and the opening up of the rural areas for development.

As regards the poor nutritive value and non-suitability for immediate animal use, research results have shown that physical treatments methods (grinding and pelleting) improve the nutritive value and intake and hence the response of animals to some of agro by-products. El Hag and Kurdi (5) concluded that physical treatment was more useful in improving the nutritive value of agro by-products and was also economically more feasible than the chemical treatment. Agro-industrial by-products and crop residues represent a vast animal feed resource, which is as yet largely unexploited. Yam peels are wastes and a by- product of processing when the tubers are being prepared by human. Yam peel is however, fed to animals such as goats and sheep and readily available at yam processing centres who remove the peels and discard it as waste.

However, information on the chemical composition of yam peel is scanty. One of the challenges of yam peel meal (YPM) is present of anti-nutritional factors such as: Oxalate, tannin, phytate and saponin (6). There is need to conduct a research that will focus on cost effective feed stuff as a way to promote poultry production. It is therefore necessary to survey and identify the available feedstuffs that are cheap and affordable for broilers production.

The major challenge militating against the use of yam peel is the present of anti-nutritional factors which includes: Oxalate, tannin and saponin. Among adopted methods for treating anti-nutritional factor in feed ingredients enzyme supplementation is in the lead. Every necessary action is required to save the poultry industry from imminent disaster which could reduce by feed scarcity or excessive hick in price. It is imperative to look for alternative ingredient to maize if the safety of the industry is to be guaranteed. This study focused on utilization of agro-industrial by product which is readily available, cheap and has nutritive value such as yam peel as a partial replacement for maize.

Materials and Methods

Experimental site

The study was conducted at the Poultry unit of the Teaching and Research Farm, Taraba State University Jalingo located between latitude 2^0 – 50N and longitude 11^o – 25E in Guinea savannah zone of northern Nigeria. The annual rain fall is between 1,000 – 1,500 mm with an average temperature of 30^oC (7).

Test ingredients and preparation

Yam peels were collected fresh from kitchens and yam processing centers, the peels were sun dried for 5 - 7 days until constant dry matter was achieved and this also reduced the enzymatic and microbial reactions which could lead to spoilage of nutrient. The dried yam peels were milled in hammer mill of 2mm mesh size before compounding the feed.

Experimental diets

A total of six isonitrogenous diets were formulated for starter chicks to meet (8) minimum nutrient requirement. The diets were formulated such that maize was replaced by yam peels on weight to weight basis. The replacement is in order of 0 %, 15% and 30 % of yam peels meal (YPM) with 0g/kg and 50g/kg levels of enzyme supplementation. The second dietary treatments contained Maize based diet contained 0kg, 15kg and 30kg levels of YPM without enzyme as T1, T2 T3 and Maize based diet contained 0%, 15% and 30% levels of YPM with 50g/kg enzyme supplementation in T4, T5 and T6 respectively as presented in Table.

Table 1: Percentage composition of broiler starter diets (0-4 weeks)

	Ttreatments					
	without enzymes			**(with enzymes)**		
	0	**15**	**30**	**0**	**15**	**30**
Ingredients	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**
Maize	52.00	37.00	22.00	52.00	37.00	22.00
YPM	0.00	15.00	30.00	0.00	15.00	30.00
Soya bean meal	18.40	18.50	18.50	18.50	18.50	18.50
Groundnut cake	17.20	16.20	16.20	16.20	16.20	16.20
Fish meal	3.00	3.00	3.00	3.00	3.00	3.00
Rice offal	5.00	6.00	6.00	6.00	6.00	6.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Lime stone	1.50	1.50	1.50	1.50	1.50	1.50
DL-Methionine	0.30	0.30	0.30	0.30	0.30	0.30
L-Lysine	0.10	0.10	0.10	0.10	0.10	0.10
Salt	0.25	0.25	0.25	0.25	0.25	0.25
*Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00
ME (kcal/kg)	2856.15	2794.65	2733.15	2856.15	2794.65	2733.15
Crude protein (%)	23.26	23.12	23.00	23.26	23.12	23.00
Crude fibre (%)	3.47	4.43	5.38	3.47	4.43	5.38
Ether extract (%)	4.18	3.73	3.27	4.18	3.73	3.27
Ca (%)	1.25	1.25	1.26	1.25	1.25	1.26
P (%)	0.46	0.45	0.44	0.46	0.45	0.44
L-Lysine (%)	1.13	1.09	1.05	1.13	1.09	1.05
DL-Methionine (%)	0.64	0.61	0.58	0.64	0.61	0.58

*YPM= yam peels meal

Table 2: Proximate composition of yam-peels meal

Constituents	Percentage (% DM)
Dry matter	87.40
Crude protein	4.38
Crude fibre	9.80
Ether extract	4.43
Ash	6.50
Nitrogen free extract	74.89
Energy (kcal/kg ME)	3,179

Design and management of experimental birds

A total number of 180 day-old unsexed broiler chicks of commercial strain (Mershal®) were purchased from a reputable hatchery. The chicks were weighed and allotted to six dietary treatment groups of three replicates each in a Completely Randomized Design. Each replicate consisted 10 chicks, having a total of 30 birds per treatment. The experiment was arranged in a 2 × 3 factorial experimental layout of two levels of enzyme (0g/100kg diet and 50g/100kg diet) and three levels of yam peels inclusion (0%, 15% and 30%). The Birds were reared on deep litter housing system for four weeks (0-4 weeks). Routine vaccinations and medications were strictly followed and feed and water were provided *ad libitum*.

Data Collection

Performance characteristics

The initial weights of the chicks were taken on arrival. The live weights of the birds as well as the feed consumption of each replicate were measured weekly. Feed conversion ratio for each replicate was determined by dividing the feed intake by the weight gain.

$$Feed\ intake/bird\ (g) = \frac{Quantity\ of\ feed\ fed - Quntity\ of\ feed\ left\ over}{Number\ of\ birds\ \times 28\ days}$$

$$Daily\ weight\ gain\ (g) = \frac{Final\ live\ weight - Initial\ weight}{Number\ of\ birds\ \times 28}$$

$$Feed\ conversion\ ratio\ = \frac{Quantity\ of\ feed\ consumed}{Weight\ gain}$$

Cost of Production analysis of feed

The following parameters were determined using the procedure of (9)

- $Cost\ of\ feed\ per\ kg\ (₦) = \frac{summation\ of\ ingredients \times Cost\ per\ kg\ ingredien}{100}$
- Cost of feed consumed per bird (₦) = Cost per kg of feed × total feed intake per bird (kg)
- Cost/kg gain = cost of feed per kg × feed conversion ratio.
- $Feed\ cost\ (\%) = \frac{Cost\ of\ feed\ consumed}{Cost\ of\ production} \times \frac{100}{1}$
- Cost of production = Operational cost + Cost of feed consumed
- Revenue generated per bird = Weight of the bird × Price/kg live weight
- Profit = Revenue - Total cost.

Statistical Analysis

Data collected were subjected to analysis of variance using SPSS software. Where significant differences exist amongst the treatments, means were separated using Duncan's New Multiple Range Test (DNMRT) (10)

Results and Discussion

The percentage nutrient composition of Yam peel meal is presented in Table 2. The

YPM recorded lower but similar value of 87.40% for dry matter content compared to value of 89.25% reported in the literature (6). Crude protein content recorded 4.38% which is at close range to the value of 4.89% reported by (11). Akinmutimi and Onen, (6) reported higher value of 12.17% for crude protein. This variation in protein content could be as a result of different in the sources of the ingredients. Slightly higher value of 4.43% recorded for ether extract was close to 3.34% reported in the literature (11). Value of 3,179 kcal/kg obtained for gross energy of the YPM supported the value of 3,000 reported in the literature (6). This suggested that yam peel meal can compete favourably with maize in energy value.

The results of main effect of graded levels of yam-peel meal (YPM) and enzymes supplementation on growth performance of starter broiler chickens is presented in Table 3. Final weight, weight gain, daily weight gain, feed intake and daily feed intake were significantly (P< 0.05) influenced by dietary inclusion of YPM. The observations in this study were in contrary to report of (6) who reported no significant (P> 0.05) influence on all the parameters measured for growth performance when broiler chickens were fed graded levels of YPM as a replacement for maize. Birds fed diets containing 0% and 30% inclusion levels YPM had higher (P< 0.05) statistical values across the parameters measured. Birds fed 0% and 30% YPM recorded similar values of 896.69g and 898.36g for final weight compared to 888.17 obtained for birds on 15% YPM. Similar trend was observed for weight gain and feed intake. This observation agreed with the report of (12) who reported highest values for final weight and weight gain in broiler chickens when fed diet containing 30% YPM as replacement for maize. Splitstoeser (13) reported that birds placed on yam-peel meal had faster metabolism rate and thus improved growth performance when birds were fed YPM as a replacement for maize. Higher values recorded for birds fed diet containing 30% yam peel meal by (14) who reported improved growth performance for broiler chickens at high level of YPM inclusion. The improved performance could be attributed to low level of lignin in YPM and hence enzyme supplementation may enhanced appreciable bio-availability of nutrients in the diets. The results of this study were contrary to the report of (15) who reported decreased in values for final weight, weight gain and feed conversion ratio with increased levels of YPM as a replacement for maize in starter broiler chickens. Even though, the graded level of YPM had no significant (P> 0.05) effect on feed conversion ratio. However, numerically, birds fed diet containing 15% YPM inclusion recorded least value of 1.52. This observation was in contrary to the report by (12) who recorded significant (P <0.05) value for birds fed 30% inclusion level of YPM as a replacement for maize.

Enzyme supplementation had significantly (P< 0.05) influenced on final weight, weight gain and feed intake. However, birds fed 0% inclusion level of enzyme had higher value of 899.20g for final weight, weight gain and feed intake followed similar pattern with the final weight at comparative level. This observation disagreed with the report of (16) who reported higher numerical values in final weight and weight gain for birds fed enzyme supplemented YPM. Daily feed intake and feed conversion ratio were not significantly influenced by enzyme supplementation.

Result in Table 4 showed the interaction effect of maize and YPM based diet supplemented with enzyme on growth performance of starter broiler chickens. Final weight, weight gain, daily weight gain, feed intake and daily feed intake were significantly (P <0.05) influenced by dietary inclusion of YPM and enzyme supplementation. Higher

statistical values of 909.93g and 903.21g were recorded for final weight in the birds fed control diet (T1) and diet containing 30% YPM with enzyme (T6). This similar statistical values were observed across parameters for birds fed control diet (T1) and diet containing 30% YPM with enzyme (T6). Birds fed diets containing 15% (T2) and 30% (T3) YPM without enzyme showed similar statistical values for final body weight (894.16g and 893.51g respectively). Similar trend was observed for birds on T2 and T3 throughout parameters measured. However, lower values were recorded for birds fed diet containing 0% YPM with enzyme (T4) and 15% YPM with enzyme supplementation T5 across the treatments. This observation disagreed with the report of (16) who recorded higher numerical values in final weight and weight gain for birds fed enzyme supplemented YPM than the control diet. This observation disagreed with report of (17) and (18) who reported highest weight gain and improved feed conversion ratio (FCR) in birds fed enzyme supplemented diet at comparative level to diet without enzyme. Dietary treatments had no significant ($P<0.05$) influence on feed conversion ratio. This observation corroborated the report of (16) who reported no significant ($P > 0.05$) effect on feed conversion ratio of birds when fed diets containing enzyme supplemented YPM.

Table 3: Main effects of yam peels meal and enzyme supplementation on growth performance of starter broiler chickens (0 – 4 weeks)

Parameter	Yam Peels Meal				Enzyme		
	0 %	15 %	30 %	SEM	0g	50g	SEM
Initial weight (g)	39.34	39.63	39.33	0.30	39.52	39.48	0.25
Final weight (g)	896.69[a]	888.17[b]	898.36[a]	2.58	899.20[a]	889.61[b]	2.10
Weight gain (g/bird)	857.35[a]	848.87[b]	858.32[a]	2.59	859.90[a]	850.13[b]	2.12
Daily weight gain (g/bird)	30.62[a]	30.31[b]	30.67[a]	0.09	30.70	30.36	0.07
Feed intake (g/bird)	1310.00[a]	1294.00[b]	1318.00[a]	3.58	1313.00[a]	1301.00[b]	2.92
Daily feed intake (g/bird)	46.89[a]	46.22[b]	47.05[a]	0.09	46.97	46.47	0.07
Feed conversion ratio	1.53	1.52	1.53	0.00	1.52	1.53	0.00

[ab] Mean on the same row having different superscripts were significantly ($P<0.05$) different.

Table 4: Interaction effects of yam peels meal and enzyme supplementation on growth performance of starter broiler chickens (0 – 4 weeks)

Enzyme	Without Enzyme (0g)			With Enzyme (50g)			
Yam Peels Meal	0%	15%	30%	0%	15%	30%	
Parameters	T1	T2	T3	T4	T5	T6	SEM
Initial weight (g)	39.59	39.78	39.18	39.09	39.46	39.87	0.16
Final weight (g)	909.03^{a}	894.16^{bc}	893.51^{bc}	883.45^{c}	882.18^{c}	903.21^{ab}	4.69
Weight gain (g/bird)	870.34^{a}	855.04^{bc}	854.32^{bcd}	844.36^{cd}	842.71^{d}	863.33^{ab}	2.68
Daily weight gain (g/bird)	31.08^{a}	30.51^{bc}	30.51^{bc}	30.16^{c}	30.10^{c}	30.83^{ab}	0.10
Feed intake (g/bird)	1330.67^{a}	1305.00^{b}	1303.33^{bc}	1288.67^{cd}	1283.00^{d}	1331.67^{a}	4.86
Daily feed intake (g/bird)	47.76^{a}	46.61^{b}	46.55^{b}	46.02^{c}	45.82^{c}	47.56^{a}	0.18
Feed conversion ratio	1.53	1.52	1.52	1.52	1.52	1.54	0.00

^{abcd}Mean on the same row having different superscripts were significantly($P<0.05$) different.

The main effect of graded levels of YPM and enzyme supplementation on economic production of starter broiler chickens is presented in Table 5. With the exception of operational cost and cost for day old chicks (DOC) varying levels of YPM significantly ($P< 0.05$) influenced the parameters determined. Cost per kg diet decreased with increased levels of YPM. Similar trend was observed for cost of feed consumed, cost/kg gain, cost of production, feed cost (%) and total cost. Cost of diets was significantly ($P< 0.05$) decreased with increased in level of YPM inclusion having the lowest cost in the birds fed diet containing 30% YPM. This observation could be attributed to reduced cost per unit of YPM compared to that of maize. Cost/kg diet and cost of production decreased with increased level of YPM (6). Birds on 30% YPM had significantly ($P< 0.05$) higher value (₦177.40) for gross margin. This observation could be attributed to reduction in cost per kilogram of feed with increased level of YPM.

Enzyme supplementation showed that cost of diet/kg, cost/kg gain, total revenue and gross margin were significantly ($P< 0.05$) influenced. Birds fed diet containing 50g enzyme supplementation had higher values for cost of diet and cost per kg gain. Higher profit margin of (₦173.97) was observed for birds on 0g level of enzyme. This result could be attributed to lesser cost of production with 0g as addition of enzyme imposed more cost.

The result of interaction effects of yam peel meal and enzyme supplementation on economic production of broiler chickens is presented in Table 6. With the exception of operation cost and cost of DOC all parameters determined were significantly ($P< 0.05$) influenced by dietary treatments. The economic analysis revealed that cost per kg diet decreased linearly with increased level of YPM with and without enzyme supplementation. Decreased valued for cost/kg diet and cost/kg gain across level of yam peel meal inclusion with and without enzyme supplementation agreed with literature (16). Birds fed control diet (T1) and diet contained 0% YPM with enzyme (T4) revealed higher similar statistical values for cost of feed consumed, cost of production, feed cost percentage and total cost. Birds fed diet contained 30% YPM without enzyme (T3) recorded the least values for cost of diet, cost

of feed consumed, cost per kg gain, cost of production and total cost. Percentage feed cost ranged from 63.91% - 66.08% which is lower than 70 - 80% reported by literature (19). This observation of lower percentage of cost production portray more profit margin. The revenue generated ranged from ₦617.40 - ₦36.53 with birds fed control diet shown highest revenue. The profit margin ranged from ₦154.80 - ₦178.40 with birds fed diet contained 30% yam peel meal with enzyme (T6) revealed the highest gross margin. This could be attributed to moderate value recorded for cost of diet per kg and improved growth performance in the birds fed T6. For a reasonable farmer, the primary objective would be efficient production at least cost to boost chance of profitability.

Table 5: Main effects of yam peels meal and enzyme supplementation on economic production of starter broiler chickens (0 – 4 weeks)

Parameter	Yam Peels Meal				Enzyme		
	0 %	15 %	30 %	SEM	0g	50g	SEM
Cost of diet (₦/kg)	133.07^{a}	126.34^{b}	121.09^{c}	1.01	125.08^{b}	128.58^{a}	0.00
Cost of feed consumed(₦/bird)	174.24^{a}	163.46^{b}	161.36^{b}	0.76	165.49	167.21	0.62
Cost per kg gain (₦/bird)	203.37^{a}	192.45^{b}	185.89^{c}	0.86	191.10^{b}	196.70^{a}	0.70
Operational cost (₦ /bird)	89.80	89.80	89.80	0.00	89.80	89.80	0.00
Cost of production (₦/bird)	263.98^{a}	253.26^{b}	251.16^{b}	0.76	255.25	257.02	0.62
Feed cost (%)	66.00^{a}	64.54^{b}	64.23^{b}	0.11	64.80	65.04	0.08
Cost of DOC (₦ /bird)	200.00	200.00	200.00	0.00	200.00	200.00	0.00
Total cost (₦/bird)	463.98^{a}	453.08^{b}	451.10^{c}	0.54	455.30	456.97	0.44
Total revenue (/bird)	627.43^{a}	621.67^{b}	628.48^{a}	1.74	629.27^{a}	622.46^{b}	1.42
Gross margin(/bird)	163.46^{b}	168.34^{b}	177.40^{a}	1.96	173.97^{a}	165.49^{b}	1.60

^{abc}Mean on the same row having different superscripts were significantly($P< 0.05$) different.

Table 6: Interaction effects of yam peels meal and enzyme supplementation on economic production of starter broiler chickens (0 – 4 weeks)

Enzyme	Without Enzyme (0g)			With Enzyme (50g)			
Yam Peels Meal	0%	15%	30%	0%	15%	30%	
Parameters	T1	T2	T3	T4	T5	T6	SEM
Cost of diet (₦/kg)	131.32^{b}	124.59^{c}	119.34^{d}	134.82^{a}	128.09^{b}	122.84^{c}	1.17
Cost of feed consumed (₦/bird)	174.74^{a}	162.59^{b}	159.14^{c}	173.74^{a}	164.33^{b}	163.58^{b}	1.08
Cost per kg gain (₦/bird)	200.92^{b}	190.21^{d}	182.19^{e}	205.82^{a}	194.69^{c}	189.58^{d}	1.21
Operational cost (₦/bird)	89.80	89.80	89.80	89.80	89.80	89.80	0.00
Cost of production (₦/bird)	264.42^{a}	252.39^{b}	248.94^{c}	263.54^{a}	254.13^{b}	253.38^{b}	1.08
Feed cost (%)	66.08^{a}	64.42^{b}	63.91^{b}	65.92^{a}	64.66^{b}	64.55^{b}	0.15
Cost of DOC (₦/bird)	200.00	200.00	200.00	200.00	200.00	200.00	0.00
Total cost (₦/bird)	464.42^{a}	452.02^{b}	448.94^{c}	463.54^{a}	454.13^{b}	453.25^{b}	1.54
Total revenue (₦/bird)	636.53^{a}	625.93^{bc}	625.33^{bc}	618.33^{cd}	617.40^{d}	631.63^{ab}	2.46
Gross margin(₦/bird)	172.11^{a}	173.41^{a}	176.39^{a}	154.80^{b}	163.27^{b}	178.40^{a}	2.78

^{abcde}Mean on the same row having different superscripts were significantly($P<0.05$) different.

Conclusions and Recommendation

It was concluded that:

1. Inclusion of yam-peels meal as a partial replacement for maize in the ration of starter broiler chickens significantly affected the growth performance and economic production of the birds.
2. Inclusion at 30% levels of yam peels meal with enzyme supplementation improved growth performance of broiler chickens.
3. Inclusion of yam peels meal at 30% level of replacement for maize without enzyme supplementation had least cost of production.
4. Inclusion of yam peels meal at 30% level of replacement for maize with enzyme supplementation had highest figure for profit margin.
5. In conclusion, inclusion of yam peels meal at 30% level of replacement for maize with or without enzyme supplementation could be recommended for improved growth performance with appreciable profit margin on starter broiler chickens.

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