



RESEARCH ARTICLE

Growth Performance and Economic Efficiency of Broiler Chickens Fed Boiled *Piliostigma reticulatum* Seed Meal as a Replacement for Soybean Meal

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ABSTRACT

The study was conducted to evaluate the performance and economics benefit of broiler chickens fed dietary levels of *Piliostigma reticulatum* seed meal (PRSM) as replacement for soya bean meal. 300 day old broiler chicks (*Ross 308* strain) were allocated to five treatment diets with four replicates in a completely randomize design. The treatments were designated as T₁, T₂, T₃, T₄ and T₅ representing levels of substitution of 0, 10, 20, 30 and 40 % respectively. The study lasted for 6 weeks were strict management practices were observed, in addition to feed and water given *ad libitum* throughout the study. At the end of the study data were collected on all the performance indices and results analyzed using ANOVA. Whereas economic benefit calculated after the termination of the study. The result of proximate analysis revealed that, PRS possesses considerable nutritional potentials. Similarly, significant (P < 0.05) differences were observed during the finisher phase for daily weight gain, total weight gain, and final body weight. The best performance was recorded at 20 % level (T₃), with final weight of 1882.40 g. However, cost benefit analysis showed that feed cost per kilogram gain was lowest for T₃ (₦1397.56), indicating the most cost-effective diet. *Piliostigma reticulatum* seed meal can effectively replace soya bean meal in broiler chickens diets up to 20 % level without adverse effects on productive performance, while achieving lower feed cost per kilogram gain, indicating that partial replacement is economically feasible and therefore, recommended.

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1. Introduction

Broiler production is a major contributor to animal protein supply and rural livelihoods in many developing countries. As reported by [12] poultry production is one of the most important livestock sub sector contributing significantly to human food production, particularly as a rapid and efficient source of animal protein. However, the profitability and sustainability of the industry are constrained by the high and fluctuating cost of feed, which accounts for the largest proportion of total production expenses [26]. Couple with the increase in human population, this condition triggers the increase in the quantity of raw materials needed for poultry feed production. Among feed ingredients, soya bean meal is widely used as the principal plant protein source because of its favorable amino acid profile and high digestibility [9]. However, the soared in the price of conventional protein supplement (soya bean) poses a challenge in the current

situation which resulted to unaffordable poultry products by majority of the society [1]. Not only high cost and scarcity of conventional protein supplement, but also competition between humans and animals for available scares resources severely restricted poultry production efficiency [10]. For this research has intensified the search for cheaper and locally available alternative protein resources. Economical and successful use of inexpensive, locally available and affordable feed supplements that have a comparable nutritional value to conventional supplements is crucial to the poultry industry's profitability and affordability of poultry products for consumers particularly from leguminous crop (seed and leaves) and other agricultural by-products [11]. One of such alternative feedstuffs is purple orchid, camel's foot or monkey's bread (*Piliostigma reticulatum* (D.C.) Hochst) seed. It is a browse plant belonging to the legume family widely use as medicine, food, feed, and many other uses. A drought

tolerant multipurpose tree commonly found in the savannah zones of Africa [21]. Its seeds contain appreciable nutrients that may support poultry growth [6], but their utilization is limited by the presence of anti-nutritional factors. Thermal processing methods such as boiling have been reported to reduce toxic compounds and improve nutrient availability in unconventional feed resources particularly *Piliostigma reticulatum* seed [13].

The use of boiled *Piliostigma reticulatum* seed meal as a partial replacement for soya bean meal could lower feed cost and reduce dependence on conventional protein sources particularly soya bean. However, the response of broiler chickens to varying dietary inclusion levels of this ingredient in terms of growth performance, feed utilization, and production economics remains insufficiently documented. Therefore, the study was designed to assess the performance and economics of production of broiler chickens fed dietary levels of boiled purple orchid (*Piliostigma reticulatum*) seed meal (PRSM) as a replacement for soya bean meal.

2. Materials and Methods

2.1. Study area

The study was conducted at the poultry production unit of the Teaching and Research Farm of Abubakar Tafawa Balewa University Bauchi. Bauchi metropolis as a capital of Bauchi state is situated in the northeast geopolitical zone of Nigeria on the north edge of Jos plateau. It lies between coordinate 10°29'N and 7.71°E 10° and covered about 3,687sq kilometers [8].

2.2 Procurement, identification and processing of purple orchid (*Piliostigma reticulatum*) seed

Mature *Piliostigma reticulatum* pod containing seeds were collected from the outskirts of Potiskum, Yobe State, Nigeria. Potiskum lies between latitude 11°42' 50.08'N and longitude 11°04' 51.89'E, with an altitude of approximately 426 m above sea level. The region has an average annual temperature of 24.9 °C and receives about 713 mm of rainfall per annum [3]. Pods were manually opened to extract seeds, which were subsequently winnowed to remove debris and stored in clean containers. Species identification was carried out at the Department of Forestry, College of Agriculture and Technology, Gujba, Yobe State, Nigeria. Identified seed were subjected to 60 minutes of moist heat treatment. Subsequently the seed was dried for 3 days and later ground to reduce its particle size for diet formulation.

2.3 Experimental design and management

Five starter and finisher diets were formulated with varying levels of *Piliostigma reticulatum* seed meal as replacement for soya bean at 0, 10, 20, 30 and 40 % corded as T₁, T₂, T₃,

T₄ and T₅ respectively. At the end of one week brooding period, the experimental broiler birds were weighed and allotted to five (5) dietary treatments that was replicated five times in a Completely Randomized Design (CRD). Feed and clean drinking water were provided *ad libitum*. Ingredient and percentage composition of the experimental starter and finisher diets were presented on Tables 1 and 2 respectively.

2.4 Data collection

Data on feed consumption of broiler birds for each replicate was measured on daily basis by subtracting the leftover from feed served over a 24-hour period. Similarly on weight gain, initial live weight of chicks were taking at the beginning of the experiment, and thereafter on weekly basis to determine body weight changes. Whereas feed conversion ratio was computed using the mathematical relationship below. However, mortality was recorded as it occur during the experiment.

$$FCR = \frac{FI}{WG} \dots\dots\dots (1)$$

2.5 Chemical analysis of test ingredient and experimental diets

Ground sample of *Piliostigma reticulatum* seed and experimental diets were collected and analysed for dry matter, crude protein, crude fibre, and ether extract. Metabolizable energy and nitrogen free extracts were also calculated using the [7] method.

2.6 Costs-benefit analysis

At the end of the four experiments, the cost-benefit analysis of using *Piliostigma reticulatum* seed meal as protein source in broiler chicken diets was determined based on the prevailing market price at the time of the study.

2.7 Data analysis

All data generated were subjected to one way analysis of variance (ANOVA) using the IBM SPSS version 25. Duncan multiple range test (DMRT) was used to separate the treatment means where significant difference exist.

2.8 Ethical Clearance for Animal Studies

All experimental procedures involving animals were conducted in accordance with institutional guidelines for animal care and use.

3. Results

3.1 Proximate composition (%) of raw purple orchid (*Piliostigma reticulatum*) seed

Table 1. Ingredients and Composition of Experimental Diets Containing Boiled Purple Orchid (*Ptilostigma reticulatum*) Seed Meal at Varying Replacement Levels for Soya Bean Meal in Broiler Starter Chicks

Ingredients	Diets				
	T ₁ (0 %)	T ₂ (10 %)	T ₃ (20 %)	T ₄ (30 %)	T ₅ (40%)
Maize	45.92	45.92	45.92	45.92	45.92
Full fat Soya bean	35.53	31.98	28.42	24.87	21.32
<i>P. reticulatum</i>	0.00	3.55	7.11	10.66	14.21
Fish meal	4.00	4.00	4.00	4.00	4.00
Wheat offal	10.00	10.00	10.00	10.00	10.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50	1.50
Premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30	0.30
Lysine	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Chemical Composition					
ME (Kcal/kg)	2909.37	2903.92	2901.57	2910.99	2909.67
Crude protein (%)	23.01	23.00	22.78	22.88	22.91
Crude fibre (%)	3.20	3.59	3.62	3.81	3.92
Ether extract (%)	14.29	15.01	15.22	14.00	15.20
Calcium (%)	1.51	1.50	1.48	1.51	1.50
Phosphorus (%)	0.88	0.89	0.87	0.87	0.86

*Vitamin-Mineral. Premix (Bio-mix) provided per Kg the following: Vitamin A 12,000,000iu, Vitamin D₃, 3,000, 000iu, Vitamin E, 30,000mg, Vitamin K₃, 2,500mg, VitaminB₁,2,000mg, VitaminB₂, 5,000mg, VitaminB₆, 3500mg, VitaminB₁₂, 20mg Folic acid 1,000mg, Nacin, 40,000mg, Calpan, 10,000mg, Biotin, 80mg, Antioxidant, 25,000mg, Cobalt, 250mg, selenium, 250mg, Iodine, 1,200mg, Iron, 40,000mg, Manganese, 70,000mg, Copper, 8,000mg, Zinc, 60,000mg. Choline chloride, 2000, 000mg.

Table 2. Ingredients and Composition of Experimental Diets Containing Boiled Purple Orchid (*Ptilostigma reticulatum*) Seed Meal at Varying Replacement Levels for Soya Bean Meal in Broiler Finisher Chickens

Ingredients	Diets				
	T ₁ (0 %)	T ₂ (10 %)	T ₃ (20 %)	T ₄ (30 %)	T ₅ (40 %)
Maize	47.00	47.00	47.00	47.00	47.00
Full fat Soya bean	31.45	28.30	25.15	22.18	18.85
<i>P. reticulatum</i>	0.00	3.15	6.30	9.45	12.60
Fish meal	2.00	2.00	2.00	2.00	2.00
Wheat offal	15.00	15.00	15.00	15.00	15.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50	1.50
Premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30	0.30
Lysine	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Chemical Composition					
ME (Kcal/kg)	3132.60	3147.30	3147.01	3138.27	3133.20
Crude protein (%)	20.05	19.88	19.79	20.03	20.01
Crude fibre (%)	4.57	4.70	4.81	4.87	4.91
Ether extract (%)	13.04	13.06	12.87	13.02	12.90
Calcium (%)	1.67	1.66	1.60	1.57	1.63
Phosphorus (%)	0.75	0.81	0.77	0.80	0.79

*Vitamin-Mineral. Premix (Bio-mix) provided per Kg the following: Vitamin A 12,000,000iu, Vitamin D₃, 3,000, 000iu, Vitamin E, 30,000mg, Vitamin K₃, 2,500mg, VitaminB₁,2,000mg, VitaminB₂, 5,000mg, VitaminB₆, 3500mg, VitaminB₁₂, 20mg Folic acid 1,000mg, Nacin, 40,000mg, Calpan, 10,000mg, Biotin, 80mg, Antioxidant, 25,000mg, Cobalt, 250mg, selenium, 250mg, Iodine, 1,200mg, Iron, 40,000mg, Manganese, 70,000mg, Copper, 8,000mg, Zinc, 60,000mg. Choline chloride, 2000, 000mg.

The proximate composition of raw *Piliostigma reticulatum* seed is presented in Table 3. The dry matter content was high at 88.87 %, indicating low moisture and good storage stability. While the crude protein content was relatively high at 28.34%, indicating strong potential as a protein source. The crude fibre was notably high at 25.30 %. Ether extract was low at 3.38 %. While the ash content was 12.51 %. The NFE was 19.34 %, representing the carbohydrate fraction of the seed. Whereas the seed contained a metabolizable energy value of 2008.93 kcal/kg, which is moderate.

3.2 Productive performance of broiler chickens fed diets containing *Piliostigma reticulatum* seed meal as substitute for soya bean meal

The growth performance of broiler chickens fed diets containing *P. reticulatum* is presented on Table 4. Initial body weights were similar across treatments. During the fourth week, body weights did not showed any significant ($P<0.05$) difference among dietary treatment. At the end of the study, significant ($P<0.05$) differences were observed in final and total body weights. Broiler chickens fed the control diet (2004.61 g) and those on 20 % PRSM level (1882.41 g) attained significantly ($P<0.05$) higher weights compared to broiler birds on other levels, that recorded lower final weights 10, 30 and 40 % with values of 1531.22, 1568.88, and 1522.68 g respectively. At the Starter phase, daily feed intake (DFI), daily weight gain (DWG), and feed conversion ratio (FCR) were not significantly affected by dietary treatments. Mortality was also found to be uniform across treatments with mortality of one chick each per diet. Additionally, during the finisher phase, daily feed intake remained similar across treatments. However, daily weight gain was significantly affected ($P<0.05$). Broiler birds on the control and 20 % PRSM diets recorded higher gains (58.95 and 55.50 g respectively), while those on 40 % inclusion had the lowest gain (42.00 g). FCR values were not significantly different affected by the diet and ranges between 2.12 and 2.80. Mortality was low.

Furthermore, the result of overall performance revealed that, daily weight gain was significantly reduced ($P<0.05$) in broiler birds fed 10, 30, and 40 % PRSM diets with values of 34.24, 35.02, and 33.99 g respectively, when compared to the control (45.46 g) and 20 % levels (42.56 g). FCR values were not statistically different, while mortality remained low and did not differ across treatments.

Table 3. Proximate Composition (%) of Raw Purple Orchid (*Piliostigma reticulatum*) Seed

Parameters	Proportions
Dry matter (%)	88.87
Crude protein (%)	28.34
Crude fibre (%)	25.30
Ether extract (%)	3.38

Ash (%)	12.51
NFE (%)	19.34
ME (Kcal/kg)	2008.93

ME = Metabolisable energy, NFE = Nitrogen Free Extract

3.3 Cost-benefit of broiler chickens fed diets containing varying levels of boiled *Piliostigma reticulatum* seed meal as substitute for soya bean meal in broiler chickens

The cost-benefit of broiler chickens fed diets containing varying levels of boiled *Piliostigma reticulatum* seed meal as a substitute for soybean meal revealed clear cost advantages at moderate inclusion levels. Total feed intake remained relatively stable across treatments (3.59 – 3.78 kg). Feed cost per kilogram decreased progressively with increasing seed meal inclusion, from ₦715.34 in the control diet (T_1) to ₦637.16 at 40 % inclusion (T_5). Consequently, total feed cost per bird declined from ₦2703.99 in T_1 to ₦2287.40 in T_5 , representing a substantial reduction in expenditure. Weight gain varied across treatments, with the highest gain recorded in the control group (1.91 kg) and a comparable performance at 20 % inclusion (1.79 kg). However, weight gain declined at 10, 30, and 40 % levels (1.44 – 1.47 kg). Feed cost per kilogram of weight gain was lowest in T_3 (₦1397.57), followed closely by the control (₦1415.70), while the highest cost was observed at 10 % inclusion (₦1749.17).

4. Discussion

4.1 Proximate composition of raw *Piliostigma reticulatum* seed

The dry matter content (88.87 %) was slightly lower than that previously reported for *Piliostigma thonningii* (93.29 %) and baobab (*Adansonia digitata*) seeds (94.12 %), as noted by [14] and [20] respectively. The comparatively higher dry matter content reported in these species could be associated with improved storage potential and extended shelf life [14].

The crude protein (CP) content obtained in this study (28.34 %) was comparable to values previously reported for *Piliostigma reticulatum* seed (30.30 and 34.40 %) by [6] and [16] respectively, as well as for *Piliostigma thonningii* (30.33 %) noted by [14]. However, the CP value recorded here was higher than those reported for *Ziziphus mauritiana* seeds (19.27 %) and *Vigna unguiculata* seeds (22.66 %) [15]; [24]. In contrast, the result was lower than values reported for other non-conventional protein sources, including *Hibiscus sabdariffa* (sorrel) seeds (43.15 %) and baobab (*Adansonia digitata*) seeds (38.71 %) [20], as well as beniseeds (*Sesamum indicum*), which contained 48.65 % CP [17]. The relatively high crude protein content of *P. reticulatum* seeds highlights their potential economic value as an alternative plant protein supplement.

The metabolizable energy content (2008.93 kcal/kg) recorded in this study were closely aligned to the values reported by [20] for sorrel seed (2675.66 kcal/kg), but

lower than that reported for *Z. mauritiana* seeds (3025.40 kcal/kg) by [15] and baobab seed cakes 2720.44 kcal/kg by [20]. Whereas, the crude fiber (CF) content was notably high (25.30 %) compared to the value (6.05 %) reported by [16]. It also exceeded levels found in several non-conventional plant protein sources, including moringa seed cake (9.47 %), roselle seed cake (8.75 %), and baobab seed cake [5]; [20]. However, the CF content was relatively close to that of *Cucurbita pepo* seed meal (21.58 %) reported by [25]. Although moderate levels of dietary fiber can improve digestibility, excessive fiber may reduce nutrient digestibility and cause gastrointestinal irritation [14]. Nonetheless, dietary fiber plays an important physiological role, influencing gastrointestinal function through bile acid elimination, modulation of fecal water content, and intestinal transit time, while also reducing the risk of colon cancer [18]; [9].

4.2 Productive performance of broiler chickens fed diets containing *Piliostigma reticulatum* seed meal as substitute for soya bean meal

The findings of the present study asserts that *P. reticulatum* seed meal can partially replace soybean meal without adverse effects on growth performance in broiler chickens. Comparable findings were reported by [2], who observed no significant differences in starter phase performance when baobab seed meal replaced soybean meal. Likewise, [4] reported no significant dietary effects on final weight, feed intake, and FCR when soybean was partially replaced with local alternative protein sources, with no mortality recorded. The uniform mortality observed across treatments in the present study further indicates that boiled *P. reticulatum* seed meal did not exert deleterious health effects on broiler chickens.

The study also revealed that, broiler birds fed 0 % (control) and 20 % replacement levels achieved significantly higher final weights and total weight gains compared to 10, 30, and 40 % levels. This suggests that replacement beyond 20 % may compromise growth performance. The decline in performance at higher substitution levels may be attributed to residual anti-nutritional factors, increased fiber content, or possible imbalance in amino acid profile as soybean meal inclusion decreases. This observation is consistent with the findings of [15], who reported decreased daily weight gain and final weight with increasing levels of *Ziziphus mauritiana* seed meal, although feed intake remained unaffected. Similarly, [17] noted improved performance at moderate inclusion (25 %) of Nigerian brown beniseed, but higher replacement levels resulted in increased FCR and reduced performance due to the fibrous and oily nature of the seed.

Furthermore, the findings in finisher phase support the influence of replacement level on growth. Daily weight gain differed significantly, with the control and 20 % groups showing better performance compared to higher levels, while daily feed intake and FCR did not differ

significantly. The lack of significant differences in feed intake suggests that palatability was not severely compromised by the substitution of boiled *P. reticulatum* seed meal. However, the reduction in weight gain at 30 and 40 % levels may indicate reduced nutrient utilization efficiency at higher substitution rates. [2], similarly observed poorer FCR at 100 % replacement of soybean meal with baobab seed meal during the finisher phase, reinforcing the concept that excessive substitution may impair nutrient balance and growth efficiency.

Interestingly, the 20 % replacement level produced performance statistically comparable to the control, indicating that boiled *P. reticulatum* seed meal can effectively substitute soybean meal up to this level without detrimental effects. This agrees with the report of [19], who observed improved live weight in broilers fed 5 – 20 % azolla meal as an alternative protein source, suggesting that moderate inclusion of unconventional plant proteins can sustain growth without impairing nutrient utilization. Furthermore, [22] reported improved body weight gain and better FCR in broilers fed 2 – 8 % moringa seed meal, attributing the improvement to its rich amino acid profile and antioxidant content. These findings collectively support the concept that moderate inclusion of alternative plant protein sources can enhance or maintain broiler chickens performance when properly processed.

4.3 Cost-benefit of broiler chickens fed diets containing varying levels of boiled *Piliostigma reticulatum* seed meal as substitute for soya bean meal in broiler chickens

Feed cost per kilogram declined steadily from ₦715.34 in the control diet (0 %) to ₦637.16 at 40 % level, reflecting the lower market value of boiled *P. reticulatum* seed meal relative to full-fat soybean. Consequently, total feed cost also decreased across treatments, from ₦2703.99 in the control to ₦2287.40 at 40 % level. Which is in agreement with the report of [23], reported significant cost reductions when sorghum replaced maize in the diets of broiler chickens. This linear reduction in feed cost supports the economic rationale for exploring alternative plant protein sources in broiler nutrition, particularly in regions where soybean prices are high or unstable.

Despite reduced feed costs, growth performance varied among treatments. Total weight gain was highest in the control group (1.91 kg) and relatively comparable to 20 % level (1.79 kg), but declined in other treatment diets. These performance differences directly influenced feed cost per kilogram gain. The lowest feed cost per kilogram gain was observed at 20 % inclusion (₦1397.57), slightly lower than the control (₦1415.70), indicating improved economic efficiency at this level. In contrast to other treatment diets demonstrating that excessive substitution negatively affected cost effectiveness due to reduced weight gain [15]. The progressive decline in feed cost per kilogram with increased level aligns with the findings of [2], who reported

a linear decrease in feed cost as baobab seed meal replaced soybean meal in broiler diets. They further observed that higher levels resulted in lower feed cost per kilogram gain compared to the control. However, unlike their findings, the present study did not demonstrate continuous improvement in feed cost per kilogram gain at higher inclusion levels. Instead, economic benefits peaked at 20 % substitution, after which performance depression. This may be attributed to differences in nutrient composition, anti-nutritional factors, or processing efficiency between baobab seed meal and boiled *P. reticulatum* seed meal.

The findings of the study are partially consistent with [4], who reported that partial replacement of soya bean with local alternative protein sources produced comparable economic outcomes to control diets. Their findings emphasize that moderate substitution can maintain economic viability, while inappropriate substitution strategies may lead to negative economic consequences [27]. Similarly, the present study demonstrates that a 20 % inclusion level maintained growth performance close to the control while achieving lower feed cost per kilogram gain, indicating that partial replacement is economically feasible.

5. Conclusion

The findings of the present study indicate that boiled Purple Orchid (*Piliostigma reticulatum*) seed meal can effectively replace full-fat soybean meal in broiler chickens diets up to 20 % level without adverse effects on productive performance, while achieving lower feed cost per kilogram gain, indicating that partial replacement is economically feasible and therefore, recommended.

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Declaration of Conflict Of Interest

All authors hereby declared that, there were no conflict of interest was so ever.

Table 4. Productive Performance of Broiler Chickens Fed Diets Containing *Piliostigma reticulatum* Seed Meal as Substitute for Soya Bean Meal

Parameters	T ₁ (0)	T ₂ (10)	T ₃ (20)	T ₄ (30)	T ₅ (40)	SEM
Productive performance						
Initial weight (g)	95.29	93.14	94.89	98.04	15.10	4.39 ^{NS}
4 th week weight (g)	671.37 ^a	537.81	622.02	548.52	545.37	26.16 ^{NS}
Final weight gain (g)	2004.61 ^a	1531.22 ^b	1882.41 ^a	1568.88 ^b	1522.68 ^b	63.44 [*]
Total weight (g)	1909.32 ^a	1438.08 ^b	1787.52 ^a	1470.84 ^b	1427.58 ^b	43.84 [*]
Starter phase (2-4 weeks)						
Daily feed intake (g)	55.03	52.10	54.90	50.60	49.67	1.83 ^{NS}
Daily weight gain (g)	31.97	25.61	29.62	26.12	25.97	1.12 ^{NS}
FCR	1.72	2.03	1.85	1.94	1.91	0.02 ^{NS}
Mortality (Number)	1	1	1	1	1	-
Finisher performance (5-7 weeks)						
Daily feed intake (g)	125.01	120.30	123.17	120.60	120.13	1.34 ^{NS}
Daily weight gain (g)	58.95 ^a	42.86 ^{ab}	55.50 ^a	43.92 ^{ab}	42.00 ^b	3.57 [*]
FCR	2.12	2.18	2.22	2.75	2.80	0.20 ^{NS}
Mortality (Number)	0	0	1	1	1	-
Overall performance (2-7 weeks)						
Daily feed intake (g)	90.02	86.20	89.03	85.60	85.40	1.15 ^{NS}
Daily weight gain (g)	45.46 ^a	34.24 ^b	42.56 ^a	35.02 ^b	33.99 ^b	1.54 [*]
FCR	2.00	2.52	2.09	2.44	2.51	0.02 ^{NS}
Mortality (Number)	1	1	2	2	2	-

A,b,c = Means bearing different superscripts within the same raw differ (P<0.05), NS = Not significant, SEM = Standard Error of Means, FCR = feed conversion ratio

Table 5. Cost Benefit of Broiler Chickens Fed Diets Containing Varying Levels of Boiled *Piliostigma reticulatum* Seed Meal as Substitute for Soya Bean Meal in Broiler Chickens

Parameters	Diets (%)				
	T ₁ (0)	T ₂ (10)	T ₃ (20)	T ₄ (30)	T ₅ (40)
Total Feed Intake (kg)	3.78	3.62	3.70	3.59	3.59
Feed Cost/kg (₦)	715.34	695.80	676.12	656.61	637.16
Total Feed Cost (₦)	2703.99	2518.80	2501.64	2357.23	2287.40
Total Weight Gain (kg)	1.91	1.44	1.79	1.47	1.43
Feed Cost/ kg gain (₦)	1415.70	1749.17	1397.57	1603.56	1599.58
Cost saving (₦)	-	-333.47	18.13	-187.86	-183.88
Cost saving (%)	-	-19.06	1.28	-11.72	-11.49

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