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Effect of Chromolaena odorata Leaf Diet Supplement on Growth Performance, Nutrient Digestibility and Carcass Traits of Piglets.

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ABSTRACT: *To determine the effect of Chromolaena odorata leaf meal supplement on growth performance, nutrient digestibility and carcass indices of piglets, an 8-week research was conducted. Ingredient for the experiment was formulated to supplement the pigs' diets in the ratios of; 000g, 250g, 300g and 350g/kg diet while other ingredients were constant across treatments. Thirty-two breeds of Landrace and Large White piglets of an average weight of 20.84kg were used. Piglets were allocated to four treatments using completely random design. Each diet had eight piglets in four replicates of two piglets. Performance on meat yield depicts that average final and average live weights were affected significantly (P<0.05) while weekly gain, total feed intake, weekly feed intake and feed conversion ratio were not significantly (P>0.05) influenced by the treatment diets. Dry matter, crude protein, ash and nitrogen free extracts were significantly (P<0.05) affected while ether extracts did not show significant (P>0.05) difference. Some carcass traits (dressing %; bled, dehaired and eviscerated weights) assayed depicted (P<0.05) differences across treatments. It could be deduced from this research that the feed ingredient could improve growth performance, digestibility and some carcass of growing pigs. This could largely reduce the over reliance on conventional feedstuff by pig farmers.*
Key words: Feed, Diets, Influenced, Experiment, Performance.

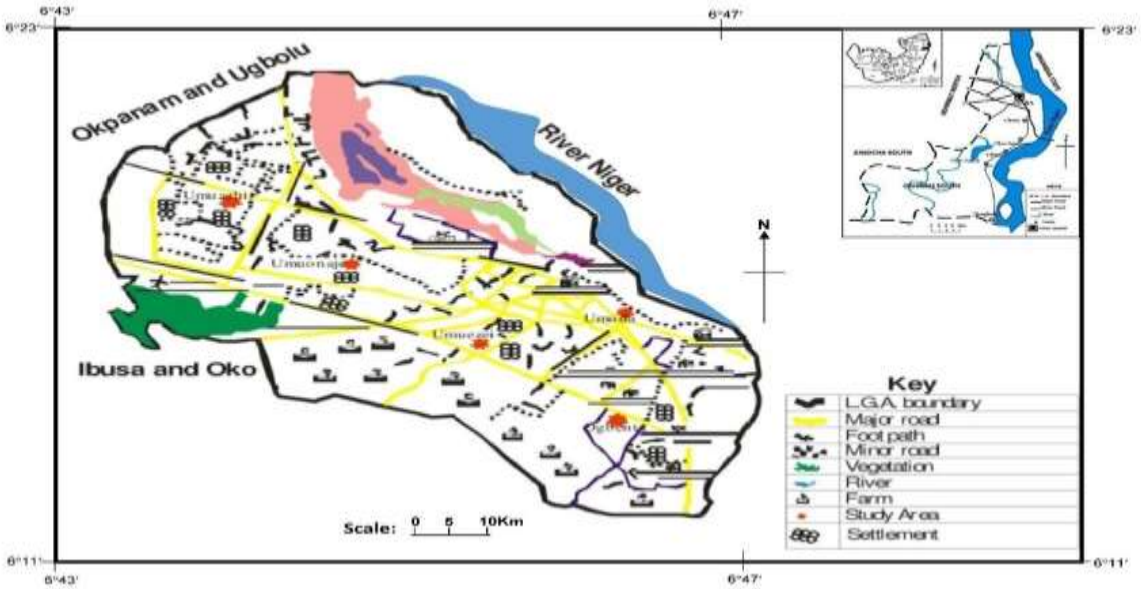
1.0: INTRODUCTION

Pig farming across the world is gaining prominence especially in regions where pork is seen as delicacy and an alternative to chicken, beef, mutton etc (Drewnowski, 2024). The business of animal production has become an integral part of the agricultural economy in any developing and developed countries of the world (Khanal et al., 2022). The industry is strong and could enhance socio-economic change, income supply and better rural life. The growth and development of the industry is largely a function of the availability of high quality feed and general management. Amongst domesticated animals, pigs proved to be outstanding due to high fecundity, good feed conversion ratio and growth (Iwegbu, et al. 2022; Bharati et al., 2022; Ma & Yin, 2024). The industry has greatly transformed from backyard rural enterprise to urban commercial based (Braamhaar et al., 2025). The increase in human population in most African countries especially Nigeria has created an elaborate vacuum between protein supply in human diet and the actual protein required by the body. Attempt to bridge this gap must evolve the use of locally available quality feed materials that could support growth, enhance digestibility and good quality carcass of the animal (Gopi & Balakrishnan, 2022; Ikhajiagbe et al., 2022).

Siam weed (*Chromolaena odorata*) popularly referred to as Awolowo is an ubiquitous herbaceous plants in southern Nigeria (Amulu et al., 2023). The chemical analysis revealed some levels of phytochemicals such as alkaloids (1.66%), flavonoids (6.30 %), phytates (2.09%), saponins (0.60%) and tannins (0.002%) (Mullik et al., 2024). Ogieriakhi & Oyedeji (2024) reported that siam weed (*Chromolaena odorata*) is high in protein and could serve as unconventional source of protein for monogastric animals. Corroborating the above (Igboh, *et al*. 2009; Olawuwo et al., 2022; Chisoro et al., 2025), noted that the proximate composition of the plant showed good potentials for feeding livestock due to its high crude protein which maybe more than 25%, low fibre and low extractable phenolic contents. They further observed that its dry matter and Crude protein contents are highly degradable with about 56% amino acids. It has become so imperative to harness the potentials of these locally abundant feed materials to support the production of farm animals especially with the current wave of high feed cost, scarcity, marginal increase in population growth and competition between man and animals for available feed ingredients (Chisoro et al., 2025).

2.0: MATERIALS AND METHOD

2.1: Location and Period of Feed Trial: The study took place at the Agriculture Faculty in Piggery Unit of Research Farm of Dennis Osadebay University, Asaba, Delta State Nigeria. It is located on longitude 60º 45ºE and latitude 60º 12º N in the derived Savanna Vegetation zone.
Fig. 1: Map of Area



Approximately four kilometers from the River Niger with a maximum day temperatures range of 27.50^{oC} to 30.90^{oC} having an annual rainfall ranges from 1800mm-3000mm which alternates with dry season (Federal Ministry of Aviation; Department of Metrological Services, Asaba, 2014). The experiment was done for 56 days.

2.2: Ingredients and Sources:

Maize, soybean meal, fish meal, wheat offal, brewers' dried grain, bone meal, premix, salt, methionine were sourced from Animal Feed Store in Asaba, Delta State while the experimental ingredient was sourced from the university environment hence it is ubiquitous.

Table 1: Nutrient Composition of Siam Weed *(Chromolaena odorata)*

Nutrient	Composition %
Crude Fat	2.90
Crude Protein	19.61
Crude Fibre	10.78
Moisture	3.66
Carbohydrate	10.89
Ash	10.89
Phosphorus	11.16

* (Mullik et al., 2024)

2.3: Experimental Ingredient and Processing

The leaves (40kg) were harvested from the vicinity of the University. They (leaves) were removed from the stems, properly rinsed and air dried for ten (10) days under room temperature until they started to break or crumble suggesting complete dryness. Thereafter, they were pounded into powder and sieved using a 2mm plastic sieve. The ingredient for the experiment was formulated to supplement the pig diets in the following proportions; 000g, 250g, 300g and 350g/kg diet.

2.4: Pigs Management and Design

Thirty two (32) piglets with a mean initial weight of 20.84kg and aged ten (10) weeks were used as the experimental animals for the eight (8) weeks. They were sourced from a reputable piggery at Ugbolu in Delta State, Nigeria. They were segmented into four (4) using their initial weight and eventually assigned to each of the four treatments using completely randomized design. Each treatment had eight (8) pigs in four (4) replicates of two (2) pigs. Seven days (7) to the arrival of the animals, the pens were evenly and thoroughly washed, disinfected and allowed to dry. The environment was cleared to ensure that dangerous predators were kept in check. The animals were routinely and dully administered with medications. Other welfare and management practices were done as the experiment progresses. The pigs were starved over-night prior to the commencement of the feeding trial. They were fed twice a day while water was given in on free will throughout the trial period. The prevailing temperature rage was between 35-37 ^{oC} with an average humidity of 65% within the period of 8 weeks of the experiment.

2.5: Formulation of Experimental Diets

The formulated diets comprises of energy sources as palm kernel cake, maize, brewer's dried grain and wheat offal while the major sources of protein were soybean meal (20%) and fish meal (5%). Other important feed ingredients included were bone meal, vitamin/mineral premix, methionine, lysine and common salt. The dietary treatments were formulated on weight equalization basis with the exception of the varying degrees of the experimental ingredient. The diets were neither iso-nitrogenous nor iso-caloric hence were formulated to fall into the required standard (3062.56 kcal/kg and 22.19 % for energy and protein respectively).

Table 2: Diets Composition

Feed Ingredients (%)	**Diet 1 000g COLMS**	**Diet 2 250g COLMS**	**Diet 3 300g COLMS**	**Diet 4 350g COLMS**
Palm Kernel Cake	22.20	22.20	22.20	22.20
Maize	25.00	25.00	25.00	25.00
Wheat Offal	15.00	15.00	15.00	15.00
Brewer's Dried Grain	10.00	10.00	10.00	10.00
Soybean Meal	20.00	20.00	20.00	20.00
Fish Meal	5.00	5.00	5.00	5.00
Bone Meal	2.00	2.00	2.00	2.00
Premix (Vit/Min)	0.25	0.25	0.25	0.25
Methionine	0.15	0.15	0.15	0.15
Lysine	0.15	0.15	0.15	0.15
Common Salt	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Determined composition:				
C.P	17.89	18.43	18.45	19.03
ME (kcal)	3352.72	3345.37	3351.21	3378.01
C.F	4.53	4.81	5.66	6.04
E.E	4.23	4.65	5.55	5.63

- CP = crude protein; ME = metabolizable energy; CF = crude fibre; EE = ether extract; COLMS = *Chromolaen odorata* Leaf meal supplement.

2.6: Performance Study

Characteristics examined were weekly feed intake, weekly weight gain and weekly feed conversion ratio (FCR). The weekly feed intake was assessed by weighing the quantity of feed given daily and subtracting the remnant the following morning. Information obtained on the daily feed intake was used to calculate the average weekly feed intake. While weekly weight gain was arrived at by the difference in the weight at the beginning of the week and the weight at the end of the week. Representative of one pig per replicate was taken across treatment diets.

Weekly feed conversion ratio (FRC) == $\frac{\text{Feed Consumed (kg)}}{\text{Weight gain (kg)}}$

Dehaired pigs were weighed and recorded. It was followed by evisceration which is the partial butchering of the animal leading to the removal of the viscera organs. Eviscerated weight was also taken. Sixteen experimental animals (1 from each replicate) were slaughtered for this purpose. Dressing % was expressed as the percentage ratio of the eviscerated weight to the live weight.

That is: Dressing (%) === $\frac{\text{Eviscerated weight}}{\text{Live weight}} \times \frac{100}{1}$

2.7: Nutrient Digestibility:

On the final week (8) of the experiment, one grower pig per replicate giving a total of sixteen were randomly taken and housed for the remaining period of the feeding trial. They were given two days to adapt before the administration of the experimental diets and collection faeces. Faeces voided were sun-dried and later oven-dried and samples taken for chemical analysis in accordance with A.O.A.C (1990).

Nutrient digestibility was calculated as: $\frac{\text{Nutrient in feed consumed} - \text{Nutrient in faeces}}{\text{Nutrient in feed consumed}} \times \frac{100}{1}$

2.8: Data collection and statistical analysis

Collated data were subjected to statistical analysis using Analysis of Variance (ANOVA) Procedure of Statistical Package for Social Sciences (SPSS, 2005) to determine the significance of treatment. While Ducan multiple range test was used to separate the means at 5% level of significant differences.

3.0: RESULT

Table 3: Meat yield of piglets as influenced by the dietary treatments.

Indices	Treatments Diets 1 000g COLMS	2 250g COLMS	3 300g COLMS	4 350g COLMS	SEM (±)
Mean initial live weight/pig (kg)	20.56	20.95	21.00	20.84	
Mean final live weight/pig (kg)	52.65^{b}	53.02^{b}	56.21^{a}	56.70^{a}	1.54
Mean total live weight gain/pig (kg)	32.09^{b}	32.07^{b}	35.21^{a}	35.86^{a}	1.15
Mean weekly weight gain/pig (kg)	4.01	4.01	4.40	4.47	0.18
Mean total feed intake/pig (kg)	113.41	113.46	114.64	114.97	0.20
Mean weekly feed intake/pig (kg)	14.18	14.18	14.33	14.37	059
Mean feed conversion ratio/pig (kg)	3.53	3.54	3.26	3.21	0.09
% Mortality	0.00	0.00	0.00	0.00	

* Means within the same row with different superscripts are significantly different (P<0.05)
* SEM = standard error mean

Table 4: Nutrient Digestibility of Piglets as Affected by the Dietary Treatments.

Parameters %	Treatments Diets 1 000g COLMS	2 250g COLMS	3 300g COLMS	4 350g COLMS	SEM (±)
Dry matter	74.59^{b}	74.78^{b}	76.26^{a}	76.71^{a}	0.43
Crude protein	78.46^{b}	78.49^{b}	80.89^{ab}	80.93^{a}	0.26
Crude fibre	45.34^{b}	46.41^{b}	48.01^{b}	49.08^{a}	1.66
Ether extract	41.60	40.96	41.72	41.78	0.32
Ash	15.09^{b}	15.11^{b}	15.74^{b}	16.94^{a}	0.23
NFE	70.32^{b}	71.03^{b}	73.43^{a}	73.54^{a}	2.02

* Means within the same row with different superscripts are significantly different (P<0.05) * NFE = nitrogen free extract

Table 5: Some Carcass Characteristics of Piglets as Influenced by the Dietary Treatments.

Parameters	Treatment Diets 1 000g COLMS	2 250g COLMS	3 300g COLMS	4 350g COLMS	SEM (±)
Live wt/pig (kg)	52.65^{b}	53.02^{b}	56.21^{a}	56.70^{a}	1.54
Dressing (%)	90.14^{ab}	89.38^{b}	91.00^{a}	90.17^{ab}	0.32
Bled wt/pig (kg)	51.23^{b}	51.88^{b}	55.04^{a}	55.26^{a}	1.37
Dehaired wt/pig (kg)	50.54^{bc}	51.15^{b}	54.15^{a}	54.17^{a}	1.12
Eviscerated wt/pig (kg)	47.46^{b}	47.39^{b}	51.15^{a}	51.13^{a}	1.09

* Means within the same row with different superscripts are significantly different (P<0.05)
* SEM = standard error mean
* Wt = weight

4.0: DISCUSSION

The performance characteristics of the growing pigs fed the treatment diets were captured in Table 3 above. Mean starting weight range of between 20.56 and 21.00kg showed that the experimental animals were appropriately selected for the feeding trial. Mean final and total weight gains progressed with dose increase from 300g in diet 3 with a significant (P<0.05) difference compared to the control diet (1) and dietary treatment 2 with less experimental ingredient. Result on these parameters (final and total weight gain) is in agreement with findings of Iwegbu *et al.*, (2023) who observed improved effect of *mucuna pruriens* on the growth performance of turkey poults. Report of

Iweala and Obido (2009) on the effect of *Gongronema latifolia* Benth in Albino rats also added credence to the beneficial effect of some of these African herbaceous plants in farm animal production. Findings in this research on weekly weight gain, total feed intake and weekly feed intake partially corroborates with the report of Zhang *et al.*, (2019). They observed an improved feed intake arising from gradual increase in the experimental ingredient. This result showed that there were no significant (P>0.05) difference on the total feed intake and weekly feed intake though they possess different statistical values. This is also applicable to the value obtained for weekly weight gain. Values for feed conversion ratio did not reveal significant (P>0.05) difference but was technically better (3.21kg) in dietary treatment 4 compared to the control (He et al., 2023). This is in conformation with the findings of Ogieriakhi & Oyedeji (2024) and El Seedi et al., (2026). There was no mortality throughout the period of the experiment which may be a testimony to the suitability of the siam weed (experimental ingredient).

Apparent nutrient digestibility of growing pigs as affected by the dietary supplement is shown in Table 4. There were significant (P<0.05) effect on crude fibre, dry matter, ash, nitrogen free extract and crude protein digestibility with the exception of ether extract. Results on dry matter, crude protein, crude fibre and ash revealed a gradual progressive increase in values obtained across treatment diets. Though the significant (P<0.05) differences cut across all the diets, values for dietary treatments 2, 3 and 4 were better than diet 1 which served as control. This may suggest the impart of the experimental ingredient on the digestibility of the animals (Conrad & Chinedu, 2022; Ogbuewu & Mbajiorgu, 2024). Agbo *et al.,* (2009) reported high levels of protein and dry matter digestibility on the administration of *Gongronema latifolia* leaf meal to supplement broiler feed. Table 4 above supports several research report about digestibility and utilization of our local herbs in providing affordable feed materials in rearing livestock. Azizi et al., (2025) and Ravhuhali et al., (2022) reported comparable values (72 – 75%) of dry matter digestibility. With the gradual protein increase (proper digestibility) in Table 4 on all the experimental diets, siam weeds leaf meal supplement could serve as alternative to scarce, expensive and competitive conventional protein sources. Result on ash digestibility indicated that only treatment 4 with 350g of siam weed leaf meal supplement (SWLMS) showed significant (P<0.05) difference from treatments 1, 2 and 3. This may also be attributed to effect a higher dose of the ingredient tested (Obayemi et al., 2025; Safiyu et al., 2024).

Some carcass traits of the experimental animals (growing pigs) placed on the feeding trial is shown in Table 5. Siam weed leaf meal supplement (SWLMS) significantly (P<0.05) influenced the assayed carcass characteristics (live-weight, dressing %, bled weight, dehaired weight and eviscerated weight kg/pig). The data obtained revealed higher live-weight in pigs placed on diets 3 and 4. Dietary treatments 1 and 2 had the same significant (P<0.05) effect with a little difference in the obtained values (52.65 and 53.02). The result on this parameter (live-weight) depicts a steady increase in the values of the data. This result corroborates with the findings of Iommelli et al., 2025; Lyu et al., 2023 who reported the effect of spices and herbs in animal production across Europe. Dressing percentage of the pigs (growing) did not follow the value pattern of the live-weight. Though this parameter showed significant (P<0.05) difference across treatments, it could be deduced from the above Table (5) that the values (90.14, 89.38, 91.00 and 90.17% respectively) did not progressively increase with higher dose administration. Bled (slaughter) and dehaired weights of the experimental animals appeared to follow the values pattern of the live weights (Güngör et al., 2022). They were though significantly (P<0.05) affected but comparable (diets 1 and 2; and 3 and 4) and appeared to have experimental ingredient's dose related effect. This research finding is tandem with the report of Essien et al., (2024) who observed comparable values (42.88, 42.88 and 43.00kg for diets 1, 2 and 3 respectively) of slaughter weights across treatment diets. Result on the eviscerated weights suggested a slight relation to the live weight of the grower pigs. This parameter may have been significantly (P<0.05) induced by the experimental ingredient. The value was lowest in dietary treatment 2 with 47.39kg and highest in diet 3 with 51.15kg. It showed not to be dose increase related across the treatments. It could be inferred from the above that siam weed leaf meal supplement (SWLMS) imparted differently on the carcass characteristics of the experimental animals. This contradicts the findings of Conrad & Chinedu, (2022) and Makinta et al., (2022) who reported a dose increase related effect on the administration of extracts of *Gongronema latifolia*.

5.0: CONCLUSION

The experimental findings suggested that "siam weed leaf meal supplement" could positively act to improve meat yield, digestibility and some carcass of growing pig thereby reducing over-dependence/ reliance on conventional feed ingredients by pig farmers.

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Conflict of Interest
It is hereby declared that this research work has no conflict of interest.

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