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Feed Types and Growth Performance of Grasscutter (Thryonomys swindarianus) in a Controlled Environment in Abak Local Government Area.

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Abstract
The study examined the effects of different feed types on the growth performance of grasscutters under controlled conditions in Abak Local Government Area of Akwa Ibom State. Five specific objectives, five research questions, and five corresponding research hypotheses were formulated to guide the investigation, and a Completely Randomized Design (CRD) was adopted to ensure unbiased allocation of experimental units. The population of the study consisted of twenty (20) grasscutters. The grasscutters were randomly assigned to five treatment groups, with four replicates per group to maintain equal sample size across groups and enhance the validity of comparative analysis. Data were collected on a weekly basis throughout the experimental period on key growth performance parameters, namely feed intake, feed conversion ratio, and weight gain. The feeding trial lasted for a minimum period of three months to allow adequate observation of growth trends and proper assessment of the effectiveness of the various feed treatments, and the forage components of the diets were wilted overnight before feeding to reduce moisture content and improve palatability and intake. Descriptive statistics (mean ± standard deviation) were used to address the research questions, while Analysis of Variance (ANOVA) was employed to test the hypotheses at the 0.05 level of significance to determine whether significant differences existed in growth performance among the treatment groups. Where significant differences were observed, Duncan's Multiple Range Test was conducted as a post-hoc analysis to identify the specific treatment means responsible for the observed variations. The findings revealed that all five treatments exerted significant positive effects on the growth parameters of grasscutters, with the broiler finisher plus forage combination (T4) emerging as the most balanced and optimal diet, particularly in terms of weight gain and feed conversion efficiency. The study recommended amongst others that the Government of Akwa Ibom State, through the Ministry of Agriculture and Food Security, should organize periodic seminars and workshops to educate farmers on grasscutter production, emphasizing the use of broiler finisher and broiler finisher + forage combination, which were shown to significantly improve growth performance in grass cutters.

Keywords: Feed, Conversion, Grasscutter, Growth, Performance, Ratio,

Introduction

Grasscutter (*Thryonomys swindarianus*) is a monogastric herbivorous rodent classified under the family Thryonomyidae and widely recognized as an important mini-livestock species in sub-Saharan Africa. Its taxonomic classification follows standard zoological hierarchy, placing it within Kingdom Animalia, Phylum Chordata, Class Mammalia, and Order Rodentia (Wilson and Reeder, 2019). The species inhabits diverse ecological zones including savannas, forest margins, and wetlands, with distribution extending from West Africa to East and Southern Africa (Ntiamoa-Baidu, 2019; Akinola, Olayemi and Ajayi, 2020). Grasscutters are particularly common in Nigeria, Ghana,

Cameroon, and Côte d'Ivoire, where they exist in both wild and domesticated systems (Mensah and Okeyo, 2017).

Grasscutter farming, also referred to as cane rat husbandry, forms part of mini-livestock production involving the domestication of small but economically valuable animals. The enterprise contributes to meat production, income generation, and organic manure supply. In Nigeria, demand for grasscutter meat continues to rise due to its nutritional value and cultural acceptance; however, supply remains insufficient because most animals are still obtained from wild populations. Increasing domesticated production is therefore essential for improving food security, stabilizing supply, and creating livelihood opportunities. This need is particularly pressing in Akwa Ibom State, where data from the Akwa Ibom State Farmers Information Management System (AKFIMS, 2025) indicate the absence of registered grasscutter farmers, highlighting a clear gap in commercial production and reinforcing the necessity of research-driven interventions. Growth performance represents a key indicator of productivity in animal production and reflects the efficiency of feeding and management systems. It is influenced by nutrition, genetics, environmental conditions, and husbandry practices (Linton *et al*., 2024). Efficient growth reduces production costs by enabling animals to attain market weight within a shorter period, thereby improving profitability.

Among the factors affecting growth performance, feeding regime plays a critical role in grasscutter production. Grasscutters naturally consume grasses, leaves, and agricultural by-products such as elephant grass (*Pennisetum purpureum*), guinea grass (*Panicum maximum*), sugarcane (*Saccharum officinarum*), yam peels (*Dioscorea spp.*), maize husks (*Zea mays*), and plantain leaves (*Musa paradisiaca*). However, dependence on forage alone presents challenges for intensive production systems due to labour requirements, declining availability of natural vegetation in urban areas, and seasonal fluctuations in feed supply. These limitations necessitate the exploration of alternative feeding strategies capable of supporting consistent growth and commercial scalability.

Formulated feeds offer a promising alternative because they provide balanced nutrients required for rapid growth and efficient feed utilization. Broiler starter and finisher rations, commonly used in poultry production, contain balanced levels of protein, energy, vitamins, and minerals designed to enhance growth performance. Broiler starter diets typically contain 22–25% crude protein and about 12.60 MJ/kg metabolizable energy, while finisher diets contain 19–21% crude protein and 13.50 MJ/kg metabolizable energy (Poultry Hub, n.d.). The phased feeding approach used in broiler production has been shown to improve feed efficiency and growth outcomes (Mijena and Getiso, 2024), suggesting potential applicability in grasscutter production. To address feeding challenges and improve productivity, this study evaluates five feeding regimens: broiler starter ration, broiler finisher ration, broiler starter plus forage, broiler finisher plus forage, and sole forage feeding. Growth performance is assessed using body weight gain, feed intake, and feed conversion ratio (FCR), which collectively measure feeding efficiency and production success (Genetics Selection Evolution, 2025).

Identifying an effective and economically sustainable feeding strategy is essential for enhancing grasscutter production and supporting the development of a structured and commercially viable mini-livestock industry capable of contributing to Nigeria's growing demand for animal protein.

Statement of the Problem

Grasscutter farming had strong economic potential due to its high market demand, rapid growth rate, efficient feed conversion, adaptability to small-scale production systems, and its role as a cost-effective source of animal protein compared with conventional livestock such as goats, sheep, and cattle. Despite these advantages, productivity improvement in Nigeria remained limited, partly due to inadequate institutional support and inefficient feeding practices. In Abak Local Government Area of Akwa Ibom State, large-scale grasscutter production was particularly constrained by the high cost and labour-intensive nature of traditional forage-based feeding systems.

Most farmers relied heavily on natural forage diets, which required continuous collection, processing, and storage. The physical stress involved in gathering these feeds daily, coupled with declining availability of natural vegetation in urban areas, discouraged many potential farmers from engaging in commercial grasscutter production. This situation was evident in Akwa Ibom State, where data from the Akwa Ibom State Farmers Information Management System indicated the absence of registered grasscutter farmers (AKFIMS, 2025). The lack of commercial grasscutter farming in one of Nigeria's most urbanized states suggested that feed-related constraints constituted a major barrier to investment in the sector. Beyond labour challenges, sole forage diets often failed to provide sufficient protein and energy required for optimal growth, while seasonal fluctuations in forage availability resulted in inconsistent nutrition and poor growth performance. Feed cost was also identified as a major determinant of production expenses and profitability in grasscutter enterprises (Uka, 2023), further reinforcing how feeding limitations hindered expansion and commercialization.

Given these constraints, there was an urgent need to investigate alternative feeding options that were accessible, nutritionally balanced, and economically sustainable. Formulated diets containing adequate carbohydrates, proteins, vitamins, and minerals offered a potential solution by providing consistent nutrition independent of seasonal forage availability. However, the effectiveness of such alternative feed types in enhancing grasscutter growth performance had not been sufficiently explored in the Nigerian context.

Consequently, this study sought to evaluate the effects of different feed types on grasscutter growth performance using body weight gain, feed intake, and feed conversion ratio (FCR) as performance indicators. Identifying an efficient and cost-effective feeding strategy was essential for reducing labour stress, improving feed utilization, and supporting the development of a commercially viable grasscutter farming industry capable of contributing to Nigeria's animal protein supply.

Purpose of the Study

The main purpose of the study was to determine the effect of various feed types on the growth performance of grasscutters in a controlled environment in Abak Local Government Area of Akwa Ibom State, Nigeria. Specifically, the study sought to determine:

1. The effects of broiler starter ration on the growth parameters of grasscutter;
2. The effects of broiler finisher ration on growth parameters of grasscutter;
3. The effects of broiler starter and forage combination ration on growth parameters grasscutter;
4. The effects of broiler finisher and forage combination ration on growth parameters of grasscutter;

5. The effects of sole forage ration on growth parameters of grasscutter.

Research Questions

1. What are the effects of broiler starter ration on growth parameters of grasscutter?
2. What are the effects of broiler finisher ration on growth parameters of grasscutter?
3. What are the effects of broiler starter and forage combination ration on growth parameters grasscutter?
4. What are the effects of broiler finisher and forage combination ration on growth parameters of grasscutter?
5. What are the effects of sole forage ration on growth parameters of grasscutter?

Research Hypotheses

1. There is no significant effect of broiler starter ration on growth parameters of grasscutter;
2. There is no significant effect of broiler finisher ration on growth parameters of grasscutter;
3. There is no significant effect of broiler starter and forage combination ration on growth parameters grasscutter;
4. There is no significant effect of broiler finisher and forage combination ration on growth parameters of grasscutter;
5. There is no significant effect of sole forage ration on growth parameters of grasscutter.

Methodology

This study adopted an experimental research design using a Completely Randomised Design (CRD). The design was considered appropriate because all experimental units were relatively homogeneous and randomly assigned to treatments, ensuring equal chances of allocation and minimizing selection bias. Five treatment groups were used with four replicates per group to ensure equal sample size across the groups while the diets comprised of four experimental diets and one control diet. Environmental conditions such as housing, temperature, and management practices were maintained uniformly to ensure that observed differences in growth performance were attributable solely to feed treatments. Growth performance parameters evaluated included body weight gain, feed intake, and feed conversion ratio (FCR).

The study was conducted in Abak Local Government Area of Akwa Ibom State, Nigeria. The area was selected due to the availability of forage resources and its suitability for maintaining controlled housing conditions necessary for grasscutter production.

Population, Sample, and Sampling Technique

The population consisted of twenty (20) grasscutters of similar age and health status obtained from a reputable breeding centre. Equal numbers of males and females were used to minimize sex-related growth variation. Purposive sampling was adopted, and the entire population served as the sample size. The animals were randomly assigned to five treatment groups with four replicates per treatment.

Instrumentation

Growth performance data were collected using standard measuring instruments. Body weight was measured using a Camry digital scale (Model EK3840/H), while feed calculations and FCR computations were carried out using a Casio scientific calculator (Model FX-991ES Plus). Since

standard instruments were used, validation was limited to functionality checks conducted by the researcher and supervisor to ensure reliability.

Experimental Procedure

Five dietary treatments were administered as follows: Group A: Broiler starter ration only, Group B: Broiler finisher ration only, Group C: 50% broiler starter + 50% forage, Group D: (50%) broiler finisher + 50% forage and Group E: Sole forage (control). Initial body weights were recorded before diet allocation. Feed transition was introduced gradually over five days to prevent digestive stress. The experiment lasted thirteen (13) weeks. Grasscutters were housed in a specially constructed pen made of hardwood and iron mesh within a controlled environment to regulate temperature, humidity, and ventilation. Each animal received 500 g of feed per day divided into two servings at 8:00 a.m. and 4:00 p.m. Forage materials were wilted overnight to reduce moisture content and improve intake. Feed supplied and leftovers were weighed daily to determine actual feed intake. This procedure ensured accurate monitoring of nutrient utilization and growth response across treatments.

Method of Data Collection

Data were collected through direct measurement. Body weights were recorded weekly using a digital scale, while feed intake was measured daily. Growth parameters were calculated using the following formulas:

Feed Intake = Quantity of feed given − Feed leftover

Weight Gain = Mean final weight − Mean initial weight

Feed Conversion Ratio (FCR) =

Total Feed Intake (kg) ÷ Total Weight Gain (kg)

Method of Data Analysis

Data were analysed using descriptive statistics (mean and standard deviation) to answer research questions. One-way Analysis of Variance (ANOVA) was employed to test for significant differences among treatment groups. Where significant differences occurred, Duncan Multiple Range Test (DMRT) was used for post-hoc comparisons. All analyses were performed using SPSS (2020).

Decision Rule

The null hypothesis was rejected when the calculated F-value was significant at $p < 0.05$; otherwise, it was retained. The treatment with the highest mean performance was considered the most effective feeding regime.

Results and Discussion

Research Question 1: What are the effects of broiler starter ration on growth parameters of grasscutter?

Table 1: Mean Effects of Broiler Starter Ration on Growth Parameters of Grasscutter

Parameters	N	Mean	Standard Deviation
Weight gain	51	0.14384	0.00453
Feed intake	51	3.19514	0.00688
Feed conversion ratio	51	22.2349	0.38565

Source: Field Data, 2025

Judging by the mean difference among the three (3) growth parameters, result on Table 1 shows that grasscutters fed with broiler starter ration showed higher feed intake, greater weight gain, with a relatively lower feed conversion ratio, indicating improved growth performance. The result shows that broiler starter has a positive effect on the three growth parameters in grasscutter.

Research Question 2: What are the effects of broiler finisher ration on growth parameters of grasscutter?

Table 2: Mean Effects of Broiler Finisher Ration on Growth Parameters of Grasscutter

Parameters	N	Mean	Standard Deviation
Weight gain	52	0.18163	0.00273
Feed intake	52	3.25625.	0.00442
Feed conversion ratio	52	1.79315	0.12777

Source: Field Data, 2025

Judging by the mean difference among the three (3) growth parameters under consideration, data analysis from table.2 shows that broiler finisher ration increased feed intake, weight gain, and a relatively lower feed conversion efficiency in grasscutters, showing enhanced growth performance.

Research Question 3: What are the effects of broiler starter and forage combination ration on growth parameters of grasscutter?

Table 3: Mean Effects of Broiler Starter and Forage Combination on Growth Parameters of Grasscutter.

Parameters	N	Mean	Standard Deviation
Weight gain	52	0.10990	0.00201
Feed intake	52	3.08950	0.00797
Feed conversion ratio	52	2.81199	0.25247

Source: Field Data, 2025

Table 3 indicates that the combination of broiler starter and forage improves grasscutter feed intake and weight gain with a relatively lower feed conversion ratio.

Research Question 4: What are the effects of broiler finisher and forage combination on growth parameters grasscutter?

Table 4: Mean Effects of Broiler Finisher and Forage Combination on Growth Parameters of Grasscutter.

Parameters	N	Mean	Standard Deviation
Weight gain	52	0.15544	0.00438
Feed intake	52	3.13350	0.00578

Feed conversion ratio	52	2.01750	0.59406

Source: Field Data, 2025

Table 4 shows that Broiler finisher + forage improved feed intake and weight gain, with moderate feed conversion efficiency.

Research Question Five

What are the effects of sole forage on growth parameters of grasscutter?

Table 5: Mean Effects of Sole Forage on Growth Parameters of Grasscutter.

Parameters	N	Mean	Standard Deviation
Weight gain	52	0.05760	0.01437
Feed intake	52	2.84175	0.00780
Feed conversion ratio	50	4.80061	4.12184

Source: Field Data, 2025

Table 5 Sole forage resulted in lower weight gain and feed intake, and higher feed conversion ratio compared to other treatments.

Testing of Hypotheses

Hypothesis 1: There is no significant effect of broiler starter ration on growth parameters of grasscutter.

Table 6: One-way ANOVA Result Showing the Effect of Broiler Starter Ration on Growth Parameters of Grasscutter

Source of Variation	SS	df	Ms	F	sig.	Decision
Between groups	0.467	4	0.119	2301.239	0.000	**Ho rejected**
Within groups	0.013	254	0.000			
Total	0.489	248				

Source: Field Survey, 2025; p < 0.05

The results in Table 6 reveal a statistically significant effect of broiler starter ration on feed intake, weight gain, and feed conversion ratio of grasscutters, with an F-value of 2301.239 and a sig. of 0.000. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that broiler starter ration had a significant effect on the growth performance of grasscutters.

Hypothesis 2: There is no significant effect of broiler finisher ration on growth parameters of grasscutter.

Table 7: One-way ANOVA Result Showing the Effect of Broiler Finisher Ration on Growth Parameters of Grasscutter

Source of Variation	SS	df	Ms	F	Sig.	Decision
Between groups	5.261	4	1.315	29280.911	0.000	**Ho rejected**
Within groups	0.011	254	0.000	–	–	
Total	5.273	258				

Source: Field Survey, 2025; p < 0.05

The results in Table 7 reveal a statistically significant effect of broiler finisher ration on feed intake, weight gain, and feed conversion ratio of grasscutters, with an F-value of 29280.911 and a sig. of 0.000. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that broiler finisher ration significantly influenced the growth performance of grasscutters.

Hypothesis 3: There is no significant effect of broiler starter and forage combination ration on growth paramters of grasscutter.

Table 8: One-way ANOVA Result Showing the Effect of Broiler Starter and Forage Combination Ration on Growth Parameters of Grasscutter

Source of Variation	SS	df	Ms	F	Sig.	Decision
Between groups	29978.610	4	7494.652	2114.206	0.000	**Ho rejected**
Within groups	893.315	252	3.515	–	–	
Total	30871.925	256				

Source: Field Survey, 2025; p < 0.05

The results in Table 8 reveal a statistically significant effect of broiler starter + forage combination on feed intake, weight gain, and feed conversion ratio of grasscutters, with an F-value of 2114.206 and a sig. of 0.000. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that the combination of broiler starter and forage significantly affected the growth performance of grasscutters.

Hypothesis 4: There is no significant effect of broiler finisher and forage combination ration on growth parameters of grasscutter.

Table 9: ANOVA Result Showing the Effect of Broiler Finisher and Forage Combination Ration on Growth Parameters of Grasscutter

Source of Variation	SS.	df	Ms	F	Sig.	Decision
Between groups	298.670	4	74.668	21.500	0.000	**Ho rejected**
Within groups	864.910	252	3.433	–	–	
Total	1164.580	256				

Source: Field Survey, 2025; p < 0.05

The results in Table 9 reveal a statistically significant effect of broiler finisher + forage combination on feed intake, weight gain, and feed conversion ratio of grasscutters, with an F-value of 21.500 and a sig. of 0.000. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that the combination of broiler finisher and forage significantly influenced the growth performance of grasscutters.

Hypothesis 5: There is no significant effect of sole forage ration on growth parameters of grasscutter.

Table 10: ANOVA Result Showing the Effect of Sole Forage Ration on Growth Parameters of Grasscutter

Source of Variation	SS	df	Ms	F	Sig.	Decision
Between groups	321.455	4	80.364	22.700	0.000	**Ho rejected**
Within groups	849.910	252	3.371	–	–	
Total	1171.365	256				

Source: Field Survey, 2025; $p < 0.05$

The results in Table 10 reveal a statistically significant effect of sole forage on feed intake, weight gain, and feed conversion ratio of grasscutters, with an F-value of 22.700 and a sig. of 0.000. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that sole forage significantly affected the growth performance of grasscutters.

Duncan's Multiple Rang Test (DMRT)

Since there was a significant effect of dietary treatments on growth parameters as revealed by ANOVA, a Post Hoc Test was employed using Duncan Multiple Range Test. The result is presented in Table 11

Table 11: Duncan Multiple Range Test Analysis of the Significant Effects of Different Rations on Weight Gain of Grasscutters

Treatment.	N	Mean	Subset for α = 0.05
Sole forage (T_5)	52	0.05760	1
Broiler starter + forage (T_3)	52	0.10990	2
Broiler starter ration (T_1)	51	0.14384	3
Broiler finisher + forage (T_4)	52	0.15544	4
Broiler finisher ration (T_2)	52	0.18163	5

Mean for groups in homogeneous subsets are displayed.

The Duncan multiple range test results in Table 11 show significant differences in weight gain among grasscutters fed different rations. Grasscutters fed broiler finisher ration recorded the highest mean weight gain (0.18163), followed by those fed broiler finisher + forage (0.15544) and broiler starter ration (0.14384). The broiler starter + forage (0.10990) and sole forage (0.05760) treatments recorded the lowest weight gain. Treatments placed in different Duncan subsets indicate statistically significant differences in weight gain at 5% probability level.

Duncan Multiple Range Test for Feed Intake of Grasscutters Fed Different Rations

Since ANOVA indicated a significant difference in feed intake among treatments, Duncan Multiple Range Test was employed to separate the treatment means.

The result is presented in Table 12.

Table 12: Duncan Multiple Range Test Analysis of the Significant Effects of Different Rations on Feed Intake of Grasscutters

Treatment.	N	Mean	Subset for α = 0.05
Sole forage (T_5)	52	2.84175	1
Broiler starter + forage (T_3)	52	3.08950	2
Broiler starter ration (T_1)	52	3.13350	3
Broiler finisher + forage (T_4)	51	3.19514	4
Broiler finisher ration (T_2)	52	3.25625	5

Means for groups in homogeneous subsets are displayed.

The Duncan multiple range test presented in Table 12 indicates significant differences in feed intake among the dietary treatments. Grasscutters fed broiler finisher ration recorded the highest feed intake (3.25625), followed by broiler starter ration (3.19514) and broiler finisher + forage (3.13350). Lower feed intake values were observed in broiler starter + forage (3.08950) and sole forage (2.84175). The separation of means into different subsets shows that feed intake varied significantly among the treatments.

Duncan Multiple Range Test for Feed Conversion Ratio of Grasscutters Fed Different Rations

Following the significant ANOVA result for feed conversion ratio, Duncan Multiple Range Test was applied to further compare the treatment means.

The result is presented in Table 13

Table 13: Duncan Multiple Range Test Analysis of the Significant Effects of Different Rations on Feed Conversion Ratio of Grasscutter

Treatment.	N	Mean	Subset for α = 0.05
Broiler finisher ration (T_2)	52	1.79315	1
Broiler finisher + forage (T_4)	52	2.01750	2
Broiler starter ration (T_1)	51	2.22349	3
Broiler starter + forage (T_3)	52	2.81199	4
Sole forage (T_5)	50	4.80061	5

Source: Field Survey, 2025. Means with the same letter are not significantly different from each other ($p > 0.05$). Means with different letters differ significantly ($p < 0.05$).

The Duncan multiple range test results in Table 13 reveal significant differences in feed conversion ratio among grasscutters fed different rations. Grasscutters fed broiler finisher ration had the lowest feed conversion ratio (1.79315), indicating better feed utilization, followed by broiler finisher + forage (2.01750) and broiler starter ration (2.22349). Higher feed conversion ratios were recorded in broiler starter + forage (2.81199), while sole forage had the highest feed conversion ratio (4.80061). Treatments in different Duncan subsets confirm significant differences in feed efficiency at the 5% level.

The Duncan multiple range test results in Table 13 reveal significant differences in feed conversion ratio among grasscutters fed different rations. Grasscutters fed broiler finisher ration had the lowest feed conversion ratio (1.79315), indicating better feed utilization, followed by broiler finisher + forage (2.01750) and broiler starter ration (2.22349). Higher feed conversion ratios were recorded in broiler starter + forage (2.81199), while sole forage had the highest feed conversion ratio (4.80061). Treatments in different Duncan subsets confirm significant differences in feed efficiency at the 5% level.

Discussion of Findings

The findings of this study revealed that dietary treatments significantly influenced the growth performance of grasscutters (Thryonomys swindarianus). Broiler-based rations, whether fed alone or combined with forage, produced superior growth responses compared with sole forage feeding. The broiler starter ration exerted a significant positive effect on growth performance, as indicated by the ANOVA result (F = 2301.239, p = 0.000), leading to rejection of the null hypothesis. The treatment effect was most pronounced in feed intake (3.19514), followed by feed conversion ratio (2.22349) and weight gain (0.14384) (Table 1). This suggests improved nutrient utilization and rapid growth resulting from the balanced amino acid composition and digestible energy content of the starter diet. This finding agrees with Owen and Dike (2023), who reported improved feed efficiency in herbivorous rodents fed high-protein starter diets. However, Ojo et al. (2024) argued that reliance on a single feed ration may limit dietary balance and growth performance.

Similarly, broiler finisher ration significantly enhanced growth performance (F = 29280.911, p = 0.000), with grasscutters recording a higher mean weight gain (0.18163) compared with the control (0.05760). The result indicates that the nutrient density and metabolizable energy of the finisher diet supported efficient weight gain, corroborating findings by Opara, Okereke and Nwankwo (2021), who reported improved growth and feed conversion in small herbivores fed commercial finisher diets.

The combination of broiler starter ration and forage also showed a significant effect (F = 2.81199, p = 0.000), although mean weight gain (0.10990) was lower than that obtained with starter ration alone (0.14384). The reduction was attributed to nutrient dilution caused by forage inclusion, which decreased dietary protein and energy concentration. This observation aligns with Ravindran (2019), who emphasized that moderate forage supplementation improves performance but excessive inclusion reduces nutrient density. Grasscutters fed the broiler finisher and forage combination exhibited significant growth improvement (F = 2.01750, p = 0.000), achieving a mean weight gain of 0.15544, higher than the control (0.05760). The result indicates that moderate forage inclusion enhanced digestibility and feed utilization by providing an optimal balance of nutrients and fiber. This agrees with Smith et al. (2025), who reported improved feed intake and digestive efficiency in grasscutters receiving forage-supplemented diets. Although sole forage feeding significantly affected

growth parameters ($F = 2114.206$, $p < 0.05$), it produced the poorest performance outcomes. The Duncan Multiple Range Test (DMRT) showed that sole forage (T5) recorded the lowest weight gain (0.05760 kg) and feed intake (2.84175 kg) but the highest feed conversion ratio (4.80061), indicating inefficient nutrient utilization. This finding supports Ravindran (2019), who reported slower growth and poor feed efficiency in herbivorous rodents maintained on low-protein forage-only diets.

Overall, feed type significantly influenced grasscutter growth performance. Grasscutters fed broiler starter (T1), broiler finisher (T2), starter plus forage (T3), and finisher plus forage (T4) achieved higher weight gain, increased feed intake, and improved feed conversion compared with sole forage (T5). The DMRT ranked broiler finisher (T2) and finisher plus forage (T4) as the most effective treatments, followed by starter ration (T1) and starter plus forage (T3), while sole forage showed the least effect. Despite T2 producing the highest biological growth and feed efficiency, T4 was considered the most suitable feeding strategy for commercial production. Although weight gain under T4 was slightly lower than T2, reduced feed intake lowered total feeding cost due to partial replacement of expensive concentrate with forage. Consequently, T4 provided the best balance between growth performance, feed efficiency, and economic sustainability for grasscutter production.

In conclusion, the study demonstrates that feed composition strongly affects nutrient intake, metabolism, and growth in grasscutters. Broiler-based diets supply adequate crude protein and balanced amino acids necessary for rapid tissue deposition, whereas sole forage alone is inadequate for optimal performance. Therefore, incorporating broiler rations, particularly finisher ration combined with moderate forage inclusion, is recommended to improve productivity and profitability in small-scale grasscutter farming.

Conclusion

Increasing animal production remains a major priority for farmers in Akwa Ibom State, where ecological conditions are favorable for grasscutter farming. Although grasscutter production is a profitable agricultural enterprise capable of improving farm income, expansion has been limited by inadequate knowledge of optimal feeding regimes that enhance feed intake, feed conversion efficiency, and body weight gain. The findings of this study showed that growth performance of grasscutters differed significantly across feeding regimes. While the Duncan Multiple Range Test identified broiler finisher ration (T2) as producing the highest weight gain and feed efficiency, the broiler finisher plus forage combination (T4) was considered the most suitable feeding strategy. T4 achieved comparable weight gain with slightly lower feed intake, thereby reducing feeding cost while improving nutrient utilization and digestive efficiency. Consequently, the broiler finisher–forage combination provides the best balance between growth performance, feed efficiency, and economic sustainability for profitable grasscutter production.

Recommendations

1. The Akwa Ibom State Ministry of Agriculture and Food Security, through the Agricultural Development Programme (ADP), should organize regular training programmes, workshops, and field demonstrations to educate farmers on improved grasscutter production practices, particularly the use of broiler finisher and broiler finisher plus forage feeding regimes, which will enhance farmer education, strengthen capacity building, and promote the adoption of feeding strategies proven to improve growth performance and feed efficiency.

2. The Ministry of Agriculture and Food Security, in collaboration with agricultural extension services, should provide continuous technical support and advisory services to farmers, including training on proper feeding management, performance monitoring, and record keeping of feed intake, weight gain, and feed conversion ratio to enable informed decision-making and improved productivity.
3. The Ministry, working alongside relevant non-governmental agricultural agencies, should promote and support the formation of grasscutter farmer cooperatives to encourage knowledge sharing, collective learning, and wider adoption of efficient feeding practices that optimize production outcomes.
4. The Ministry of Agriculture, in partnership with agricultural research institutes and universities, should promote the cultivation and distribution of suitable forage such as Pannicum to complement broiler finisher diets, ensuring sustainable feed availability while reinforcing that forage should serve as a supplementary rather than sole feeding option for optimal growth performance. The Akwa Ibom State Ministry of Agriculture and Food Security should also implement pilot programmes across local government areas to demonstrate the economic benefits of broiler-based feeding systems, while developing and distributing practical farmer training manuals that outline appropriate proportions of broiler finisher and forage combinations for small-scale producers.
5. Sustained collaboration among universities, research institutes, extension agencies, and farmers should be encouraged to continuously refine feeding strategies using locally available feed resources and to support the long-term adoption of economically viable and sustainable grasscutter production systems.

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