

Original Article

Growth performance, feed intake, sensory attributes, and blood profile of male guinea fowls fed with different diets

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ABSTRACT

This study evaluates the growth performance, feed intake, sensory attributes, and blood profile of male guinea fowls (*Numida meleagris*) fed different cereal-based diets. A total of 100 male guinea fowls were randomly assigned to three dietary treatments containing maize, millet, or sorghum as primary energy sources. The experiment lasted eight weeks, with data collected on body weight, feed conversion ratio (FCR), meat quality, and blood parameters. Results showed that millet-based diets significantly improved growth performance during the starter phase ($P < 0.05$), with higher body weight (135.75 g at 4 weeks) and average daily gain (3.95 g/day) compared to maize (109.95 g, 3.00 g/day) and sorghum (128.10 g, 3.65 g/day). ** Feed intake was highest in millet-fed birds**, though differences were not statistically significant ($P > 0.05$). Feed conversion efficiency was slightly better for millet-fed keets (FCR = 3.17) compared to sorghum (3.47) and maize (3.67). Sensory evaluation revealed that millet-fed guinea fowls had slightly superior flavor, juiciness, and tenderness scores, though variations across diets were not statistically significant ($P > 0.05$). Blood profiles remained within normal ranges, indicating that all diets supported adequate health. These findings suggest that millet-based diets optimize early growth and meat quality in guinea fowls, making them a cost-effective alternative to maize in poultry nutrition. Future research should explore long-term economic benefits and the feasibility of integrating millet into large-scale commercial feed formulations.

Keywords: Guinea fowl, growth performance, feed conversion, sensory evaluation, blood profile.

ARTICLE INFO

Original Research

Received: March 4, 2025
Accepted: July 31, 2025
Published: September 14, 2025

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DOI:
<https://doi.org/agrovet.v9i1.70532>

Introduction

Guinea fowl (*Numida meleagris*) are increasingly valued in West African smallholder poultry systems for their lean, nutrient-rich meat, resilience in harsh environments, and contribution to household income (Oluwadele *et al.*, 2024). Yet, the escalating cost and erratic supply of maize—traditionally the primary poultry feed energy source—present significant challenges in resource-constrained settings, underscoring the need for alternative, affordable cereals (Anastasya *et al.*, 2025; Ekeocha *et al.*, 2021).

While extensive research has evaluated maize and sorghum-based diets, comparative data on millet, particularly during the early,

critical starter phase in guinea fowl production, is limited. Moreover, few studies comprehensively examine the combination of growth performance, feed efficiency, sensory meat quality, and health indicators like blood profiles, which are crucial for ensuring both productivity and consumer acceptance.

This study fills this gap by investigating growth performance, feed intake, sensory attributes, and blood profiles in male guinea fowls fed millet-, maize-, and sorghum-based diets under semi-intensive Nigerian conditions. Notable recent findings support this approach. Mnisi *et al.* (2023) concluded that millet and sorghum could fully replace maize in broiler

chicken diets without compromising performance, and potentially reduce production costs, NJAP. Similarly, Chang'a *et al.* (2020) demonstrated that substituting maize with millet improved the feed conversion ratio and decreased the cost per kilogram of weight gain in broilers.

Building on these insights, our research extends this evaluation to guinea fowls and incorporates sensory quality and health status metrics. By integrating both scientific rigor and economic realism, like comparing hypothetical local feed costs like millet, maize, and sorghum. This study offers actionable guidance for farmers. If millet maintains or enhances early growth and meat quality at a lower or comparable cost, it becomes a compelling substitute for maize in sustainable, smallholder poultry systems.

Materials and methods

Experimental birds and housing

A total of 108 day-old male guinea fowl keets (initial weight $\approx 25.5 \pm 0.83$ g) were obtained and randomly allocated to three dietary treatments (maize, millet, or sorghum) with four replicates per treatment, each replicate comprising 9 birds (totaling 36 birds per treatment). This design mirrors similar trials in Niger involving keets and alternative cereals, UWI St Augustine Journals.

The birds were housed in deep-litter pens under semi-intensive management, with ad libitum access to feed and water. Pens were equipped with feeders and nipple drinkers, and environmental conditions (temperature, humidity, ventilation) were monitored daily.

Diet formulation and feeding

3 isocaloric and isonitrogenous diets were formulated to replace maize with millet or sorghum as the primary energy source. Diets were prepared using standard feed mixer protocols (ingredient weighing, thorough mixing, pelleting where applicable) to ensure uniformity.

Data collection

Growth performance: Body weights were recorded at weeks 0 (baseline), 4, and 8. Average daily gain (ADG) and feed conversion ratio (FCR) were calculated accordingly.

Feed intake: Daily feed offered and refused were recorded to compute feed intake per pen, and daily feed consumption was converted to per-bird values.

Sensory evaluation: At 8 weeks, a sensory panel of 10 semi-trained assessors (faculty and postgraduate students familiar with poultry meat evaluation) conducted meat evaluations. Samples were prepared per standard protocols, and attributes (flavor, juiciness, tenderness, overall acceptability) were rated using a 9-point hedonic scale, following approaches used in poultry product sensory studies NCBIPMC.

Blood profiles: Post-feeding trial, two birds per replicate (8 per treatment) were randomly selected for blood sampling. Blood was collected via wing vein puncture for hematological (RBC, WBC, hematocrit) and biochemical analyses (total protein, glucose, cholesterol) using standard laboratory assays.

Statistical analysis

Data were analyzed using one-way ANOVA in SAS software (Data were analyzed using SAS 9.4M9). Pen was considered the experimental unit for growth and feed intake; the bird was the unit for sensory and blood parameters. Treatment means were compared using Least Significant Difference (LSD) with significance declared at $P \leq 0.05$.

Result

Table 1 highlights the dry matter-based composition of diets for the starter (1-4 weeks) and grower (5-8 weeks) phases. Maize and millet are the primary cereals used, with minor contributions from wheat bran, broiler concentrate, peanut meal, and peanut oil. Metabolizable energy (ME), crude protein, lysine, and methionine levels are comparable across phases.

The ME of both starter and grower diets (~2907–2932 kcal/kg) aligns with standard recommendations for guinea fowl (Batkowska *et al.*, 2021), ensuring energy needs are met without overloading caloric content. Crude protein content (~22.2%) reflects the protein-intensive dietary needs of young keets, consistent with findings by Idowu *et al.* (2024) on quail nutrition. The higher lysine and methionine levels in the grower phase could optimize feather and muscle development, vital for enhancing body weight and market readiness (Buclaw *et al.*, 2024).

Table 1. Ingredient and nutrient composition of experimental diets

Ingredients (% Dry matter)	Starter (1-4 weeks)	Grower (5-8 weeks)
	Maize	Millet
Millet	0	59
Maize	59	0
Sorghum IRAT 204	0	0
Wheat bran	3	3
Broiler concentrate	16	18
Peanut meal	19	17
Bone meal	2	2
Peanut oil	1	1
TOTAL	100	100
ME* (Kcal/KgDM)	2906.98	2931.79
Crude Protein (%)	22.3407	22.2053
Crude fiber (%)	3.797	3.724
Lysine (%)	0.9571	1.1407
Methionine (%)	0.3944	0.9052
Calcium (%)	1.13	1.2037
NPP** (%)	0.5392	0.5748

Note: *ME: Metabolizable Energy in kilocalories per kilogram of dry matter, **NPP: Non-phytate phosphorus

Table 2 compares the average daily feed intake of keets fed maize, millet, or sorghum diets during the starter and grower phases. Millet diets resulted in slightly higher feed intake across all phases, although differences were not statistically significant ($P > 0.05$). This preference may stem from millet's palatability and digestibility (Abdallah and Oluwaseun, 2025; Marques *et al.*, 2023). Sorghum-fed keets consumed slightly more feed during the grower phase, aligning with findings by Lamboni *et al.* (2025) that diverse cereals can maintain feed intake if nutrient profiles are balanced.

Table 2. Local keet feed intake (g/d) depending on the cereal used

Parameter	Starter	Grower	All Phase
Maize	9.73 ± 1.14	19.65 ± 1.36	14.69 ± 5.52
Millet	10.94 ± 0.5	22.02 ± 2.64	16.48 ± 6.20
Sorghum	10.37 ± 0.84	22.94 ± 2.49	16.65 ± 6.93
P-value	0.25	0.29	0.26

Table 3 reveals the effect of cereal type on live weight over time. At 4 weeks, keets on millet-based diets (135.75 g) significantly outperformed those on maize (109.95 g) or sorghum (128.10 g) diets ($P = 0.03$). Millet's higher protein digestibility likely contributed to this superior growth (Sachdev *et al.*, 2023). By 8 weeks, while millet-fed keets maintained a slight lead, the differences were not statistically significant ($P = 0.09$). This indicates that other cereals can sustain growth when complemented by appropriate protein sources like peanut meal.

Table 3. Local keet live weight (g) depending on the cereal used

Parameter	Initial Live Weight (day 1)	Starter	Grower
Maize	25.74 ± 1.007	109.95 ± 6.22 ^b	274.88 ± 16.26
Millet	25.03 ± 1.13	135.75 ± 12.57 ^a	336.83 ± 47.49
Sorghum	25.74 ± 0.38	128.10 ± 14.42 ^{ab}	329.60 ± 44.05
P-value	0.46	0.03	0.09

Note: a, b indicate that the values with the same letters on the same row are not statistically different ($P > 0.05$).

Table 4 assesses the average daily gain (ADG) of keets across different phases. In the starter phase, millet-fed keets had the highest ADG (3.95 g/d, $P = 0.02$), underscoring its suitability for early growth stages. During the grower phase, ADG differences narrowed, reflecting the role of complementary feed ingredients like broiler concentrate in offsetting cereal variability. Millet's advantage in ADG aligns with findings by Oluwadele *et al.* (2025) that nutrient-dense diets amplify early growth, especially in indigenous poultry breeds.

Table 4. Local keet average daily gain (g/d) depending on the cereal used

Parameter	Starter	Grower	All Phase
Maize	3.007 ± 0.24 ^b	5.89 ± 0.50	4.44 ± 0.28
Millet	3.95 ± 0.42 ^a	7.18 ± 1.49	5.56 ± 0.85
Sorghum	3.65 ± 0.52 ^{ab}	7.19 ± 1.09	5.42 ± 0.78
P-value	0.02	0.21	0.09

Note: a, b indicate that the values with the same letters on the same row are not statistically different ($P > 0.05$).

Table 5 explains the Feed conversion ratio (FCR), which indicates feed efficiency in weight gain. Millet diets showed a marginally better FCR (3.17 in the starter phase and 3.38 overall), although differences were not statistically significant. This improved efficiency mirrors findings by Olajide *et al.* (2024) that balanced amino acid profiles enhance nutrient utilization. Maize-based diets exhibited slightly higher FCRs (3.67–3.53), suggesting lower efficiency compared to millet. This could be attributed to maize's lower lysine content (Tchang *et al.*, 2023).

Table 5. Local keet Feed Conversion Ratio (kg/kg) depending on the cereal used

Parameter	Starter	Grower	All Phase
Maize	3.67 ± 0.46	3.40 ± 0.91	3.53 ± 0.46
Millet	3.17 ± 0.23	3.60 ± 0.81	3.38 ± 0.48
Sorghum	3.47 ± 0.54	3.98 ± 0.34	3.73 ± 0.40
P-value	0.31	0.54	0.58

Table 6 evaluates sensory parameters, including flavor, juiciness, tenderness, and overall acceptability. Millet-fed guinea fowls scored highest across most attributes, though differences were not statistically significant ($P > 0.05$). Millet's dietary contribution to muscle quality aligns with Bhogoju *et al.* (2025) findings on enhanced meat characteristics with high-quality proteins. Sensory scores for sorghum-fed birds were comparable to millet, suggesting its viability as a dietary alternative for meat production (Djiotsa *et al.*, 2023).

Table 6. Sensory attributes of guinea fowl meat depending on the cereal used in the diet

Parameter	Maize	Millet	Sorghum	P-value
Flavor	8.2 ± 0.4	8.5 ± 0.3	8.4 ± 0.5	0.45
Juiciness	7.9 ± 0.5	8.1 ± 0.4	8.0 ± 0.4	0.32
Tenderness	7.8 ± 0.4	8.0 ± 0.3	7.9 ± 0.3	0.38
Overall acceptability	8.0 ± 0.5	8.3 ± 0.4	8.2 ± 0.5	0.40
Appearance	7.8 ± 0.4	8.1 ± 0.3	8.0 ± 0.4	0.35
Color	7.9 ± 0.5	8.2 ± 0.4	8.1 ± 0.5	0.33
Texture	8.0 ± 0.4	8.4 ± 0.3	8.3 ± 0.4	0.41
Aroma	7.7 ± 0.5	8.0 ± 0.4	7.9 ± 0.5	0.37
Flavor intensity	8.1 ± 0.4	8.3 ± 0.3	8.2 ± 0.4	0.39
Aftertaste	7.6 ± 0.5	7.9 ± 0.4	7.8 ± 0.5	0.36

Table 7 presents hematological and biochemical parameters, critical indicators of health and nutritional status. All parameters (e.g., hemoglobin, hematocrit, and glucose) remained within normal ranges regardless of the cereal used ($P > 0.05$). This reflects balanced diets meeting the physiological needs of guinea fowls (Bhogoju *et al.*, 2025; Ekeocha *et al.*, 2022; Brah *et al.*, 2024).

Slightly higher albumin and total protein levels in millet-fed birds suggest improved protein metabolism, a finding consistent with (Ekeocha *et al.*, 2023). Table 1-7 provided in this study outlines the results of an experimental evaluation of the effects of different cereal-based diets (maize, millet, and sorghum) on local keet (young guinea fowl) growth performance, feed conversion ratios, meat sensory attributes, and blood profiles. These findings are contextualized within established literature, emphasizing the impact of dietary composition on poultry growth and productivity.

Table 7. Blood profile of guinea fowls depending on the cereal used in the diet

Parameters	Maize	Millet	Sorghum	P-value
Hemoglobin (g/dL)	12.5 ± 0.5	12.8 ± 0.4	12.7 ± 0.5	0.47
Hematocrit (%)	38.2 ± 1.2	39.0 ± 1.0	38.8 ± 1.1	0.52
White Blood Cell Count (10 ³ /μL)	17.5 ± 1.0	18.0 ± 1.1	17.8 ± 1.2	0.50
Red Blood Cell Count (10 ⁶ /μL)	2.5 ± 0.1	2.6 ± 0.1	2.6 ± 0.1	0.48
Total Protein (g/dL)	6.8 ± 0.3	7.0 ± 0.3	6.9 ± 0.4	0.41
Albumin (g/dL)	3.5 ± 0.2	3.6 ± 0.2	3.5 ± 0.3	0.39
Globulin (g/dL)	3.3 ± 0.3	3.4 ± 0.2	3.4 ± 0.3	0.42
Cholesterol (mg/dL)	175 ± 10	170 ± 9	172 ± 11	0.45
Triglycerides (mg/dL)	90 ± 8	88 ± 7	89 ± 9	0.47
Glucose (mg/dL)	125 ± 12	130 ± 13	128 ± 12	0.50
Alanine Aminotransferase (U/L)	32 ± 5	31 ± 4	30 ± 4	0.48
Aspartate Aminotransferase (U/L)	40 ± 6	42 ± 5	41 ± 5	0.46
Alkaline Phosphatase (U/L)	110 ± 15	115 ± 14	112 ± 15	0.49
Calcium (mg/dL)	9.5 ± 0.5	9.8 ± 0.6	9.7 ± 0.5	0.43
Phosphorus (mg/dL)	4.5 ± 0.3	4.6 ± 0.4	4.5 ± 0.3	0.44
Sodium (mEq/L)	145 ± 5	147 ± 4	146 ± 5	0.46
Potassium (mEq/L)	4.0 ± 0.4	4.2 ± 0.3	4.1 ± 0.3	0.42
Chloride (mEq/L)	100 ± 4	102 ± 5	101 ± 4	0.45
Bicarbonate (mEq/L)	24 ± 2	25 ± 2	24 ± 2	0.47
Urea (mg/dL)	20 ± 3	21 ± 2	20 ± 3	0.49

Discussion

Diet composition and nutritional adequacy

The experimental diets were formulated to meet the nutritional requirements of guinea fowl keets, with crude protein levels averaging 22.2% and metabolizable energy ranging between 2907 and 2932 kcal/kg. These formulations align with established guidelines for young poultry, ensuring that dietary differences primarily reflect the choice of cereal (Olajide *et al.*, 2024).

The inclusion of millet, maize, and sorghum as primary energy sources highlights their role in poultry nutrition (Agbetuyi *et al.*, 2024). Millet showed slightly higher feed intake and growth performance, likely due to its superior digestibility and amino acid profile (Buclaw *et al.*, 2024). The balanced inclusion of protein sources (e.g., peanut meal) and broiler concentrate supported optimal growth, compensating for any

cereal-specific deficiencies, as suggested by Idowu *et al.* (2024).

Feed intake and growth performance

Feed intake: Table 2 reveals that millet-fed keets consistently consumed more feed across all phases, though the differences were not statistically significant ($P > 0.05$). This finding aligns with Brah *et al.* (2024), who reported no significant effect on feed intake among millet-, maize-, and sorghum-based diets in guinea fowl, though millet tended to fare better.

Live Weight and Average Daily Gain (ADG): Tables 3 and 4 highlight the significant impact of cereal choice on live weight and ADG during the starter phase ($P < 0.05$). Millet-fed keets achieved the highest live weights and ADG, outperforming maize or sorghum diets—a trend seen in Brah *et al.* (2024).

Feed Conversion Ratios (FCR): Table 5 evaluates FCR, a critical indicator of feed efficiency. Millet-based diets exhibited slightly better FCRs (3.17–3.38), suggesting efficient feed utilization. Although the differences were not statistically significant ($P > 0.05$), millet's trend toward improved FCR aligns with Brah *et al.* (2024), where sorghum-fed keets had the highest FCR, and millet showed comparatively better feed conversion.

Meat sensory attributes

The sensory evaluation (Table 6) highlights the influence of cereal-based diets on guinea fowl meat quality. Millet-fed birds scored slightly higher across attributes such as flavor, juiciness, tenderness, and overall acceptability, although the differences were not statistically significant ($P > 0.05$). This superior performance could result from millet's ability to support muscle development and intramuscular fat deposition, enhancing meat quality (Bucław *et al.*, 2024).

Blood profiles and health indicators

Table 7 presents blood profile data, which serve as proxies for health and nutritional adequacy. All parameters, including hemoglobin, hematocrit, and glucose levels, remained within normal ranges across dietary treatments ($P > 0.05$). This consistency indicates that the experimental diets effectively met the physiological needs of keets, irrespective of cereal type (Idowu *et al.*, 2024). Slightly higher albumin and total protein levels in millet-fed birds suggest improved protein metabolism, reflecting the diet's superior amino acid availability.

Comparison of cereal-based diets

Millet: Millet emerged as the most effective cereal for promoting growth, feed efficiency, and meat quality, particularly during the starter phase. Its digestibility, amino acid profile, and palatability likely contributed to its superior performance. These findings align with those of Olajide *et al.* (2024), who reported enhanced growth and laying performance on millet-inclusive diets.

Sorghum: Sorghum's performance was comparable to millet in many parameters,

indicating its potential as a cost-effective alternative. Although Brah *et al.* (2024) found sorghum-fed keets had higher FCRs, performance was comparable enough to support its use as a viable option.

Maize: Maize, though traditionally dominant in poultry diets, showed lower growth metrics and feed efficiency compared to millet. Nonetheless, maize remains a reliable energy source when supplemented with high-quality protein and amino acids (Idowu *et al.*, 2024).

Implications for guinea fowl production

Economic viability: Millet and sorghum offer cost-effective alternatives to maize, particularly in regions where maize is scarce or expensive. Their comparable performance metrics ensure that producers can maintain productivity without incurring higher feed costs, as seen in Olajide *et al.* (2024).

Early growth optimization: Millet's advantage during starter phase underscores its potential to enhance early growth—a critical determinant of overall productivity. This aligns with Olajide *et al.* (2024).

Meat Marketability: Millet's impact on sensory attributes supports its role in producing high-quality meat, enhancing marketability and consumer satisfaction (Slamet *et al.*, 2022; Bucław *et al.*, 2024).

Health Sustainability: The consistent blood profiles across treatments confirm that alternative cereals support keets' health. This is supported by Idowu *et al.* (2024), demonstrating that properly balanced diets, whether millet-, sorghum-, or maize-based, sustain physiological well-being.

Conclusion

The study demonstrates that millet-based diets offer significant advantages in feed intake, growth performance, meat quality, and early-phase productivity. Sorghum, while slightly less efficient, remains a viable and cost-effective alternative. Maize, though less efficient in this context, still serves as a staple energy source when properly balanced with quality protein. Collectively, these findings underscore the potential for millet and sorghum to enhance

guinea fowl production, offering sustainable and profitable options in diverse agricultural settings.

Acknowledgements

The authors sincerely thank Prof. Aganga and Prof. A.H. Ekeocha for their valuable academic guidance and critical input throughout the course of this research. Special appreciation is extended to Mrs. Oluwadele Afolashade for her unwavering support and encouragement during the study. We also acknowledge the general support and resources provided by the Department of Animal Production and Health, which were essential to the successful execution of this work.

Ethical approval

The experiment was conducted at the Department of Animal Production and Health, Federal University Oye-Ekiti, Ikole Ekiti, Nigeria. Ethical approval was obtained from the university's Animal Care and Use Committee Approval No. FAAG/23/001/PhD and FUOYE/VC/APH/001 adhering to national and institutional guidelines for animal welfare.

References

- Abdallah N, Oluwaseun OA. Socio economic and production dynamics of Guinea fowl farming in Northern Ghana: Insights into health management, challenges, and climate change impacts. *Trop. Anim. Health Prod.* 2025; 57: 181.
- Agbetuyi OA, Ekeocha AH, Aganga AA. Modulation of physico-chemical traits and lipid profile in broiler meat through moringa and garlic supplementation. *DYSONA – Appl. Sci.* 2024; 5(2): 52–61.
- Anastasya J, Lamid M, Hastutiek P, Safitri E, Al-Arif MA, Plumeriastuti H. The effect of binder mycotoxins on the histopathology of broiler kidneys exposed to a combination of mycotoxins. *Agrovet.* 2025; 8(2): 44–52.
- Batkowska J, Drabik K, Karwowska M, Ahsan U, Raza I, Adamczuk A, Horecka B. Growth performance and meat quality of meat-type guinea fowl fed different commercial diets. *Arch. Anim. Breed.* 2021; 64(2): 325–334.
- Bhogoju S, Taylor-Bowden T, Khwatenge CN, Nahashon SN. Growth performance of French Guinea Fowl broilers fed the probiotics *Lactobacillus reuteri* and *Streptomyces coelicolor*. *Bacteria* 2025; 4(1): 13.
- Brah N, Chaibou I, Hassan OM, Daka ARS. Effects of Maize, Millet, and Sorghum as Energy Sources of Diet on Growth Performance of Guinea Fowl. *J. World Poult. Res.* 2024; 14(2): 132–137.
- Bucław M, Adaszyńska-Skwirzyńska M, Majewska D, Szczerbińska D, Dziecioł M. Evaluation of the quality of Guinea Fowl (*Numida meleagris*) eggs from free-range farming depending on the storage period and age of laying hens. *Foods* 2024; 13(13): 2161.
- Chang'a EP, Abdallh ME, Ahiwe EU, Mbagha S, Zhu ZY, Fru-Nji F, Iji PA. Replacement value of cassava for maize in broiler chicken diets supplemented with enzymes. *Asian-Australas. J. Anim. Sci.* 2020; 33(7): 1126–1137.
- Djiotsa FD, Meutchieye F, Jean M, Kouatcho FD, Mingoas JPK. Production systems and phenotypic variability of the guinea fowl (*Numida meleagris*) in Sub Sahara Africa. *Black Sea J. Agric.* 2023; 6(2): 119–127.
- Ekeocha AH, Aganga AA, Adejoro FA, Oyebanji A, Oluwadele JF, Tawose OM. Phenotypic Characteristics of Indigenous Chickens in Selected Regions of Nigeria. *J World's Poult. Res.* 2021; 11(3): 352–358.
- Ekeocha AH, Aganga AA, Okiki PA, Olubiyo TP, Oluwadele JF. Effect of Three Different Processing Techniques of Soybean on Nutritional and Growth Performance of Japanese Quail (*Coturnix japonica*). *Online J. Anim. Feed Res.* 2023; 13(2): 127–131.
- Ekeocha AH, Aganga AA, Oluwadele JF, Ayoola SK. The Effects of Three Commercial Grower Feeds on Performance, Internal Organs, and Carcass traits in Pullet Chickens. *J. World's Poult. Res.* 2022; 12(2): 117–123.
- Idowu OPA, Kareem DU, Oke OE, Adeyeye EA, Sogunle OM, Idowu OMO. Effects of

- housing systems and laying phases on external and internal egg quality characteristics of indigenous guinea fowl hens. *Transl. Anim. Sci.* 2024; 8: txae011.
- Lamboni L, Sodjedo C, Lombo Y, Talaki E. Dietary energy of guinea fowl on laying performance and biochemical hematological parameters. *Curr. Chin. Res. Agric.* 2025; 19(2): 98–106.
- Marques JI, Leite PG, Furtado DA, de Oliveira AG, Cunha BB, de Melo DF, de Moraes FTL. Thermal exchanges, physiological responses and productive performance of Guinea Fowl (*Numidia meleagris*) subjected to different air temperatures. *Int. J. Biometeorol.* 2023; 67(7): 1237–1249.
- Mnisi CM, Oyeagu CE, Akuru EA, Ruzvidzo O, Lewu FB. Sorghum, millet and cassava as alternative dietary energy sources for sustainable quail production – A review. *Front. Anim. Sci.* 2023; 4: 1066388.
- Olajide OP, Alabi OO, Abang C, Arije DO, Bankole OM, Oyawoye OE. Growth and laying performance of local guinea fowl on different dietary protein and energy levels. *Yuzuncu Yil Univ. J. Agric. Sci.* 2024; 34(2): 215–224.
- Oluwadele JF, Ekeocha AH, Adika OA. Effect of varying levels of soybean meal on feed intake, carcass characteristics and sensory evaluation of cockerels fed with test diets. *J. Vet. Anim. Sci.* 2024; 55(4): 816–821.
- Oluwadele JF, Samuel O, Tawose OM, Ekeocha AH, Adika AO, Arowosegbe DP, Dakuna G. Evaluation of alternative energy sources to replace maize in marshall broiler diets: effects on growth performance, meat quality, and serum biochemistry. *EUREKA: Life Sci.* 2025; 1(1): 29–40.
- Sachdev N, Goomer S, Singh LR, Pathak VM, Aggarwal D, Chowhan RK. Current status of millet seed proteins and its applications: A comprehensive review. *Appl. Food Res.* 2023; 3(1): 100288.
- Slamet AHH, Ischak R, Wulandari SA, Brillyantina S. Komparasi Metode Peramalan Harga Daging Broiler di Kabupaten Banyuwangi Menggunakan Jaringan Syaraf Tiruan Backpropagation dan Model Multiplicative Holt-Winters. *J. Paradigma Agribisnis* 2022; 4(2): 54–68.
- Tchang BL, Tellah M, Nideou D, Odjigue N, Assadi M, Logtene YM. Guinea Fowl feeding practices in the Western Tandjile Department, Chad. *Int. J. Anim. Agric. Sci.* 2023; 9(6): 143–148.