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RESEARCH ARTICLE

Evaluation of feed efficiency and growth performance of slow-growing indigenous chicken under different rearing systems

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ABSTRACT

Objective: This study aimed to evaluate feed efficiency and growth parameters of slow-growing indigenous chicken raised for meat production under different rearing systems.
Material and Methods: Two treatments, pasture-raised system (PRS) (treatment) with six replicates and Intensive Rearing System-IS (control) with three replicates, were tested. The birds in the treatment were fed only 80% of the daily feed requirement, while in the control, 100% of the requirement was provided. Birds in both were fed with the same cereal-based starter/grower/finisher diets, based on age. Daily feed intake and weekly body weight were measured. Daily body weight gain (DBWG), average body weight, feed conversion ratio (FCR), and residual feed intake (RFI) were calculated.
Results: The crude protein and metabolizable energy contents of the formulated starter, grower, and finisher diets were 22.74% ± 0.20%, 20.97% ± 0.20%, 20.63% ± 0.20%, and 2,495.94 ± 44.47 kcal/kgDM, 2,909.11 ± 44.47 kcal/kgDM, and 2,927.78 ± 44.47 kcal/kgDM, respectively. The DBWG during the grower and finisher stages of control (18.99 ± 0.66 gm and 16.79 ± 0.66 gm) were significantly higher ($p < 0.05$) than the treatment (14.24 ± 0.46 gm and 14.72 ± 0.46 gm). Overall FCR in the treatment (4.28 ± 0.20) and the control (4.62 ± 0.28) was not significantly different. The RFI was significantly lower ($p < 0.05$) in the treatment in both grower and finisher stages (−0.0206 ± 0.006 and −0.0205 ± 0.010) than the control (0.0474 ± 0.009 and 0.0265 ± 0.014).
Conclusion: Considering the ABW and DBWG, slow-growing indigenous chickens fed cereal-based formulated diets under an intensive system are more profitable. However, when assessing RFI, a pasture-raised system proves more efficient than an intensive system. Hence, the farmer could choose either pasture-raised or an intensive management system, depending on the available resources.

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KEYWORDS

Cereal-based diet; intensive system; meat purpose; pasture-raised system

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Introduction

In Sri Lanka, poultry rearing has been practised for centuries as a backyard operation, especially in rural areas where it plays an important role in income generation and food production [1,2]. The indigenous chicken, or village chicken, is usually reared under backyard systems. They are usually fed with kitchen refuse and agricultural by-products. Hence, the cost of production is minimal [1]. However, due to the rapid increase in consumption of chicken meat and eggs in recent years, the poultry sector has emerged as an industry within the livestock sector, with a shift from free-range scavenging systems to intensive systems. Hence, native backyard poultry rearing has been replaced with the buy-back system of commercial broiler and layer production in rural areas due to the higher demand for chicken meat and eggs [3,4].

Presently, intensively reared broilers are fed with specially formulated feeds containing plant and animal-based ingredients and additives to enhance growth in a shorter period. However, there are some issues related to the intensive broiler production system, i.e., welfare concerns

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due to higher stocking density and health concerns associated with feed additives in commercial broiler feeds [5,6]. Therefore, consumer preference for free-range and organic poultry has increased more than that for intensively reared broiler chicken [7]. As a result, consumption of village chicken meat is becoming more popular in both developing and developed countries compared to commercial broiler meat, due to its flavor, firmer texture, premium price, and health benefits [8].

In Sri Lanka, 85% to 100% of the meat and egg production is covered by commercial farming systems [9]. Thus, the sale of poultry meat by small-scale poultry farmers has become difficult due to the competition from reputable meat brands. For that, the smallholders must produce a consistent, high-quality product. However, due to high market demand and comparatively limited supply, village chicken products are priced higher than commercial poultry products [10]. Furthermore, when meat market segmentation is considered between commercial chicken and village chicken, the premium price for village chicken is 50% to 100% higher than that of broiler meat due to its taste and quality [11]. Thus, the rearing of village chicken enables the farmer to always obtain a premium price. Hence, having considered the above factors, this study was designed to evaluate whether the slow-growing indigenous chicken can be reared under a pasture-raised system for meat purposes in Sri Lanka by evaluating growth parameters (average body weight and daily body weight gain) and feed efficiency parameters (daily feed intake, feed conversion ratio, and residual feed intake).

Materials and Methods

Ethical approval

The experiment was undertaken with the approval of the Research Ethics Committee of the Uva Wellassa University of Sri Lanka (UWU/REC/2022/7).

Experimental site

The study was conducted in two consecutive trials: Experiment 1 from 24 February 2022 to 15 May 2022 (Temperature; RH; rainfall mean values were 28.0ºC ± 0.32ºC; 64.5% ± 2.53%; 2.3 ± 0.84 mm, respectively) and Experiment 2 from 10 August 2022 to 30 October 2022 (Temperature; RH; rainfall mean values were 27.2ºC ± 0.11ºC; 81.1% ± 0.55%; 1.9 ± 0.48 mm, respectively). Both the brooding and post-brooding periods were carried out at the Faculty Farm, Faculty of Agriculture (8.37136° N, 80.41639° E), Rajarata University, Sri Lanka. The field experiments were undertaken at the School of Agriculture, *Puliyankulama*, Anuradhapura (8.37313° N, 80.42086° E). The research site was located within a medium-scale coconut plantation at an elevation of 89 m above sea level.

Experimental design

There were two treatments (Treatment and Control) in this experiment. The rearing of the slow-growing chicken under a semi-intensive system called "pasture-raised system (PRS)" with six replicates was considered as the Treatment, and rearing of slow-growing birds under an "intensive system (IS)" with three replicates was considered as the Control. Each replicate had 21 birds. The experiment was repeated twice to obtain two data sets. The field design is given in Figure 1.

Formulation of diets

Three cereal-based formulated diets (starter, grower, and finisher) were prepared for the birds according to the nutritional guidelines described by Berger et al. [12]. The formulated diets included commercially available feed ingredients, supplemented with HCL-Lysine, DL-Methionine, and a commercially available mineral mixture (Pecutrin Vitaminized Mineral Mixture). The composition of starter, grower, and finisher diets on an as-fed basis is given in Table 1. The growth stages consisted of a 28-day starter period, a 35-day grower period, and an 18-day finisher period, or until the mean live body weight reached 1 kg per bird.

During feed mixing, the major ingredients (maize meal, wheat bran, rice bean, soybean meal, and dhal dust) were weighed and mixed separately. Subsequently, the minor ingredients (calcium carbonate, dicalcium phosphate, salt, vitamins and minerals, sodium carbonate, DL-methionine, HCL-lysine) were weighed and mixed separately. Both mixtures were then fed to a semi-automated feed mixer, which thoroughly mixed them.

Experimental birds

A total of 200 day-old, slow-growing *Giriraj* cross chicks were purchased from Miloshi Farm and Hatchery, a commercial hatchery located in Ragama, Sri Lanka.

Preparation of poultry units

The poultry houses were constructed 1.2 m above ground to protect against predators and facilitate manure collection. The floor space of a constructed poultry unit was 1.5 m × 1.2 m. Calicut tiles were used for roofing, while both the floor and walls were constructed using 50 × 50 mm G-12 galvanized wire mesh. The poultry houses were centrally positioned within a 30 × 30 m^2 run area, with individual units spaced 30 m apart (Fig. 2).

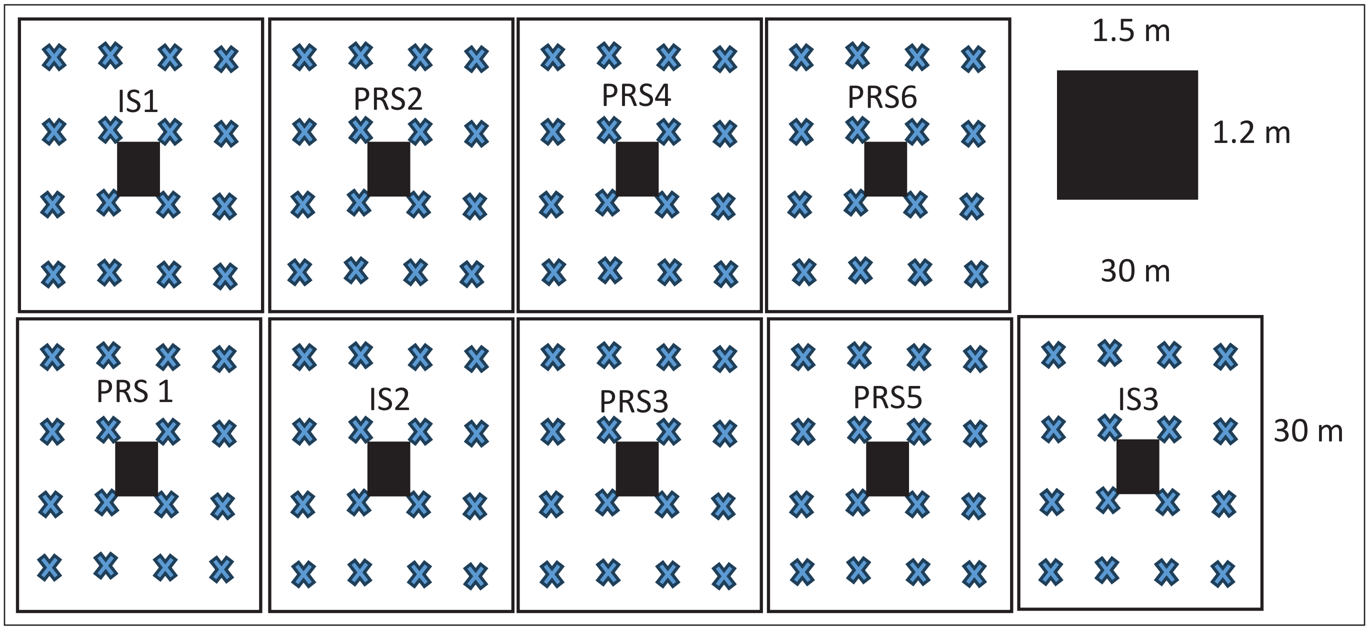

Figure 1. The layout of the research field layout. IS, intensive system; PRS, pasture-raised system.

Table 1. Composition of formulated diets.

Ingredient	Composition (%)		
	Starter	Grower	Finisher
Maize (*Zea mays*) meal	12	15	17
Wheat (*Triticum aestivum*) bran	12	10	10
Rice (*Oryza sativa*) bran	33	36	36.5
Soybean (*Glycine max*) meal	24	20.5	17
Dhal (*Lens culinaris*) dust	15	15	16
Calcium carbonate	0.600	0.390	0.390
Dicalcium phosphate	2.000	1.540	1.540
Salt (NaCl)	0.260	0.200	0.200
Vitamins and Minerals	0.500	0.400	0.400
Sodium carbonate	0.114	0.227	0.227
DL-Methionine	0.210	0.230	0.230
HCL-Lysine	0.264	0.373	0.373
Threonine	0.052	0.140	0.140

Brooding management

The 200 *Giriraj* cross chicks (day-old) were weighed in groups of 50 birds and introduced into a brooder with an initial diameter of 16.4 m (5 ft), which was gradually expanded as the chicks grew. All chicks were provided with glucose on the day of arrival, followed by a three-day consecutive treatment consisting of Vitamin E (Selvit-E®) at 1 ml/l and antibiotic (Enrofloxacin 10%) at 1 ml/2 l, offered with the drinking water to treat stress. All chicks were fed with the starter diet from day 1 to day 28 and had a 14-day brooding period.

Due to their smaller body size (0.12 ± 0.002 kg), an additional 16 days of post-brooding period were provided prior to introduction into the research field. As a result, the birds were introduced to the research field at 30 days of age, when they weighed 0.31 ± 0.008 kg.

Disease management

All birds were vaccinated against Infectious Bursal Disease (IBD) with the Gumboro vaccine (Intermediate Type, Living BP) at the age of 7 and 14 days and for Newcastle Disease (Live, LaSota Strain, BP) at the age of 9 and 16

Figure 2. A poultry house with a run area.

days. To prevent coccidiosis, coccidiostats (BIO-SUPER COC, W.S.P.) were provided with drinking water on different schedules for each trial: days 12 and 36 for trial 01, and days 7 and 28 for trial 02.

Feeding management

After being introduced to the research field, birds in the PRS were in the run area from 7.00 am to 5.00 pm every day. Birds in the IS were kept inside the house throughout the study period. The birds under PRS were fed only 80% of the feed requirement based on the assumption that the birds could obtain 20% of their nutritional needs through foraging, whereas in the IS, 100% feed requirement was provided. During the rainy days (only 03 days during the trial one), birds in the PRS were also kept inside the houses. But they were fed with cut pasture from the run area, along with 80% of the formulated diet. Feed was provided twice daily, at 7.00 am and 5.00 pm, for both the PRS and IS groups. Drinking water was available throughout the day.

Sample analysis

The proximate composition of formulated starter, grower, and finisher diets was analyzed through various analytical methods. Dry matter (DM) content was determined using the oven drying technique, while ash and ether extract (EE) contents were determined by muffle furnace (DMF3514, Korea) and solvent extraction unit (Velp Scentifica-SER 148, Italy) methods, respectively. Crude fiber (CF) analysis was conducted using the Van Soest Analysis method with a Fiber Extraction Unit (Microsil, India). Nitrogen content was determined using the Kjeldahl method (Velp Scientifica-DK 20, Italy), and crude protein content was calculated as N% x 6.25. Both acid detergent fibre (ADF) and neutral detergent fibre (NDF) were quantified following the Van Soest Analysis method [13]. The Metabolizable Energy (ME) content was estimated using an indirect calculation method based on the compositional data, as described by Admasu et al. [14].

Average body weight (ABW) and daily body weight gain (DBWG)

Birds in each replicate of both PRS and IS were collectively weighed every week using an electronic balance (WEIGHTECHROLEZ 2P-15B, China), and the average weight per bird was calculated. Body weight gain per bird was calculated as described by Ojediran et al. [15].

Mortality

The percentage mortality was calculated according to the method described by Pereira et al. [16].

Table 2. Proximate composition, acid detergent fiber, and neutral detergent fiber contents of formulated starter, grower, and finisher diets (Mean ± SE).

Parameter	Starter	Grower	Finisher
CP%	$22.74^{a} \pm 0.20$	$20.97^{b} \pm 0.20$	$20.63^{b} \pm 0.20$
EE%	$1.76^{b} \pm 0.49$	$3.90^{a} \pm 0.49$	$4.25^{a} \pm 0.49$
CF%	$13.59^{a} \pm 0.39$	$10.9^{b} \pm 0.39$	$10.59^{b} \pm 0.39$
Ash%	$8.45^{a} \pm 0.14$	$7.86^{b} \pm 0.14$	$7.73^{b} \pm 0.14$
ADF%	$27.48^{a} \pm 2.08$	$17.83^{b} \pm 2.08$	$21.77^{ab} \pm 2.08$
NDF%	39.70 ± 5.11	30.31 ± 5.11	27.71 ± 5.11
ME (Kcal/kg DM)*	$2495.94^{b} \pm 44.47$	$2909.11^{a} \pm 44.47$	$2927.78^{a} \pm 44.47$

$^{a, b, c}$ means within the same row with different superscripts were significantly different ($p < 0.05$). CP- crude protein, EE-ether extract, CF-crude fiber, ADF- acid detergent fiber, NDF- neutral detergent fiber. *Calculated value

Daily feed intake (DFI)

Daily feed intake per bird was calculated as the difference between the offered and remaining feed [17].

Residual feed intake (RFI)

Residual feed intake at the grower (29–63 days) and finisher (64–81 days) stages was calculated using the method described by Aggrey et al. [18].

Feed conversion ratio (FCR)

The FCR was calculated as the net feed conversion per unit of live weight gain for a given period [15].

Statistical analysis

The statistical analyses were conducted under several key assumptions: (1) The same *Giriraj* crossbred birds were used in both trials, although they were purchased in two different batches, (2) Weather conditions, soil characteristics, and the availability of pasture for grazing were comparable across the two trial periods, (3) Identical management practices were followed throughout both trials, and (4) External effects were considered minimal and were therefore not included as a separate factor in the statistical model. Data related to ABW, DBWG, mortality, FI, FCR, and RFI were analyzed using a nested linear model using General Linear Model (proc GLM). Treatment/Control was considered as a fixed effect. Replicate, nested within treatment/control, was considered a random effect. Partial regression coefficients for feed intake on metabolic body weight and body weight gain were generated using a regression procedure, and the chemical composition of the feed ingredients used was analyzed using a one-way ANOVA in SAS 9.0 [17]. Means were separated using the Least Significant Difference (LSD) in proc GLM, and statistical significance was set at $p < 0.05$.

Results and Discussion

Proximate composition of formulated diets

In the present study, rice (*Oryza sativa*) bran, wheat (*Triticum aestivum*) bran, and maize (*Zea mays*) meal were used as main energy sources, while dhal (*Lens culinaris*) dust and soybean (*Glycine max*) meal were used as protein sources. In accordance with the Label Rouge standards, animal-based feed ingredients were excluded from diet formulation. The proximate composition, ADF, and NDF contents of formulated starter, grower, and finisher diets are presented in Table 2.

Results showed that CP, CF, and ash contents were significantly higher ($p < 0.05$) in the starter diet than in the grower and finisher diets. Starter diets are formulated with higher protein levels to support early growth, whereas grower and finisher diets contain lower protein levels because older birds have lower protein requirements [19]. In the present study, EE content was significantly lower ($p < 0.05$) in the starter diet than in the grower and finisher diets, which may be attributed to the lower inclusion level of rice bran in the starter formulation. Furthermore, no significant differences in NDF content were observed among the formulated starter, grower, and finisher diets. Metabolizable energy (ME) content was significantly lower ($p < 0.05$) in the starter diet than in the grower and finisher diets; however, it was within the required range for the chicks [15]. Further, there was no significant difference in ME between the grower and finisher diets.

Birds reared under the PRS had access to a variety of pasture species in the run area, including *Desmodium triforum, Bracharia mutica, Ipomoea littoralis, Mikania cordata, Commelina diffusa, Cyperus kyllingiaa, Mimosa pudica, Aeschynomene indica, Exallage Auricularia, Imperata cylindrica, Vernonia cinerea, Cyperus rotundus, Ipomoea aquatica, Alysicarpus vaginalis, Alternanthera sessilis*, with insects and worms, overall providing a

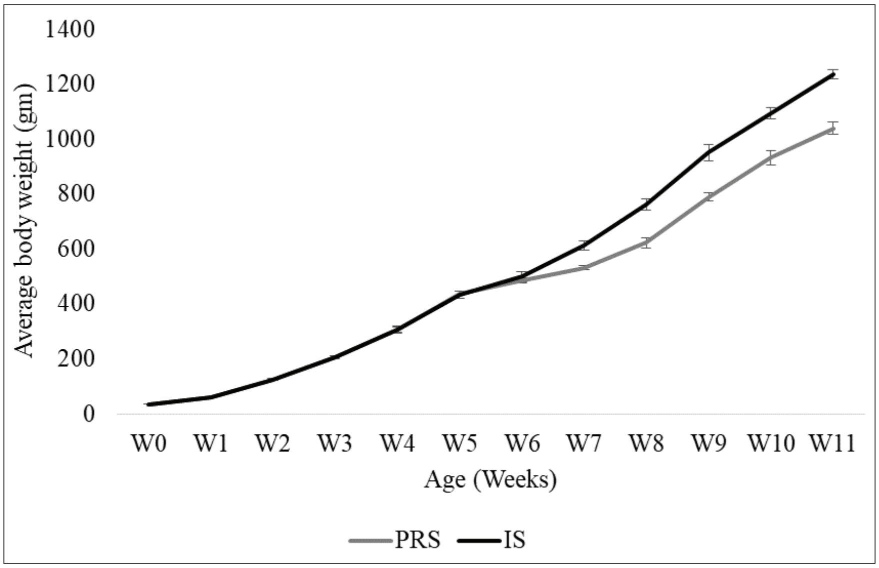

Figure 3. The change in the average body weight of the birds reared PRS and IS. IS, intensive system; PRS, pasture-raised system.

Table 3. Proximate composition, acid detergent fiber and neutral detergent fiber contents of forages grown in the run area of the research field (Mean ± SE).

Parameter	IS	PRS
CP%	8.64 ± 0.21	8.63 ± 0.15
EE%	1.31 ± 0.06	1.28 ± 0.04
CF%	29.65 ± 0.37	29.76 ± 0.26
Ash%	9.88 ± 0.41	9.49 ± 0.29
ADF%	45.31 ± 1.08	47.24 ± 0.76
NDF%	57.44 ± 0.49	56.23 ± 0.35

CP, crude protein; EE, ether extract; CF, crude fiber; ADF, acid detergent fiber; NDF, neutral detergent fiber; IS, intensive system; PRS, pasture-raised system.

supplementation of extra nutrients in addition to the diets provided.

The proximate composition, ADF, and NDF contents of forages grown in the run area of the research field are presented in Table 3. Results show that there was no significant difference in CP, CF, EE, ash, ADF, or NDF contents of collected forages from the run area between PRS and IS, even though the birds were grazing only in the run area of PRS.

Average body weight (ABW) and daily body weight gain (DBWG)

The ABW of birds reared under PRS and IS is presented in Figure 3, while ABW and DBWG at different growth stages are summarized in Table 4. At the end of the starter stage, no significant difference in ABW was observed between PRS and IS birds (206.06 ± 17.73 gm), as all birds were reared under identical conditions before being introduced to the experimental field at 30 days of age.

At the end of both grower and finisher stages, birds reared under IS exhibited significantly higher ($p < 0.05$) ABW compared to those under PRS. Similarly, DBWG during the starter period did not differ significantly between PRS and IS (9.69 ± 0.46 gm). However, DBWG during the grower and finisher stages was significantly higher ($p < 0.05$) in IS birds than in PRS birds.

Generally, growth rate is influenced by genetic factors, environmental factors such as feeding conditions, and their interactions [20]. The growth rate accelerates during the early stages, and after reaching the maximum growth rate (the inflection point), it gradually slows [21]. Furthermore, commercial layers showed higher growth potential than indigenous poultry due to their genetic potential, whereas indigenous chicken growth was continuous and took a relatively longer time to reach the point of inflection than commercial genotypes [22]. The results of the present study were in line with the above statement and showed continuous growth throughout the 81 days of the rearing period.

Results of DBWG were in agreement with the findings of [23,24] that the indigenous chicken reared under an intensive system had a greater response in DBWG than the semi-intensive system during the grower stage (day 29 to day 63).

Mortality

The mortality rate before introduction to the research field was 3.5% ± 1.5%. An outbreak of coccidiosis was observed during trial one. Furthermore, the results showed that the rearing system had no significant impact on percentage mortality. However, a higher mortality was observed in PRS (12.70% ± 2.23%) than in IS (5.84% ± 3.86%), mainly due to daytime predator attacks.

Daily feed intake (DFI)

Daily feed intake of birds reared under PRS and IS during the experimental period is presented in Figure 4, and the DFI of PRS and IS during starter, grower, and finisher stages is presented in Table 5. Results revealed no significant difference in feed intake between PRS and IS during the starter stage. But feed intake was significantly higher ($p < 0.05$) in IS than in PRS at both the grower and finisher stages.

In general, feed intake increases gradually in later stages because birds require feed for maintenance and production, as well as to cope with the stress of egg and meat production [25]. Normally, DBWG increases with FI; therefore, higher DBWG during the grower and finisher stages in IS could be associated with higher FI.

Feed conversion ratio (FCR)

FCR in starter, grower, and finisher stages was presented in Table 5. No significant difference in FCR was observed between PRS and IS across growth stages. At the finisher stage, body weight gain slowed, thereby affecting the feed conversion ratio, as described by [14]. However, birds under PRS had a lower feed conversion ratio. It should be noted that birds in the semi-intensive system were fed only 80% of their feed requirement. Earlier improvements in FCR were achieved as a correlated response to genetics, nutrition, and the rearing system [26]. Generally, the free-range poultry production system is characterized as a low-productivity, low-input system that depends on the

Table 4. DBWG and ABW at the end of the starter, grower and finisher stages (Mean ± SE).

Trial	Growth stage	Daily body weight gain (gm)		Average body weight (gm)	
		PRS	IS	PRS	IS
Trial 01	Grower	$15.70^{b} \pm 0.62$	$21.60^{a} \pm 0.88$	$810.73^{b} \pm 19.43$	$1011.33^{a} \pm 27.47$
	Finisher	11.13 ± 0.62	12.54 ± 0.88	$999.90^{b} \pm 19.43$	$1224.47^{a} \pm 27.47$
Trial 02	Grower	$12.77^{b} \pm 0.93$	$16.37^{a} \pm 1.32$	$768.93^{b} \pm 19.55$	$891.33^{a} \pm 27.65$
	Finisher	18.32 ± 0.93	21.05 ± 0.32	$1080.40^{b} \pm 19.55$	$1249.13^{a} \pm 27.65$
Overall	Grower	$14.24^{b} \pm 0.46$	$18.99^{a} \pm 0.66$	$789.83^{b} \pm 12.48$	$951.33^{a} \pm 17.65$
	Finisher	$14.72^{b} \pm 0.46$	$16.79^{a} \pm 0.66$	$1040.15^{b} \pm 12.48$	$1236.80^{a} \pm 17.65$

$^{a, b, c}$ means within the same row with different superscripts were significantly different ($p < 0.05$). IS, intensive system; PRS, pasture-raised system.

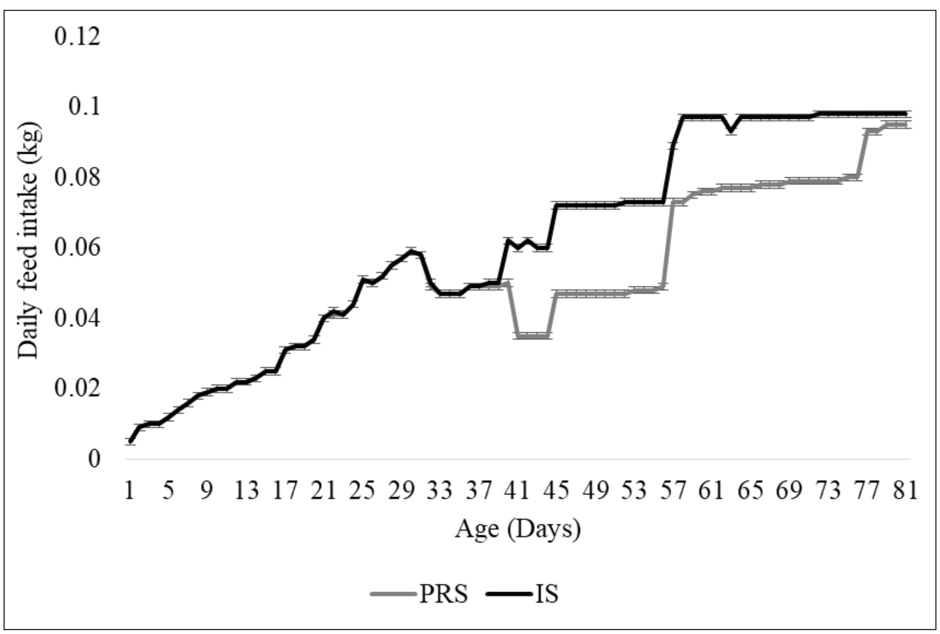

Figure 4. Daily feed intake of birds reared under PRS and IS throughout the study period. IS, intensive system; PRS, pasture-raised system.

Table 5. Daily Feed intake and FCR during different growth stages (Mean ± SE).

Trial	Growth stage	Feed intake (kg)		Feed conversion ratio (FCR)	
		PRS	IS	PRS	IS
Trial 01	Starter	0.027 ± 0.001	0.027 ± 0.001	3.24 ± 0.24	3.24 ± 0.34
	Grower	0.053^{b} ± 0.001	0.068^{a} ± 0.001	3.51 ± 0.24	3.26 ± 0.34
	Finisher	0.076^{b} ± 0.001	0.098^{a} ± 0.001	7.34^{b} ± 0.24	8.33^{a} ± 0.34
Trial 02	Starter	0.027 ± 0.002	0.027 ± 0.003	2.55 ± 0.25	2.55 ± 0.36
	Grower	0.053^{b} ± 0.002	0.069^{a} ± 0.003	4.18 ± 0.25	4.62 ± 0.36
	Finisher	0.090 ± 0.003	0.097 ± 0.004	4.87 ± 0.25	5.70 ± 0.36
Overall	Starter	0.030 ± 0.001	0.030 ± 0.001	2.90 ± 0.36	2.90 ± 0.38
	Grower	0.053^{b} ± 0.001	0.069^{a} ± 0.001	3.84 ± 0.64	3.94 ± 0.86
	Finisher	0.083^{b} ± 0.001	0.098^{a} ± 0.001	6.10 ± 1.58	7.02 ± 1.59

$^{a, b, c}$ means within the same row with different superscripts were significantly different ($p < 0.05$). IS, intensive system; PRS, pasture-raised system.

Table 6. Residual feed intake of pasture-raised and intensively reared slow-growing chicken (Mean ± SE).

Trial	Growth stage	PRS	IS
Trial 01	Grower	-0.025^{b} ± 0.01	0.038^{a} ± 0.01
	Finisher	-0.027^{b} ± 0.01	0.035^{a} ± 0.02
Trial 02	Grower	-0.016^{b} ± 0.01	0.057^{a} ± 0.01
	Finisher	−0.014 ± 0.01	0.018 ± 0.02
Overall	Grower	-0.021^{b} ± 0.01	0.047^{a} ± 0.01
	Finisher	-0.021^{b} ± 0.01	0.026^{a} ± 0.01

$^{a, b, c}$ means within the same row with different superscripts were significantly different ($p < 0.05$). IS, intensive system; PRS, pasture-raised system.

genetic potential of the selected poultry breed, the effectiveness of disease control methods, the quality of feed, and the availability of quality pastures [27].

Residual feed intake (RFI)

RFI values for the grower and finisher stages are presented in Table 6. A significant difference ($p < 0.05$) in RFI was observed between rearing systems, with IS birds showing significantly higher ($p < 0.05$) RFI values than PRS birds at both stages. RFI represents the difference between expected and actual feed intake and is widely used as an indicator of feed efficiency [28]. Statistically, the mean RFI within a population is zero, and a more efficient bird should have a negative value for RFI [26]. Accordingly, birds with low RFI (R-) require less feed to attain a similar body weight and production level and are considered more efficient than those with high RFI (R+) [29,30]. Results of the RFI revealed that the slow-growing chicken under the pasture-raised system was more efficient than the intensively reared slow-growing chicken. [26] observed that the RFI is independent of growth. Confirming the above finding, in the present study, there was no significant difference in RFI between grower and finisher stages within either PRS or IS.

Conclusion

Slow-growing indigenous chicken fed with cereal-based diets under an intensive system achieve higher average body weight and daily weight gain. However, when considering residual feed intake, pasture-raised birds are more efficient than those in the intensive system. Both systems show comparable feed conversion ratios. Overall, combining plant-based diets with access to pasture supports healthy growth and efficient feed utilization, leading to improved feed efficiency and reduced reliance on commercial feed. These findings indicate that slow-growing indigenous chicken can be effectively raised for meat production under either pasture-raised or intensive management, with the choice of system influenced by the resources available for the farmer and market factors such as feed costs and meat prices.

List of abbreviations

ABW, Average body weight; ADF, acid detergent fiber; CF, Crude fiber; DBWG, daily body weight gain; DFI, daily feed intake; DM, dry matter; EE, ether extract; FCR, feed conversion ratio; FRR, feed conversion ratio; IS, intensive system; NDF, neutral detergent fiber; PRS, pasture-raised system; RFI, residual feed intake.

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Conflict of interest

The authors declare that there is no conflict of interest.

Authors' contributions

Conceptualization: S.C., W.A.D., A.M.J.B., and M.A.A.P.; methodology: K.G.N. H., G.A.K.N., and S.C.; analysis: K.G.N.H., G.A.K.N., and S.C.; data curation: K.G.N.H. and S.C.; writing-original draft preparation: K.G.N.H. and S.C.; writing-review and editing: K.G.N.H., S.C., W.A.D., A.M.J.B, and M.A.A.P.; supervision: S.C., M.A.A.P., W.A.D. and A.M.J.B.; funding acquisition: S.C., W.A.D., A.M.J.B., and M.A.A.P.; All authors have read and agreed to the published version of the manuscript.

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