



Comparison of the growth performance of available layer strains in Bangladesh

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ABSTRACT

Various factors have been reported that affect the growth performance of layers, such as genetics, nutrition, environment, and disease. Attaining appropriate growth is essential to ensure profit. The present study was conducted to make comparative analyses of the growth performance of four commonly available layer strains in Bangladesh. A total number of 400-layer day-old chicks (DOCs), 100 from each of NOVOgen brown, ISA brown, Hy-Line brown and Bovans brown were used for the experiment. The birds were equally divided and randomly assigned to 4 treatments having 4 replications in each treatment comprising 25 birds per replication. All birds fed diet with similar composition and provided with the identical care and management up to 16 weeks of age. The results from this study revealed that there were no significant differences among the growth performances (weekly body weight, feed intake, uniformity and survivability) of four commonly available layer strains and all the strains followed the standard very closely. There were also no statistical differences based on the economic parameters of the strains compared in this study. Taken together, it may be concluded that the layer strains available in Bangladesh are highly competitive and suitable for local climatic conditions and the farmers can rely any of them.

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Introduction

The population of poultry is 375.6 million in 2022, including 311.8 million chickens (DLS, 2022). Malnutrition is an important and common phenomenon in the developing world, and an increased demand for quality protein is being seen in such countries. To fulfill these demands, there is an increase in the production of poultry (Mengesha *et al.*, 2008) and poultry plays an important role to fulfill the demand of food from animal origin (Permin and Pedersen, 2018). The climatic condition of our country is hot and humid, which is not so comfortable for poultry farming. Moreover, Bangladesh Meteorological Department Says that the temperature in the

country rose 1–1.34⁰C on average over the past century, with an annual average temperature with 25⁰C with monthly means between 18⁰C in January and 29⁰C in August. Birds are suffering, their productivity is decreasing, and mortality rate is increasing. So, researchers are trying to develop new biotechnological tools to combat heat stress.

Several brown and white commercial layer strains are available in Bangladesh which is reared on small, medium, and large scales. Brooding and growing periods are critically important for the performance of layers because if the birds do not achieve the standard body weight and standard uniformity before the onset of lay, the overall

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performance of the flock will be affected (Abbas *et al.*, 2010). The first 16 weeks of a pullet's life are very important, and good management at this time makes the birds ready to lay eggs. For a successful flock to lay eggs, a pullet's body weight at the time of lay must be healthy (Summers, 1987). A variety of factors influence the growth, uniformity, and survivability of layer chicks during the growing period reared on the littered floor in open-sided houses under local conditions in Bangladesh. To the best of authors' knowledge, a limited number of studies had previously been conducted addressing the pre-laying growth performance of different commercial layer strains and a little information available on their comparative analyses. Considering the situation and the paucity of information on this aspect, an attempt was made to compare the growth performance and production cost of four commonly available commercial layer strains in Bangladesh from day old to 16 weeks.

Materials and Methods

Experimental layout, birds, and dietary treatment

To compare the growth performance of four commonly available layer strains in Bangladesh the birds were reared in deep-litter system in an open-sided house. The experiment was carried out with 100 (one hundred) DOCs from each of NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown for a period of 16 weeks (0-16 week) at Bangladesh Agricultural University (BAU) Poultry Farm, Mymensingh. The layer chicks were brooded for DOC to 4 weeks and then reared 5 to 16 weeks in the same house (brood-grow house). The birds were divided equally and randomly into 4 treatments, each with 4 replications and 25 birds per replication. The treated groups were composed of the strains of NOVOgen brown (T1), ISA brown (T2), Hy-Line brown (T3), and Bovans brown (T4). All birds were fed with the diets of similar composition, manufactured by Kazi Farms Limited and provided with identical care and management up to 16 weeks of age. The birds were supplied layer starter (DOC to 4 weeks)

which composed of ME 2900 kcal/kg, 18% CP, 3% EE, 5% CF, 0.45% methionine and 0.99% lysine. Later the birds were supplied layer grower diet (5 to 16 weeks) composed of ME 2850 kcal/kg, 17% CP, 4% EE, 5% CF, 0.33% methionine and 0.71% lysine. Strict sanitary measures and controls were implemented during the experimental period.

Record keeping

Each chick was weighed separately before the experiment began, and the initial weights were recorded. After that, until the trial was over, the weight of the birds was measured each week. The record of temperature was taken in the morning and afternoon. Body weight and feed intake were measured weekly and average daily weight gain, average daily feed intake, uniformity at 16 weeks, and feed cost per bird were calculated.

Statistical analyses

Data for different variables were subjected to analysis of variance (ANOVA) in a completely randomized design (CRD) employing IBM SPSS Statistics 20. Differences with p-values of 0.05 or better were considered to be significant.

Results and Discussion

Overall growth performance

The overall growth performance of four commonly available layer strains in Bangladesh from initial to 16 weeks of age is summarized in Table 1. It reveals that there were no significant differences between the various treatment groups in the final body weight, feed consumption, feed cost per bird, uniformity, or survivability.

Weekly body weight

A representative chart of weekly body weight in different ages of four-layer strains is shown in Figure 1. There were no significant differences observed ($p > 0.05$) in the body weight assessment up to 16 weeks. According to the management guide of NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown, the target body weight of birds at 14 weeks should be 1270-1340 g, 1330-1410 g, 1350 g, and 1350 g

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respectively at 16 weeks of age. In our experiment, body weight of the birds was higher than average as stated in the manufacturers'

guidelines, which is a sign of effective management.

Table 1: Growth performance of four commonly available layer strains in Bangladesh (0-16 weeks)

Parameter	T ₁	T ₂	T ₃	T ₄	p-value
Initial Body Weight (g)	35.00±0	36.45±0	36.00±0	35.90±0	-
Final Body Weight (g)	1408.75±7.51	1435.75±22.12	1442.37±10.87	1423.37±21.91	0.535
Total Body Weight Gain (g)	1373±7.51	1399.3±22.12	1406.37±10.87	1387.47±21.91	0.574
Cumulative Feed Intake (g/b)	5879.17±41.42	5908.26±31.95	5877.38±10.78	5929.28±19.50	0.534
Feed Cost (BDT/b)	246.92±1.47	248.14±1.34	246.85±0.45	249.02±0.81	0.534
Uniformity (%)	95.00±2.88	95.00±2.88	92.50±2.50	90.00±4.08	0.640
Survivability (%)	91.00±1.91	95.00±1.00	92.00±1.63	94.00±2	0.360

Here, T₁= NOVOGen brown, T₂= ISA brown, T₃= Hy-Line brown, and T₄= Bovans brown. *p*<0.05, was considered significant and the value indicates mean ± standard error. Uniformity was done at week 16.

Age (Wk)	T ₁	T ₂	T ₃	T ₄	p-value
4	602.70±0	561.29±0	605.96±0	590.23±0	-
8	1837.05 ^b ±12.46	1793.35 ^a ±4.65	1846.18 ^b ±5.79	1831.37 ^b ±11.29	0.008
12	3736.41±40.04	3740.78±32.47	3732.62±8.64	3772.12±25.09	0.764
16	5879.17±41.42	5908.26±31.95	5877.38±10.78	5929.28±19.50	0.534

Table 2: Cumulative feed intake (g) of four commonly available layer strains in Bangladesh

Here, T₁ = NOVOGen brown, T₂ = ISA brown, T₃ = Hy-Line brown and T₄ = Bovans brown. *p*<0.05, was considered significant and the value indicates mean ± standard error. Means bearing dissimilar alphabets in the similar row differ significantly at the stated level of probability.

According to Haider and Chowdhury (2010), commercial brown-layer chicks raised in an open-sided housing may attain body weight similar to breeder's standards despite some challenges, which is consistent with our findings that brown layer chick growth from 0 to 17 weeks follows the standard. The average body weight of ISA brown, NOVOgen brown, and Shaver 579 did not significantly differ amongst strains, according to Hasan et al. (2021). Islam et al. (2013) found that Hisex White, Hy-Line brown, ISA brown, Dekalb, and NOVOgen White layer birds' average mature weights varied considerably (*P*<0.001) between them.

Feed intake

The cumulative feed intake of different treated groups was shown in Table 2. It was found that

the cumulative feed intake varied considerably (*p*<0.001) between the four strains at the age of 8 weeks. The ISA brown had the lowest average daily feed intake compared to the other strains at 8 weeks of age. Hy-Line brown consumed fewer amounts of feed (5877.38 + 10.78) than other three strains compared up to 16 weeks.

According to the management guide of NOVOgen brown, ISA brown, Hy-Line brown and Bovans brown, the cumulative feed intake of layer birds is 5400-5500 g/b, 5500 g/b, 5208-5551 g/b and 5500 g/b respectively after 16 weeks of age. So, it can be concluded that NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown consumed more feed up to 16 weeks than the standard. Haider and Chowdhury (2010) found

different results for Shaver 579 strains. They found that Shaver 579 strain consumed feed similar to the standard up to 17 weeks of age

The uniformity (at 16 weeks) of different layer strains is presented in Figure 2. The uniformity was monitored four times throughout the experiment. The first uniformity was monitored in four weeks and every four-week intervals in 8, 12, and 16 weeks, respectively.

Uniformity

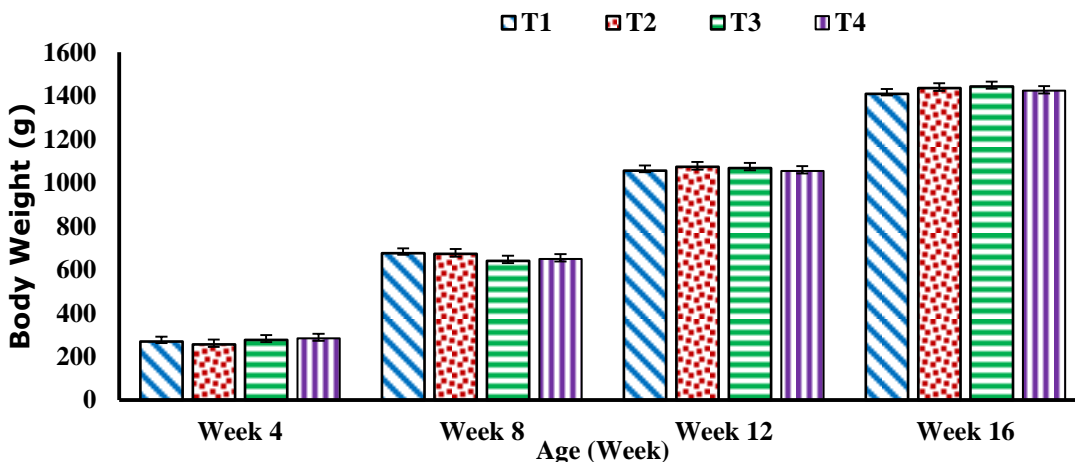


Figure 1: Weekly body weight (g) of different layer strains. Here, T₁= NOVOGen brown, T₂= ISA brown, T₃= Hy-Line brown, and T₄= Bovans brown.

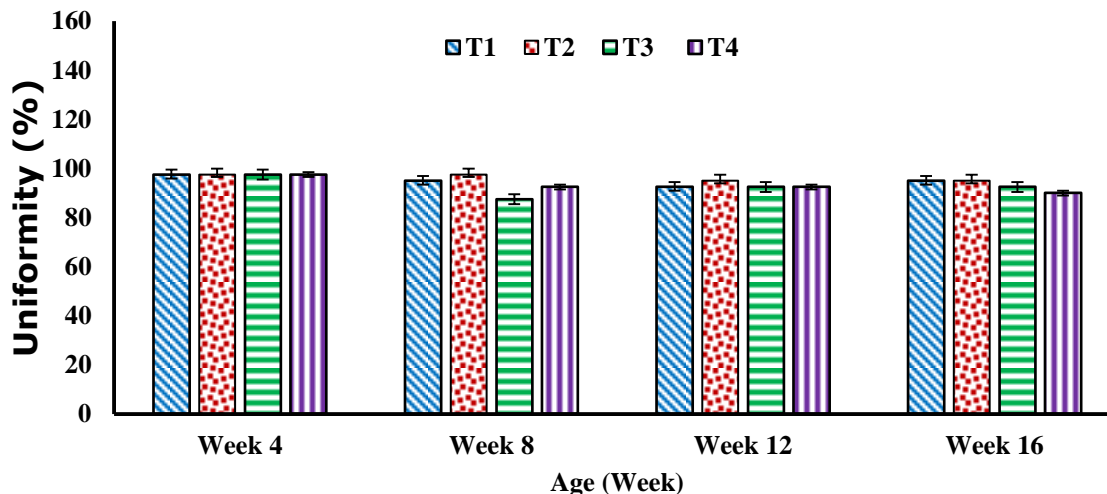


Figure 2: Uniformity (%) of different layer strains. Here, T₁= NOVOGen brown, T₂= ISA brown, T₃= Hy-Line brown, and T₄= Bovans brown

No significant difference was observed throughout the experiment in uniformity assessment. The achieved uniformity of NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown were 95.00±2.88%, 95.00±2.88%, 92.50±2.50%, and 90.00±4.08%. According to the management guide of NOVOgen brown, ISA brown, Hy-Line brown and Bovans brown, the uniformity of layer

birds should be a minimum of 80%, 85%, 80% and 80% respectively at 16 weeks of age. So, it can be concluded that the achieved uniformity of NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown followed the standard. Haider and Chowdhury (2010) found similar results for Shaver 579 strain. They found that the flock

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uniformity was 80% at 17 weeks for the commercial layer.

Survivability

The survivability of different treated groups is presented in Figure 3. The survivability was recorded in each week of the experiment. No significant difference was observed throughout the experiment in survivability assessment. ISA

brown showed a better survivability rate (95.00 ± 1.00), followed by Bovans brown (94.00 ± 2.00), Hy-Line brown (92.00 ± 1.63), and NOVOgen brown (91.00 ± 1.91). According to the management guide of NOVOgen brown, ISA brown, Hy-Line brown, and Bovans brown, the survivability of layer birds is 97-98% at 16 weeks of age.

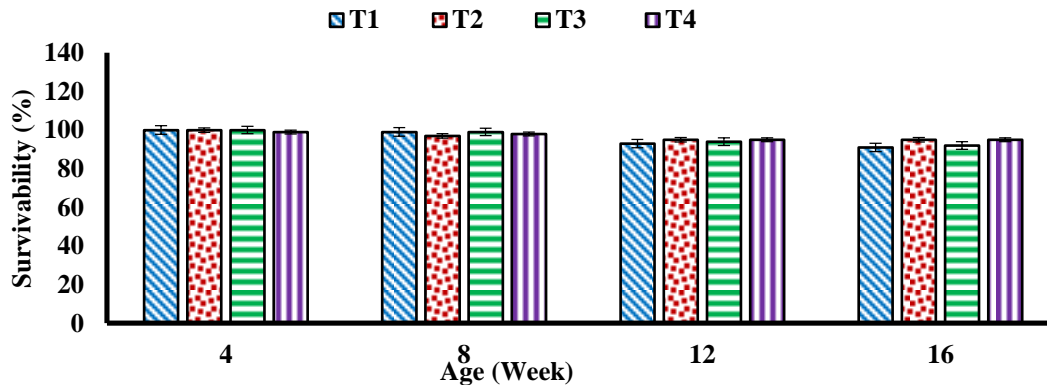


Figure 3: The survivability (%) of different layer strains. Here, T₁= NOVOgen brown, T₂= ISA brown, T₃= Hy-Line brown, and T₄= Bovans brown.

Islam et al., (2013) found a similar result. They found that the mortality percentage did not vary significantly for the Hy-Line brown, ISA brown, and NOVOgen White. Shaver 579-layer strains had outstanding survival rates (99.3%), according to Haider and Chowdhury (2010), over the experimental period (0-17 weeks). Similarly, Okoro et al., (2017) found that the survivability of Hy-Line brown is higher than local strains.

Conclusion

The growth performance of NOVOgen brown, ISA brown, Hy-Line brown and Bovans brown was almost close to the standards stated in manufacturers' guidelines. The production cost was also similar among the strains. So, it may be concluded that the available layer strains in Bangladesh are highly competitive and adaptable under the climatic condition of Bangladesh.

Author's contribution

AKM Emran: conducted the research and prepared the manuscript data, B Dey: conceptualized the research and reviewed the manuscript, SC Das: reviewed the manuscript, BC

Ray: data analysis and improved the manuscript, and Z Rahaman: involved with the research and prepared the manuscript.

Conflicts of interest statement

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Data Availability

The data used in this research would be available for any scientific purposes but need proper authentication from the authors and the journal as well.

Ethical Approval

No birds have been sacrificed in this research. However, the authors have taken approval from the respective committee.

Consent to participate

All the authors agreed to participate and would be happy for any further clarification needed from this paper.

Consent for publication

All the authors agreed and provide their consent for the publication of this manuscript in the Bangladesh Journal of Animal Science.

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