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Article

Performance of different commercial layer strains in Bangladesh

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Abstract: To know the production performances of different commercial layer strains in Bangladesh, total 18,420 birds of ISA Brown, 14,790 birds of Novogen-Brown and 27,400 birds of Shavar-579 Brown were studied from 30 commercial layer farms (10 farms for each strain), which were randomly selected from the 7 different districts of Bangladesh by farm visit via a well structured questionnaire. All birds were reared in open-sided shed in cage system. The hen day egg production percentage (HDEP%), average body weight and average feed intake per day of three different strains were studied. The HDEP% of ISA Brown, Novogen-Brown and Shaver-579 Brown were 90.79±0.44%, 78.89±1.84% and 79.13±1.41% respectively, average body weight were 1877±26.4 gm, 1885±26.9 gm and 1815.5±43.9 gm respectively, average feed intake per day were 111±1.88 gm, 109.8±1.86 gm and 112.5±1.35 gm respectively. The HDEP% was higher in ISA Brown, however there were no significant difference among strains for average body weight and average feed intake per day. Finally, it is recommended that ISA Brown is more adaptable and profitable in Bangladesh than that of other strains. Further scientific study is needed to see the production performance of different commercial layer strains in farm trail with same environmental condition.

Keywords: layer strains; HDEP; feed intake; body weight

1. Introduction

Poultry sector play an important role to reduce malnutrition of the people of Bangladesh by supplying quality meat and egg. It also plays a vital role to increase the agricultural growth of Bangladesh. Different types of stakeholder are related in this poultry sector such as farmer, feed companies, veterinarian, animal scientist, poultry equipment supplier and pharmaceutical companies. In our poultry sector, over 1 million entrepreneurs and 8 million people are directly involved (Hamid *et al*., 2017). The contribution of livestock sub-sector in our GDP (Gross Domestic Products) is 3.47% in FY 2018-19 (DLS, 2018). Despite of huge production of eggs, our small-scale layer farmers are not getting profit nowadays. Selection of breed and strain, environmental condition of the house, management practices like feed and feeding management, climatic condition and biosecurity are the major factors which have a direct influence on the production of quality egg (Talukder *et al*., 2010). Due to genetic variation there are differences in production performance among different breeds and strains.

Layer strains are produced by breeding companies on the basis of selection of different desirable traits- age of sexual maturity, egg production per hen, age of peak egg production, rate of laying before and after moult, livability and blood and meat spot eggs. Among different desirable traits egg production per hen is the top most important trait for the selection of layer strains for commercial layer farms (Bennewitz *et al.*, 2007). Egg production and quality differ among strains because of genetic variation (Moreng & Avens, 1985; Harms *et al.*,

2000). More than 10 commercial layer strains are available at field level in Bangladesh and most common commercial layer strains are ISA Brown, Hy-line White, Hy-line Brown, Shavar-579 Brown, Novogen-Brown, Hy-sex White and Hy-sex Brown. Among them some are white shell egg producer (Hy-line White, Hy-sex White) and some are brown shell egg producer (ISA Brown, Hy-line Brown, Shavar-579 Brown, Novogen-Brown and Hy-sex Brown). Generally, brown egg producing strains exhibit early sexual maturity (132.07 days) than the white egg producing strains (137.8 days). Moreover, hen day egg production (HDEP) of brown egg producing strains is higher (85.6%) than the white egg producing strains (83.2%) (Anderson *et al*., 2004). For this reason our farmers prefer to rear brown egg producing strains than the white egg producing strains. To get optimum growth and higher egg production from different commercial layer stains a better layer management is needed (Samad, 2013).

Quality egg production is the key of success for commercial layer business, because a layer farmer gets 90% of total farm income from selling of eggs (Oluyemi and Robert, 1979). Generally, layer birds reach in sexual maturity at 19 weeks of age, and the goes to the peak egg production between 26 to 30 weeks of age and farmers replace their birds between 72 to 76 weeks of age when it gives less than 60% of egg production (Rahman, 2003). To meet up our egg requirement and for profitable layer farming we need optimum level of egg production through high yielding strains. From this study, we wanted to know the production performance of different commercial layer strains in Bangladesh to find out the more suitable and profitable commercial layer strain for farmers.

2. Materials and Methods

2.1. Study area, time and data collection

Different commercial layer farms were randomly selected from 7 different districts of Bangladesh (Kishoreganj, Narsingdi, Rajshahi, Gazipur, Chattogram, Sylhet and Sunamganj) over a period of 6 months (September to February, 2020). The addresses of farmers were collected with the help of veterinary surgeons of different districts and upazila's. On the basis of availability of different commercial layer strains, farms of ISA Brown, Novogen-Brown and Shaver-579 Brown were selected and total 30 commercial layer farms (10 farms for each strain) were visited and interview of farmers were taken with a structured questionnaire. Birds of all commercial layer farms were reared in open-sided shed in cage system. Total number of layer birds was 60,610 in 30 commercial layer farms. There were 18,420 number of birds of ISA Brown strain in 10 farms, 14,790 number of birds of Novogen-Brown strain in 10 farms and 27,400 number of birds of Shavar-579 Brown strain in 10 farms.

2.2. Data entry and data management

The raw data were entered in a spread sheet with the help of Microsoft Office Excel 2016. The different information putted into the spread sheet was as follows- name of strain, number of birds in the farm, rearing system, age of the birds (weeks), average body weight of the birds (gm), standard body weight as per strain (gm), average feed intake by per bird per day (gm), standard feed intake by per bird per day (gm) as per strain, number of eggs produced per day, HDEP% (Hen Day Egg production) and standard egg production % as per strain.

2.3. Measurement of Hen Day Egg production

Hen Day Egg production percentage of the farm were measured by following index:

$$\text{HDEP\%} = \frac{\text{Total number of eggs produced on a day}}{\text{Total number of hens present on that day}} \times 100$$

2.4. Statistical procedure

Different parameters (Hen day egg production percentage (HDEP%), average body weight and average feed intake per bird) were analyzed by ANOVA using the GLM procedure of Minitab statistical software (2019) at 5% level of significance. Tukey pairwise comparisons were used to see the variation among different strains for HDEP%.

3. Results and Discussion

The production performances of ISA Brown strain between 25 to 70 weeks of bird's age are shown in Table 1. The average HDEP% (Hen Day Egg Production) for ISA Brown strain was 90.79% for 25 to 70 weeks of age. Among the farms of ISA Brown strain, highest 92.5% HDEP were recorded at 37 weeks of age and lowest 88.75% HDEP were recorded at 41 weeks of age.

The average body weight and average feed intake per day for ISA Brown strain were recorded 1877.77 gm and 111gm respectively between the age ranges from 25 to 70 weeks. According to the standard of ISA Brown strain, the average body weight, feed intake per day and HDEP% are 1941.36 gm, 112.90 gm and 91.87%, respectively between 25 to 70 weeks of age (ISA Brown Commercial Product Guide, 2019). The standard data of body weight, feed intake per day and HDEP% of ISA Brown strain between 25 to 70 weeks of age are presented in Table 2. In comparison with data recorded in this study, the average body weight (1877.77 gm), average feed intake per day (111 gm) and average HDEP% (90.79) between 25 to 70 weeks of age, all are lower than the standard of ISA Brown strain.

The production performances of Novogen-Brown strain are shown in Table 3. The average HDEP% for Novogen-Brown strain was 78.89% for 26 to 65 weeks of age. Highest 83.8% HDEP were recorded at 49 weeks of age and lowest 70.51% HDEP were recorded at 64 weeks of age for Novogen-Brown strain. In the farm, the average body weight and average feed intake per day between 26 to 65 weeks of age for Novogen-Brown strain were recorded 1885 gm and 109.8 gm respectively. According to the standard of Novogen-Brown strain, the average body weight, feed intake per day and HDEP% are 1861.11 gm, 115 gm and 88.66%, respectively between the ages of 26 to 65 weeks (Commercial Layers Management Guide – Novogen-Brown, 2018). The standard body weight, feed intake per day and HDEP% for Novogen-Brown strain between 26 to 65 weeks of age are shown in Table 4. In comparison with data recorded from farms in this study, the average body weight (1885 gm) is higher than the standard of Novogen-Brown strain, the average feed intake per day (109.8 gm) and average HDEP% (78.89%) are lower than the standard of Novogen-Brown strain.

The average HDEP% for Shaver-579 Brown strain was recorded 79.13% between 22 to 67 weeks of age. For Shaver-579 Brown strain, highest 83.78% HDEP was recorded at 40 weeks of age and lowest 70% HDEP recorded at 67 weeks of age. The production performances of Shaver-579 Brown strain between 22 to 67 weeks of age are shown in Table 5. The average body weight and average feed intake per day for Shaver-579 Brown strain was recorded 1815.5 gm and 112.5 gm respectively between the age of 22 and 67 weeks. According to the standard of Shaver-579 Brown strain, the average body weight, feed intake per day and HDEP% are 1838 gm, 111.75 gm and 89.61%, respectively within the age of 22 and 67 weeks (Shaver Brown product guide cage production system, 2019). The standard body weight, feed intake per day and HDEP% of Shavar-579 Brown strain between 22 to 67 weeks of age are presented in Table 6. In comparison with data recorded from different farms, the average body weight (1815.5 gm), and average HDEP% (79.13) are lower than the standard of Shaver-579 Brown strain, however average feed intake per day per bird (112.5 gm) is higher than the standard of Shaver-579 Brown strain between 22 to 67 weeks of age.

Among the 3 strains the highest HDEP% were recorded (90.79%) for ISA Brown strain followed by Shaver-579 Brown (79.13%) and Novogen-Brown (78.89%). The hen day egg production (HDEP%), average body weight and average feed intake per day of different strains are shown in Table 7. The values obtained in this study for HDEP% for ISA Brown layer strain is higher than the findings of Renema *et al*., (2001) (86.7% HDEP for ISA Brown strain), Okedere *et al*., (2020) (73.79% HDEP for ISA Brown strain) and Kabir and Haque (2010) (77.11% HDEP for ISA Brown). However in case of HDEP% of Shaver-579 Brown layer strain our findings is lower than the Islam *et al*., (2015) (83.88% HDEP for Shaver-579 Brown strain). In our study we observed better biosecurity, feeding and lighting management in the farms of ISA Brown layer strain and for this reason ISA Brown layer strain exhibited higher HDEP% than other strains. The HDEP% of Novogen-Brown strain is similar with the findings of Cornwall–Thomas (2019) (HDEP% for Novogen-Brown ranged from 57.7 to 79.1%). The salient criteria for appraising the performance of the commercial layer strains have been HDEP% and egg weights. In this study all the findings were not same with recommended level. This occured due to differences in environmental condition, management system, housing system, lighting system, feeding, medication, biosecurity and genetic variation of strain.

Table 1. Production performances of ISA Brown strain in farms.

Farm No.	Birds age (Wks)	No. of Birds	Av. body weight/bird (gm)	Av. feed intake/bird/day (gm)	No of Egg/day	HDEP* %
Farm 1	41	4000	1900	108	3550	88.75
Farm 2	49	1490	1900	117	1370	91.94
Farm 3	47	1100	1950	120	998	90.72
Farm 4	25	900	1900	110	804	89.33
Farm 5	70	900	1900	115	817	90.77
Farm 6	37	2000	1900	105	1850	92.5
Farm 7	57	1800	1650	100	1603	89.05
Farm 8	53	2700	1900	110	2444	90.5
Farm 9	45	2750	1920	115	2530	92
Farm 10	39	780	1850	110	720	92.3
Mean±SEM			1877±26.4	111±1.88		90.79±0.44

*HDEP-Hen Day Egg Production

Table 2. Standard body weight, feed intake and HDEP% of ISA Brown strain.

Birds age (Wks)	Standard body weight/bird (gm)	Standard feed intake/bird/day (gm)	Standard HDEP%
25	1796	112	96.1
37	1896	113	95.2
39	1906	113	94.8
41	1915	113	94.4
45	1931	113	93.5
47	1939	113	92.9
49	1946	113	92.3
53	1969	113	90.9
57	1969	113	89.4
70	1988	113	83.5
Mean±SEM	1941.36±9.14	112.90±0.09	91.87±1.05

*HDEP-Hen Day Egg Production

Source: ISA Brown Commercial Product Guide (2019)

Table 3. Production performance of Novogen-Brown strain in the farm.

Farm No.	Age (Wks)	No. of Birds	Average body weight/bird (gm)	Average feed intake/bird/day (gm)	No of Egg/day	HDEP* %
Farm 1	49	1050	1900	110	880	83.80
Farm 2	40	1000	1900	107	800	80
Farm 3	26	400	1950	110	300	75
Farm 4	64	1560	1900	120	1100	70.51
Farm 5	45	2000	1900	120	1650	82.5
Farm 6	64	2600	1900	110	2100	80.76
Farm 7	65	1100	1650	105	790	71.81
Farm 8	50	1000	1900	105	810	81
Farm 9	60	2080	1950	108	1706	82.01
Farm 10	40	2000	1900	103	1630	81.5
Mean±SEM			1885±26.9	109.8±1.86		78.89±1.48

*HDEP-Hen Day Egg Production

Table 4. Standard body weight, feed intake and HDEP% of Novogen-Brown strain.

Age (Wks)	Standard body weight/bird (gm)	Standard feed intake/bird/day (gm)	Standard HDEP* %
26	1790	115	94
40	1840	115	94
45	1850	115	93
49	1860	115	91
50	1860	115	91
60	1880	115	86
64	1890	115	83
64	1890	115	83
65	1890	115	83
Mean±SEM	1861.11±10.94	115	88.66±1.56

*HDEP-Hen Day Egg Production
Source: Commercial Layers Management Guide – Novogen-Brown (2018)

Table 5. Production performance of Shaver-579 Brown strain in farms.

Farm No.	Age (Wks)	No. of Birds	Average body weight/bird (gm)	Average feed intake/bird/day (gm)	No of Egg/day	HDEP* %
Farm 1	63	2000	1950	110	1650	82.5
Farm 2	40	1850	1800	110	1550	83.78
Farm 3	37	5000	1825	116	4100	82
Farm 4	62	6000	1950	120	4560	76
Farm 5	22	1000	1650	105	750	75
Farm 6	67	3000	1980	115	2100	70
Farm 7	25	2500	1600	114	2100	84
Farm 8	28	1050	1750	110	845	80.47
Farm 9	65	3000	1950	115	2340	78
Farm 10	25	2000	1700	110	1590	79.5
Mean±SEM			1815.5±43.9	112.5±1.35		79.13±1.41

*HDEP- Hen Day Egg Production

Table 6. Standard body weight, feed intake and HDEP% of Shaver-579 Brown strain.

Age (Wks)	Standard body weight/bird as per strain (gm)	Standard feed intake/bird/day as per strain (gm)	Standard HDEP% as per Strain
22	1700	111	81.3
25	1748	111	95.5
28	1748	112	96.5
37	1850	112	94.3
40	1864	112	93.8
62	1929	112	86.4
63	1930	112	86
67	1935	112	84.1
Mean±SEM	1838±33.43	111.75±0.16	89.61±2.09

*HDEP- Hen Day Egg Production
Source: Shaver-579 Brown product guide cage production system (2019)

Table 7. Hen day egg production (HDEP%), average body weight and average feed intake per day of different strains.

Parameters (%/gm)	ISA Brown	Novogen-Brown	Shaver-579 Brown
HDEP%	90.79±0.44[a]	78.89±1.48[b]	79.13±1.41[b]
Average body weight (gm)	1877±26.4	1885±26.9	1815.5±43.9
Average feed intake per day (gm)	111±1.88	109.8±1.86	112.5±1.35

Numbers with a different superscript differ between strains for specific parameter $p \leq 0.05$, results are shown as means ± SEM

4. Conclusions

In this study, we found higher HDEP% in ISA Brown than the Novogen-Brown and Shaver-579 Brown. Finally, from the collected data (by farm visit via a well-structured questionnaire) we can say that the ISA Brown layer strain is more adaptable and profitable in Bangladesh than that of other available strains. Further scientific study is needed to see the production performance of different commercial layer strains in farm trail with same environmental condition.

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Conflict of interest

None to declare.

References

Anderson KE, GS Davis, PK Jenkins and AS Carroll, 2004. Effects of bird age, density, and molt on behavioral profiles of two commercial layer strains in cages. Poult. Sci., 83: 15-23.

Bennewitz J, O Morgades, R Preisinger, G Thaller and E Kalm, 2007. Variance component and breeding value estimation for reproductive traits in laying hens using a Bayesian threshold model. Poult. Sci., 86: 823-828.

Cornwall–Thomas A, 2019. The impact of THI on egg production of a layer strain and the implications for climate change. Conference paper.

Directorate of Livestock Services (DLS), 2018. Annual report on livestock, Division of Livestock Statistics, Ministry of Fisheries And Livestock, Farmgate, Dhaka, Bangladesh.

Hamid MA, MA Rahman, S Ahmed and KM Hossain, 2017. Status of poultry industry in Bangladesh and the role of private sector for its development. Asian J. Poult. Sci., 11: 1-3.

Harms RH, GB Russell and DR Sloan, 2000. Performance of four strains of commercial layers with major changes in dietary energy. J. Appl. Poult. Res., 9: 535-541.

ISA Brown Commercial Product Guide, 2019.

Islam S, MS Bari, SP Moni, MZ Siddiqe, MH Uddin and OF Miazi, 2015. Phenotypic Characteristics of Commercial Layer Strains, ISA Brown and Hisex Brown. Int. J. Nat. Sci., 5: 41-45.

Kabir F and T Haque, 2010. Study on production performance of ISA brown strain at Krishibid Firm ltd. Trishal, Mymensingh. *Bd*. Res. Pub. J., 3: 1039-1044.

Moreng R and JS Avens, 1985. Classification, nomenclature, and showing of poultry. Poultry Science and Production. Reston Publishing Co., Inc. Prentice-Hall Company. Reston, Virginia, 22090, pp.16-45.

Okedere DA, PQ Ademola and PM Asiwaju, 2020. Performance and cost-benefit analysis of ISA Brown layers on different management systems. Bull. Natl. Res. Cent. , 44: 1-7.

Oluyemi JA and FA Roberts, 1979. Poultry production in warm wet climates. Macmillan Press Ltd..

Rahman M, 2003. Growth of poultry industry in Bangladesh poverty alleviation and employment opportunity. In Proceedings of 3rd International Poultry Show and Seminar, Organized by World's Poultry Science Association-Bangladesh Branch, pp. 1-7.

Rahman S, IA Begum IA and MJ Alam, 2014. Livestock in Bangladesh: distribution, growth, performance and potential. LRRD, 26: 233-238.

Renema RA, FE Robinson, JJ Feddes, GM Fasenko and MJ Zuidhoft, 2001. Effects of light intensity from photostimulation in four strains of commercial egg layers: 2. Egg production parameters. Poult. Sci., 80: 1121-1131.

Samad MA, 2013. Poultry Science and medicine, 2nd edition, LEP publication, BAU campus, Mymensingh, Bangladesh.

Shaver-579 Brown product guide, cage production system, 2019.

Talukder S, T Islam, S Sarker S and MM Islam, 2010. Effects of environment on layer performance. J. Bangladesh Agril. Univ., 8: 253-258.

Commercial Layers Management Guide – Novogen-Brown, 2018.