

## PERFORMANCE EVALUATION OF DAHLEM RED, RHODE ISLAND RED AND NATIVE CHICKEN UNDER INTENSIVE MANAGEMENT IN HIMACHAL PRADESH

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Received: 19.10.2022; Accepted: 02.01.2023

### ABSTRACT

The present study assessed the production performance of Dahlem Red (DR), Rhode Island Red (RIR) and Native (N) chicken under All India Coordinated Research Project on Poultry Breeding (Rural Poultry Unit) Palampur. Birds were kept under deep litter system for a period of 72 weeks. The study was planned to identify suitable germplasm and their subsequent use in developing new stock for rural poultry production. Growth and production data was collected from the performance records maintained at Poultry Farm, Palampur and analyzed. Traits studied were day old chick weight, body weight at 4, 8, 12, 20, 40 weeks, egg weight at 28, 40 and 52 weeks of age, age at sexual maturity (ASM), hen housed egg production (HHEP), hen day egg production (HDEP) and survivor egg production (SEP) at 40 week, 52 week and 72 week of age. The phenotypic means and variability for different traits was estimated among different stocks. The data was analyzed by SPSS 24 software package. Significant differences were observed for growth rate, age at sexual maturity, egg production and egg weight among different genetic groups. Results revealed that body weights of Dahlem Red were significantly ( $P<0.05$ ) higher than corresponding body weight of RIR and native birds at different age groups. With regard to comparative performance on egg production and egg weight, DR birds performed better than RIR and native chicken. DR also showed early sexual maturity, age at 25 % and 50% hen housed egg production. The egg production and egg weights were higher in DR throughout the laying period followed by RIR and native. The better performance of DR birds indicated their use in developing new stock for backyard rearing through cross breeding programme.

**Keywords:** Performance record, Growth traits, Dahlem Red, RIR, Native

**How to cite:** Dinesh, K., Sankhyan, V., Thakur, D., Kumar, R. and Thakur, Y.P. (2023). Performance evaluation of Dahlem Red, Rhode Island Red and Native chicken under intensive management in Himachal Pradesh. *The Haryana Veterinarian* 62(SI-2): 73-76.

Livestock and poultry rearing is an imperative factor for improving the nutritional security of rural poor in India (Pathak and Nath, 2013). Chickens play an important role in rural economies in most of the developing and underdeveloped countries. They play a major role for the rural, poor and marginalized section of the people with respect to their subsidiary income and also provide them nutritious egg and meat for their own consumption (Padhi, 2016). The knowledge of performance of economic traits in chicken is important for the formulation of breeding plans for further improvement in production traits. Growth and production traits of a bird indicate its genetic constitution and adaptation with respect to the specific environment (Ahmed and Singh, 2007). Loss in output might be due to genotype, ambient factors, management and climate (Cahaner and Leenstra, 1992). There has been a gap on the suitability of breed/variety for backyard poultry farming in the state of Himachal Pradesh. Contrary to fast national growth, poultry production in Himachal Pradesh had grown slowly due to sluggish growth of organized commercial poultry. Apart from topographical and agro-climatic limitations, other major constraints associated with poultry farming are lack of input support in terms of unavailability of quality chicks of high yielding strains, non-availability and high cost of feed and feed ingredients, lack of adequate technological support and poor technical knowhow and management skill of local

poultry farmers. As a result poultry production in Himachal Pradesh has witnessed slower growth due to sluggish growth of organized commercial poultry. The stagnant per capita egg availability of 14 eggs/annum is far less than national average of 79 eggs/annum (BAHS, 2019). The state has high and increasing local demands for eggs and poultry meat which is being largely fulfilled by supplies from adjoining states at comparatively high prices (Dinesh *et al.*, 2020). It is therefore very essential to recognize potential poultry breed/variety suitable for backyard farming in hill region of Himachal Pradesh which is easily adaptable to high rainfall, cold environment and high altitude.

In backyard farming system, farmers usually rear native type chicken having low egg and meat production potential. The traditional backyard poultry rearers usually keep 5-25 non-descript poultry birds producing 60-80 eggs/ annum (Shinde and Srivastava, 2006; Sethi, 2007). Low weight gain, low egg production, high mortality due to low genetic potential and low nutrition level are the common constraints to adopt backyard poultry farming as a profitable venture. Genetic improvement in local stock may be time consuming but the improvement will be permanent (Dinesh *et al.*, 2018).

The poultry birds like Dahlem Red and Rhode Island Red (RIR), dual purpose birds with colorful plumage resembling indigenous (desi) have proved to be suitable for backyard farming (Khan *et al.*, 2016). Moreover, due to

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their plumage colour, these birds are highly preferred by people for day to day consumption, traditional rituals and sacrifices (Mahapatra *et al.*, 1999; Rangnekar and Rangnekar, 1999). These improved breeds of poultry have high egg laying and growing capacity (Das *et al.*, 2013). With these views, the present study evaluate the growth and production performance of native with two exotic breeds i.e. Dahlem Red and RIR to examine the best potential breed under intensive system of management.

## MATERIAL AND METHODS

Growth and production data for the present study were collected from the performance records maintained at Poultry Farm, Palampur under AICRP on Poultry Breeding. Performance data of 200 birds each of Dahlem Red (DR), Rhode Island Red (RIR) and Native (N) were utilized for the present study. Dahlem Red is an egg-purpose breed of chickens, imported from Germany to India. It is a red-feathered breed which lays brown tinted eggs of optimum weight and has high disease tolerance and immune competence (Kundu *et al.*, 1999). Rhode Island Red is a dual-purpose breed, popular in rural areas and have optimum egg production potential. These breeds are used in cross breeding programme to produce improved germplasm suitable for backyard poultry rearing. Day old chicks of DR and RIR were procured from Central Poultry Development Organisation, Chandigarh, whereas native birds were purchased from farmers of different districts of Himachal Pradesh.

All chicks were brooded up to six weeks of age and thereafter reared in deep litter system for a period of 72 weeks. The birds were provided starter feed up to 0-6 week, grower feed 7-18 week and layer feed 18 week onward. All the chicks were immunized against Ranikhet disease by using F1 and Lasota strain on 7<sup>th</sup> and 28<sup>th</sup> days, respectively. Gumboro (IBD) disease vaccine was administered on 13<sup>th</sup> and 24<sup>th</sup> days by using intermediate strain. Other vaccination and deworming schedule were followed up to 72 weeks of age as per Chauhan and Roy (2003).

The growth performance traits studied were day old chick weight, body weight at 4, 8, 12, 20 and 40 weeks, egg weight at 28, 40 and 52 weeks of age, age at sexual maturity (ASM), hen housed egg production (HHEP), hen day egg production (HDEP) and survivor egg production (SEP) at 40 weeks, 52 weeks and 72 weeks of age. The phenotypic means and variability for different traits was estimated among different stocks. The data was analyzed by SPSS 24 software package. Significant differences between DR, RIR and native birds were tested by one way analysis of variance (ANOVA) with Tukey's multiple comparison test as post-hoc test (Snedecor and Cochran 1994).

**Table 1. Performance evaluation of DR, RIR and Native birds for growth traits under farm conditions**

	DR	RIR	Native
<b>Body Weight (g)</b>			
Day old	36.81 ± 0.30 <sup>a</sup>	38.90 ± 0.32 <sup>b</sup>	31.29 ± 0.46 <sup>c</sup>
4 week	257.35 ± 5.14 <sup>a</sup>	242.80 ± 3.45 <sup>b</sup>	189.04 ± 1.52 <sup>c</sup>
8 week	668.68 ± 8.81 <sup>a</sup>	600.40 ± 4.47 <sup>b</sup>	473.30 ± 13.84 <sup>c</sup>
12 week	1090.67 ± 8.81 <sup>a</sup>	1050.40 ± 26.0 <sup>a</sup>	805.10 ± 13.97 <sup>b</sup>
20 week	1600.34 ± 11.60 <sup>a</sup>	1513.70 ± 16.33 <sup>b</sup>	1427.97 ± 20.21 <sup>c</sup>
40 week	1662.96 ± 11.94 <sup>a</sup>	1598.50 ± 13.20 <sup>b</sup>	1549.14 ± 21.58 <sup>b</sup>
<b>Egg weight (g)</b>			
28week	50.45 ± 0.28 <sup>a</sup>	49.50 ± 0.20 <sup>b</sup>	40.60 ± 0.11 <sup>c</sup>
40 week	53.72 ± 0.41 <sup>a</sup>	52.50 ± 0.25 <sup>b</sup>	45.46 ± 0.36 <sup>c</sup>
52 week	56.06 ± 0.48 <sup>a</sup>	54.05 ± 0.15 <sup>b</sup>	49.25 ± 0.29 <sup>c</sup>

Arithmetic mean with different superscript in rows differ significantly

**Table 2. Performance evaluation of DR, RIR and Native birds for production traits under farm conditions**

	DR	RIR	Native
<b>ASM (days)</b>			
Age at 1st Egg	133	142	152
Age at 25% HHEP	162	192	166
Age at 50% HHEP	183	208	203
<b>Egg production up to 40 weeks</b>			
Hen housed	67.93	62.09	40.10
Hen day	72.48	67.23	42.02
Survivor	79.30	74.78	43.03
<b>Egg production up to 52 weeks</b>			
Hen housed	103.90	98.36	60.62
Hen day	115.62	105.02	65.20
Survivor	132.79	124.45	68.63
<b>Egg production up to 72 weeks</b>			
Hen housed	154.03	139.14	79.50
Hen day	183.57	168.14	85.30
Survivor	238.64	198.47	89.40

## RESULTS AND DISCUSSION

The phenotypic mean estimated for performance traits of DR, RIR and native birds for growth traits viz. (day old chick weight, body weight at 4 week, 8 week, 12 week, 20 week and 40 week), egg weight at 28, 40 and 52 weeks of age, age at sexual maturity (ASM), hen housed egg production (HHEP), hen day egg production (HDEP) and survivor egg production (SEP) at 40, 52 and 72 weeks of age are presented in table 1 and 2.

### Growth Traits

Body weight of DR birds differ significantly ( $p < 0.05$ ) from RIR at all ages except at 12 week. There is no significant variation in body weight of DR and RIR bird

at 12 week. Whereas body weight of RIR and native bird differ significantly. However, there is no significant variation in body weight of RIR and native birds at 40 week. The present finding revealed that body weight of Dahlem Red bird at different age groups were significantly higher than RIR and native birds. Body weight is the direct reflection of growth and it influences the production and reproduction trait of birds (Niranjan *et al.*, 2008). The lower body weight of native birds was on expected line as light and compact body weight helps them to escape from the predators in free range system of rearing (Haunshi *et al.*, 2009). Alireza *et al.* (2015) observed the average weight of native hen and rooster pullets in Isfahan Province at ages of 8, 12 and 24 week as  $671 \pm 109$  and  $853 \pm 125$ ,  $929 \pm 177$  and  $1199 \pm 237$ ,  $1765 \pm 363$  and  $2167 \pm 335$  grams which were higher than the present findings. In contrast to present study Khan *et al.* (2016) reported higher body weight for RIR birds and lower body weight for native birds at 20 and 40 week under backyard system of poultry farming in West Bengal.

Roy *et al.* (2017) reported that RIR male and female attained an average weight of 0.61 kg & 0.52 kg, 1.41 kg & 1.04 kg, 2.55 kg & 2.11 kg, 3.04 kg & 2.42 kg and 3.72 kg & 3.19 kg at the age of 4 weeks, 10 weeks, 20 weeks 40 weeks and 72 weeks, respectively whereas, Desi male and female attained an average weight of 0.32 kg & 0.29 kg, 0.96 kg & 0.85 kg, 1.57 kg & 1.48 kg, 2.54 kg & 1.88 kg and 2.92 kg & 2.76 kg at the age of 4 weeks, 10 weeks, 20 weeks 40 weeks and 72 weeks, respectively which is higher than present finding. Shivaprasad *et al.* (2017) reported least squares mean of body weight at 4, 8, 20 and 40 weeks in DR bird were 146.88, 374.28, 1150.70 and 1678.57 grams which is lower than the present study. Sarma *et al.* (2018) reported lower body weight for desi birds at 8 ( $368.12 \pm 2.74$ ), 20 ( $789.14 \pm 5.03$ ), 40 ( $1269.31 \pm 9.01$ ) and 52 ( $198.31 \pm 2.03$ ) weeks of age under field condition in Boko Block of Kamrup district in Assam.

### Age at Sexual Maturity

DR birds showed sexual maturity at age of 133 days, RIR at 142 days and native at 152 days. The DR started laying earlier compared to RIR and Native. The lower age at sexual maturity in the layer is desirable, which may lead to the increase laying period and improving the egg production. Variation was also observed for 25 % and 50 % HHEP. Results of present study are consistent with earlier report of Giri and Sahoo (2012) who observed age at first lay of 138 days in intensive system and 142 days in extensive system of management in Gramapriya birds. Haunshi *et al.* (2009) reported higher age of sexual maturity in improved varieties Gramapriya (179.50 days)

and Vanaraja birds (197.70 days), which were developed for backyard farming. Jha *et al.* (2013) in their study under intensive system of management at Ranchi reported ASM 143.65 days in Dahlem Red, 171.38 days in Dahlem Red  $\times$  Native cross and 212.43 days in Native birds which is higher than the present study. Khan *et al.* (2016) estimated age at first egg laying in RIR to be 186.32 days and native birds 202.64 days under backyard field condition in Birbhum district of West Bengal. Roy *et al.* (2017) observed 168.34 days and 187.34 days for attaining sexual maturity in RIR and native birds under backyard farming system in Darjeeling district of West Bengal.

### Production Traits

Egg production and egg weight determine the success of poultry enterprise. As evident from Table 1, DR birds produced eggs with higher weight than RIR and native birds, while RIR produced eggs with higher weight than that of native chicken at 28, 40 and 52 weeks of age. The result showed that there was significant difference of egg weight among three genetic groups.

Hen housed egg production, Hen day egg production and Survivor egg production was higher in DR followed by RIR and then native chicken at 40, 52 and 72 weeks of age. Similarly DR birds showed higher egg production than all the stocks throughout the laying cycle. The comparative study of egg production showed that RIR produced higher number of eggs than native chicken and lower number of egg than DR (Table 2).

Kalita *et al.* (2009) recorded egg production and egg weight for indigenous chicken up to 72 weeks of age as  $65.30 \pm 1.45$ . and  $37.80 \pm 0.65$  gram in tribal and  $62.60 \pm 1.56$  and  $38.69 \pm 0.69$  gram in non-tribal communities of Assam. In another study Kalita *et al.* (2017) compared the performance evaluation of PB2  $\times$  indigenous and Dahlem Red birds under intensive system of rearing and reported delayed age at sexual maturity (ASM)  $172.36 \pm 5.26$  days in PB-2  $\times$  indigenous and  $158.23 \pm 2.75$  days in Dahlem Red bird in comparison to present study. Egg production at 40 and 52 weeks of age were recorded as 39.20 and 70.23, respectively in PB-2  $\times$  Indigenous bird and 82.56 and 124.76 in Dahlem Red bird, respectively which is higher than the present findings. Shivaprasad *et al.* (2017) reported egg production up to 40 weeks of age (71.06 eggs) and higher egg weight 52.81 and 56.25 gram at 32 and 40 weeks of age in Dahlem Red bird maintained at the Project Directorate on Poultry (PDP), Hyderabad. In a similar study, Khan *et al.* (2016) reported egg production of RIR to be  $157.23 \pm 1.11$  and indigenous bird to be  $65.73 \pm 0.7$  at 72 weeks of age under backyard system of rearing in Birbhum district of West Bengal. Age at sexual maturity, weekly egg

lay, total egg production and egg weight had been studied by Roy *et al.* (2017) where he observed that RIR chicken performed better than Vanaraja and Desi birds. The significant difference in egg production and egg weight among three genetic groups may be attributed to the difference in genetic potential of the birds.

The study assessed the production performance of DR, RIR and Native chicken under intensive system of management and found that DR birds showed better growth and production performance compare to RIR and local Native birds. Based on better performance of DR birds under intensive system, the DR birds may be utilized to develop the cross with native birds for conducting further evaluation of developed cross under backyard poultry farming.

## REFERENCES

- Ahmad, M. and Singh, P.K. (2007). Estimates of genetic parameters for some economic trait in white leghorn. *Indian J. Poult. Sci.* **42**: 311-312.
- Alireza, A., Gheisari, A. and Nabinejad, A. (2015). Evaluation of native chicken performance in rural areas of Isfahan province. *Anim. Sci. J.* **28**(1): 147-156.
- BAHS. (2019). Ministry of Fisheries, Animal Husbandry & Dairying, Government of India, New Delhi.
- Cahaner, A. and Leenstra, F. (1992). Effects of high temperature on growth and efficiency of male and female broilers from lines selected for high weight gain, favourable feed conversion and high or low fat content. *Poult. Sci.* **71**: 1237-1250.
- Chauhan, H.V.S. and Roy, S. (2003). Poultry disease diagnosis and treatment. (2nd Edn.), New Age International Private Limited, Publication, New Delhi, India. pp. 196-236.
- Dinesh, Krishanender., Sankhyan, V., Thakur, Y.P., Kumar, R. and Singh, S. Gurdeep (2018). Estimation of phenotypic trend in performance traits of native chicken germplasm of Himachal Pradesh. *J. Anim. Res.* **8**(6): 1071-1074.
- Dinesh, Krishanender., Sankhyan, V., Thakur, Y.P., Kumar, Rajesh and Bhardwaj, N. (2020). Phenotypic Time Trend in Performance Evaluation of Dahlem Red Chicken under Intensive Management in Himachal Pradesh. *J. Anim. Res.* **10**(3): 417-422.
- Giri, S.C. and Sahoo, S.K. (2012). Performance of gramapriya chicken under extensive and intensive system of management. *Indian Vet. J.* **89**: 52-55.
- Haunshi, S., Dooley, S. and Shakuntala, I. (2009). Production performance of indigenous chicken of northeastern region and improved varieties developed for backyard farming. *Indian J. Anim. Sci.* **79**: 901-905.
- Haunshi, S., Niranjana, M., Shanmugam, M., Padhi, M.K., Reddy, M.R., Sunitha, R., Rajkumar, U. and Panda, A.K. (2011). Characterization of two Indian native chicken breeds for production, egg and semen quality and welfare traits. *Poult. Sci.* **90**: 314-320.
- Jha, D.K., Prashad, S., Patel, N. and Baskar, K. (2013). Comparative evaluation of Dahlem Red and Desi cross chicken under intensive system of Poultry management. *Int. J. Agric. Technol.* **9**(6): 1405-1410.
- Kalita, N., Pathak, N. and Ahmed, M. (2017). Comparative evaluation of various traits of PB-2 × indigenous and Dahlem Red chicken under intensive system of rearing. *J. Entomol. Zool. Studies.* **5**(6): 156-159.
- Khan, M., Manna, D.C., Mondal, S.K., Chatterjee, J.K. and Pyne, S.K. (2016). Comparative performance of Vanaraja, RIR and indigenous birds under backyard system of rearing in Birbhum district of West Bengal. *Indian J. Poult. Sci.* **51**(3): 308-311.
- Kundu, A., Singh, D.P., Mohapatra, S.C., Dash, B.B., Moudgal, R.P. and Bisht, G.S. (1999). Antibody response to sheep erythrocytes in Indian native vis-a-vis imported breeds of chickens. *British of Poult. Sci.* **40**: 40-43.
- Mahapatra, S.C., Mishra, S.C and Korel, D. (1999). Indigenous Poultry Genetic Resources of Orissa.
- Niranjana, M., Sharma, R.P., Rajkumar, U., Reddy, B.L.N., Chatterjee, R.N. and Bhattacharya, T.K. (2008). Comparative evaluation of production performance in improved chicken varieties for backyard farming. *Int. J. Poult. Sci.* **7**(11): 1128-1131.
- Padhi, Kumar M. (2016). Importance of indigenous breeds of chicken for rural economy and their improvements for higher production performance. *Scientifica*. Article ID 2604685, 9 pages.
- Pathak, P.K. and Nath, P. (2013). Rural poultry farming with improved breed of backyard chicken. *The J. World's Poult. Res.* **3**(1): 24-27.
- Rangnekar, D.V. and Rangnekar, S. (1999). Traditional Poultry Production systems and the Role of Women in parts of Western India. *Livestock Feed Resources within Integrates Farming systems*. pp. 373-76.
- Roy, Rakesh., Monda, Tista and Moktan, M.W. (2017). Production performance of improved poultry under backyard farming system in Hill agro-climatic condition in West Bengal. *Indian J. Hill Farming*. pp. 21-26.
- Sarma, M., Islam, R., Borah, M.K., Sharma, P., Mahanta, J.D., Kalita, N. and Bhattacharyya, B.N. (2018). Comparative performance of Vanaraja, Srinidhi and Desi chicken under traditional system among tribal community of Assam. *Indian J. Anim. Res.* **52**(10): 1518-1520.
- Sethi, B. (2007). Backyard Poultry in Orissa. <http://orissagov.nic.in/e-magazine/Orissareview/engpdf/48-52>. Accessed January, 2007.
- Shinde, P.K. and Srivastava, N. (2006). Adaptive Research Interventions on Household Poultry: Lessons Learned and Feedback for Further Research. In: Sasidhar, P.V.K. (Ed.). Poultry Research Priorities to 2020, Proceedings of National Seminar, 2-3 November, Central Avian Research Institute, Izatnagar. pp. 239-243.
- Shivaprasad, C.H., Ramesh, Gupta B. and Chatterjee, R.N. (2017). Genetic study on the performance of Dahlem Red layers. *The Pharma Innovation J.* **6**(10): 394-397.
- Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods, (8<sup>th</sup> Edn.), Affiliated East-West Press and Iowa State University Press.