

*Original Research***Comparative Assessment of Production and Hatchability Performance of Vanaraja, Rhode Island Red and Indigenous Poultry Birds under Backyard Rearing System at West Bengal****Amitava Roy¹, Sanjoy Datta^{2*}, Partha Sarathi Roy¹, Sukanta Biswas³ and Sidharth Prasad Mishra²**¹Murshidabad Krishi Vigyan Kendra, Murshidabad, West Bengal, INDIA²West Bengal University of Animal and Fishery Sciences, Mohanpur, West Bengal, INDIA³University of Kalyani, Kalyani, West Bengal, INDIA***Corresponding author:** drsanjoydatta@gmail.com

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| Rec. Date: | Nov 23, 2017 19:25 |
| Accept Date: | Feb 10, 2018 11:08 |
| DOI | 10.5455/ijlr.20171123072540 |

Abstract

In order to accelerate economic growth of poor households in rural areas of Murshidabad district, West Bengal, low input technology backyard poultry farming was introduced by Krishi Vigyan Kendra for supplementing the earnings of poor farmers and landless labourers. Poultry birds of Vanaraja and Rhode Island Red (RIR) varieties were provided to the farmers. The performance of the birds under gangetic alluvial areas of Murshidabad district was found satisfactory. The body weights of Vanaraja birds were significantly ($p<0.05$) higher than that of RIR and Indigenous birds at different ages. The egg production of RIR birds was significantly ($p<0.05$) higher than Vanaraja and Indigenous birds. Vanaraja eggs were significantly ($p<0.05$) higher in weight than RIR and Indigenous birds. No significant difference in mortality was found during laying period (31-52 weeks) among the three varieties. The hatchability of Indigenous, Vanaraja and RIR birds were found to be 86.98%, 85.22% and 89.53% respectively. The study revealed significant higher production and hatchability performances Vanaraja and RIR birds over the Indigenous poultry birds guiding to a better way of livelihood and nutritional security.

Key words: Backyard Rearing, Murshidabad, RIR, Vanaraja

How to cite: Roy, A., Datta, S., Roy, P., Biswas, S., & Mishra, S. (2018). Comparative Assessment of Production and Hatchability Performance of Vanaraja, Rhode Island Red and Indigenous Poultry Birds under Backyard Rearing System at West Bengal. International Journal of Livestock Research, 8(7), 296-303. doi: 10.5455/ijlr.20171123072540

Introduction

Poultry is one of the fastest growing segments of the animal husbandry sector in India. According to the Livestock census 2012, out of 729.2 million of total fowls, 217.5 million poultry birds are reared under backyard poultry farming. The backyard poultry farming contributes 19.8% of total egg production in

India. As per the recommendations of National Institute of Nutrition, we require 180 eggs and 11 kg of poultry meat per capita per year, but we have presently achieved upto 63 eggs and 2.5 kg of poultry meat per capita per year. Therefore, it is clear that we have to improve the productivity of poultry birds to mitigate the huge demand of dietary animal protein for the increasing human population. However, our country is blessed with a variety of poultry breeds which have the potentiality both for poverty alleviation and food production, especially for 30.3 million families of rural poor farmers who are directly involved in backyard poultry farming. Different poultry stocks developed for backyard poultry farming are being tried for their suitability to local agroclimatic conditions for their further promotion in backyard farming. RIR, Vanaraja and Indigenous birds are mostly reared in backyard system of management in the tropical areas of Murshidabad. Such breeds are popular and well accepted by the small, marginal and landless farmers across the district. The native chicken varieties had adopted in free-range backyard conditions for centuries contribute about 11% of total egg production in India (Kumaresan *et al.*, 2008). Therefore, to increase the productivity of backyard poultry farming, improved varieties which are alike Indigenous chickens are now being massively introduced in the region (Singh *et al.*, 2002). Pica-Ciamarra and Dhawan (2009) reported that rural farmers were motivated with Rhode Island Red in backyard production under the largest Poultry Distribution Scheme of the world in the West Bengal state. Production potential of RIR birds seems to be capped in low input farming system (Dumrya, 2015). Vanaraja is a dual purpose variety developed at Project Directorate on Poultry for backyard poultry production in rural and tribal areas (Reddy *et al.*, 2002). It has been observed that consumers have preference for colored birds and brown-shelled eggs, both of which are produced in the rural backyard system through rearing of RIR and Vanaraja also. In poultry, body weight at different ages, egg production, egg weights, mortality percentage, hatchability and ratio of egg weight and chick weight are the major traits of economic importance. Though lot of works have been carried out by Jilani *et al.* (2007), Panda *et al.* (2004), Mishra *et al.* (2006), on the performance of production and reproduction traits of established breeds, very scanty of information is available on the rearing of established poultry bird in backyard condition. Keeping these views in mind, the purpose of this study was to compare and evaluate the productive and reproductive performances of RIR and Vanaraja with that of Indigenous poultry birds under backyard rearing system. The proposed study was aimed at evaluating the mortality, body weight, egg production, age at first laying and egg weight of three birds under backyard farming condition.

Materials and Methods

Selection of the Study Area

The study was conducted during the period of October, 2015 to February, 2017. Based on the availability of chicks and good communication facilities, the study was conducted in six different villages under

Jiaganj, Bhagwangola-I and Bhagwangola-II blocks of Murshidabad district (24.2290° N, 88.2461° E) of West Bengal. The areas have an average elevation of 18 metres (59 feet) from mean sea level. The annual temperature ranges from 10.2°C during winter to 38.4°C during summer. The average rainfall varies from 9.3 mm in January to 303.1 mm in the month of July (WBSMB Statistics, 2016).

Selection of Sample and Sampling Technique

A total of 300 numbers of unsexed day old Vanaraja chicks and 300 numbers of unsexed day old RIR chicks were purchased from State Livestock Farm, Government of West Bengal and were distributed among 30 farmers, each with 10 numbers of chicks of each type. The farmers were selected randomly with a condition to keep a minimum of 10 numbers of Indigenous poultry birds of different ages under backyard system. Thus a total of 300 Indigenous poultry birds of different ages were also included under the present study. Artificial brooding of Vanaraja and RIR chicks were done upto 21 days of age with the help of electric bulb, saw dust as bedding materials depending upon the environmental temperature at the demonstration unit of Murshidabad Krishi Vigyan Kendra. The Indigenous poultry birds were reared under traditional system without artificial brooding. The birds were vaccinated against Ranikhet and Gumboro diseases by standard vaccination schedule. Sufficient clean drinking water and commercial broiler starter feed were provided to all the birds during brooding period and natural feeding practice was followed thereafter during productive stages.

Collection of Data

Raw data on body weights at day old, 8, 20, 40 and 52 weeks of age, age at first egg, egg weights at 32, 40 and 52 weeks of age, egg production up to 32, 40 and 52 weeks of age were recorded. Mortality percentage was noted at 0 to 5, 6 to 30 and 31 to 52 weeks of age. The data was also collected for hatchability percentage, chick weights and egg weights. Analysis of data was done by using IBM SPSS Statistics (Ver. 21.0) software.

Results and Discussion

Body Weights

The mean body weight at different ages for Vanaraja, RIR and Indigenous poultry birds are given in Table 1. The body weights of Vanaraja were significantly ($p < 0.05$) higher than the body weights of RIR and Indigenous poultry birds at different ages. Sankhyan *et al.* (2016) reported that comparatively higher body weight of Vanaraja birds might be due to inheritance of exotic germplasm Cornish, a meat type bird. Kumaresan *et al.* (2008) stated that under standard management conditions, the average body weight of Vanaraja birds at 6 weeks was 625.0 ± 10.9 gm under backyard conditions and the body weight at 18 months was 3.6 ± 0.8 kg.

Table 1: Body weight in different age groups of Vanaraja, Indigenous and RIR birds

| Age | Vanaraja (gm) | Indigenous (gm) | Rhode Island Red (gm) |
|----------|-----------------------------|-----------------------------|-----------------------------|
| Day old | 32.23 ^a ±1.48 | 29.44 ^b ±1.54 | 30.84 ^b ±1.49 |
| 8 weeks | 766.74 ^a ±20.18 | 362.25 ^b ±22.28 | 598.53 ^c ±24.02 |
| 20 weeks | 1688.54 ^a ±33.71 | 776.64 ^b ±14.22 | 1459.38 ^c ±27.24 |
| 40 weeks | 2967.23 ^a ±22.88 | 1269.95 ^b ±33.43 | 2577.07 ^c ±26.09 |
| 52 weeks | 3489.09 ^a ±19.93 | 1417.69 ^b ±31.54 | 2998.28 ^c ±24.26 |

Row-wise similar superscripts does not differ significantly ($p < 0.05$)

Niranjan *et al.* (2008) and Ramana *et al.* (2010) recorded higher body weight of Vanaraja birds at different ages under intensive system of management. The present findings also revealed that the body weights of RIR at different age groups were also significantly higher than the Indigenous poultry birds in backyard management. The significant effects of different varieties on body weights of poultry birds were reported by Mohammed *et al.* (2005), Devi and Reddy (2005) and Chatterjee *et al.* (2007) which is similar to the present study. In the present study, adult body weight of Vanaraja bird was recorded lower as compared to earlier reports (Pathak and Nath 2013) that stated its average adult body weight was 2300 gm. This variation might be attributed to different management practices adopted and local climatic variations.

Egg Productions

The egg production at 32, 40 and 52 weeks differed significantly ($p < 0.05$) among the 3 varieties investigated in the present study (Table 2). The egg production of RIR birds was significantly ($p < 0.05$) higher than Vanaraja and Indigenous birds. The egg production at 32, 40 and 52 weeks ranged from 11.90 (Indigenous) to 37.47 (RIR), 54.32 (Vanaraja) to 61.90 (RIR) and 53.05 (Indigenous) to 111.03 (RIR) respectively.

Table 2: Comparison of egg production of Indigenous, Vanaraja and RIR birds

| | Egg Production (Nos./Hen) | | |
|-----------|---------------------------|--------------------------|---------------------------|
| | Indigenous | Vanaraja | Rhode Island Red |
| 32nd week | 11.90 ^a ±0.78 | 32.94 ^b ±1.55 | 37.47 ^c ±1.41 |
| 40th week | 31.40 ^a ±1.21 | 54.32 ^b ±1.87 | 61.90 ^c ±1.65 |
| 52nd week | 53.05 ^a ±1.93 | 88.92 ^b ±2.39 | 111.03 ^c ±3.54 |

Row-wise similar superscripts does not differ significantly ($p < 0.05$)

The comparative study of egg production indicated that Vanaraja produced significantly ($p < 0.05$) higher nos. of eggs than Indigenous birds and significantly ($p < 0.05$) lower nos. of eggs than RIR birds at 32nd, 40th and 52nd weeks of age which might be due to different genetic make-up. Chutia (2010) also found an overall mean for annual egg production of Indigenous birds of Assam which ranged from 53.8±0.23 to 58.4±0.26. Kumaresan *et al.* (2008) reported that annual egg production of Vanaraja birds under the

backyard system of rearing was 176 ± 9.24 . However, Suresh *et al.* (2005) reported that the average egg production of Vanaraja birds were 147 eggs/ hen/ annum under traditional system in Manipur.

Egg Weights

The mean egg weights of three poultry varieties at 32, 40 and 52 weeks of age are presented in the Table 3.

Table 3: Comparison of mean egg weight of Indigenous, Vanaraja and RIR birds

| Egg Weight (gm) at Different Age | | | |
|----------------------------------|--------------------|--------------------|--------------------|
| | Indigenous | Vanaraja | Rhode Island Red |
| 32nd week | $29.77^a \pm 0.77$ | $47.39^b \pm 0.38$ | $45.93^c \pm 0.31$ |
| 40th week | $31.92^a \pm 0.65$ | $50.02^b \pm 0.51$ | $49.55^b \pm 0.28$ |
| 52nd week | $37.08^a \pm 0.92$ | $54.69^b \pm 0.49$ | $52.28^c \pm 0.46$ |

Row-wise similar superscripts does not differ significantly ($p < 0.05$)

There was significant ($p < 0.05$) difference of egg weight at different weeks of ages among three varieties. Vanaraja produced eggs with higher weight than RIR and Indigenous birds, while RIR produced eggs with higher weight than that of Indigenous birds. The lower values might be due to poor genetic potential in Indigenous birds of West Bengal. Kalita *et al.* (2011) also recorded the average weight of egg as 35.27 ± 0.15 gm in case of Indigenous birds of Assam. Further, the present findings of Vanaraja are comparable with the findings of Suresh *et al.* (2005), who reported that the average egg weight of 58 gm under traditional rearing system in Manipur. The egg weight at 32nd, 40th and 52nd weeks ranged from 29.77 gm (Indigenous) to 47.39 gm (RIR), 49.55 gm (RIR) to 50.02 gm (Vanaraja) and 37.08 gm (Indigenous) to 52.28 gm (RIR) respectively. Sharma and Hazary (2002) reported 42-44 gm (40 weeks) of egg weight in Vanaraja which were lower than the present estimates.

Mortality

Mortality percentage of adult birds of three varieties under backyard system of management was presented in Table 4.

Table 4: Mortality (%) in different groups under backyard rearing system

| Mortality (%) | | | |
|-----------------|------------|----------|------------------|
| Age | Indigenous | Vanaraja | Rhode Island Red |
| 0 to 5th week | 6.66 | 12.32 | 10.87 |
| 6 to 30th week | 4.03 | 2.38 | 1.78 |
| 31 to 52nd week | 2.12 | 1.88 | 1.02 |

In early period (0-5 week), mortality for Vanaraja is higher (12.32%) than RIR (10.87%) and Indigenous (6.66%). There was no significant difference in mortality percentage during laying period (31-52 weeks)

among the three varieties. This might be due to proper vaccination schedule, similar managerial and housing practices. Islam *et al.* (2014) recorded no significant difference in mortality rates between Vanaraja and Indigenous birds during 6 to 30 and 31 to 52 weeks of age. George *et al.* (1976) stated that the chick survivability was strongly correlated with growth rates; therefore, the present study showed that rearing of 21 days old bird in backyard condition will be better with respect to performance than rearing day old chicks. In laying stage, mortality in the present study was comparatively lower as reported by Jha *et al.* (2012) and Bhat *et al.* (2007).

Hatchability

Hatching was done by natural brooding using Indigenous broody hen for all the fertile eggs received from three varieties of poultry birds. The results are given in Table 5.

Table 5: Performance of hatchability (%) of different eggs

| Variety | Hatchability on Fertile Egg (%) |
|------------|---------------------------------|
| Indigenous | 86.98 |
| Vanaraja | 85.22 |
| RIR | 89.53 |

Kalita *et al.* (2012) also reported higher rate of hatchability (81-100%) in Indigenous birds of Assam. In contrast to the present findings, Kumar *et al.* (2005) reported lower hatchability as 72.6 % in Vanaraja birds under traditional system of rearing in Manipur. Khatun *et al.* (2005) reported that the hatchability on fertile eggs ranged from 78.33 to 90.79% in different varieties with the overall percentage of 85.99, which was similar with the present findings. Hence, the higher hatchability percentage was attributed to the fact that proper number of eggs was set under each Indigenous hen and the climatic conditions were suitable for hatching.

Chick and Egg Weight Ratio

Egg weights prior to setting and subsequent chick weights were determined from three varieties. Average egg weights were 37.08, 54.69 and 52.28 gm respectively for Indigenous, Vanaraja and RIR poultry birds. Average chick weights were 29.44, 32.23 and 30.84 gm for Indigenous, Vanaraja and RIR varieties respectively. The chick-egg ratio was higher in Indigenous variety (79.40%) than that of Vanaraja (58.93%) and RIR birds (58.99%) (Table 6).

Table 6: Chick and egg weight ratio at hatch of different varieties

| Varieties | Average Egg Weight (gm) | Average Chick Weight (gm) | Chick-egg weight ratio (%) |
|------------|-------------------------|---------------------------|----------------------------|
| Indigenous | 37.08 | 29.44 | 79.40 |
| Vanaraja | 54.69 | 32.23 | 58.93 |
| RIR | 52.28 | 30.84 | 58.99 |

Conclusions

From this study, it can be concluded that performances with respect to production and hatchability of Vanaraja and RIR in the gangetic alluvial areas of Murshidabad district of West Bengal was found satisfactory and the birds were well adapted to local agro-climatic condition under backyard system of rearing. Performance of RIR and Vanaraja were comparatively better than local Indigenous birds in terms of body weight, egg production and egg weight while mortality and hatchability were almost similar for three different varieties. Further, this study indicated that RIR was one of the best adopted breeds for backyard rearing in West Bengal for its dual (meat and egg production) purpose utility. Vanaraja, a dual purpose variety had significantly lower egg production but faster growth rate as compared to RIR. Therefore, farmers from rural areas of West Bengal should substitute Indigenous native poultry birds with Vanaraja and RIR birds for better livelihood and nutritional security.

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