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Sudhanshu ShekharKrishi Vigyan Kendra (ICAR-
NRRI), Jainagar, Koderma,
Jharkhand, India

Growth, performance and economics of Vanaraja poultry birds under the backyard system of rearing at Koderma, Jharkhand, India

Sudhanshu Shekhar**Abstract**

Backyard poultry is one of the age old, handy and promising enterprises to improve the socio-economic status of farmers in rural areas with low-cost initial investment and high economic return along with, it also help in alleviation of malnutrition and empowerment of rural women. The present study has been undertaken to evaluate the performance of Vanaraja poultry birds under backyard condition of the Koderma district of Jharkhand, India. The mean body weights of Vanaraja birds at 0 day, 4 week, 20 week and 40 weeks were recorded as 39.3 ± 1.17 , 280.6 ± 2.05 , 1680.8 ± 26.34 and 3170 ± 54.48 gram, respectively and the mean egg production at 280 and 500 days were recorded as 55.5 ± 2.4 and 170.15 ± 5.7 number, respectively. The overall mean body weight, the mean eggs production and egg weight of Vanaraja birds were significantly ($P \leq 0.05$) higher as comparison to indigenous birds. The mortality rate during 0 to 4, 5 to 20, weeks of age in Vanaraja birds under backyard system of rearing were recorded 8.12 ± 1.75 , 2.26 ± 0.73 percent respectively and no mortality of Vanaraja birds were recorded above 20 weeks of age. The overall mortality rate and age of sexual maturity of Vanaraja birds were significantly lower ($P \leq 0.05$) than indigenous birds. The total gross income per farm family (10 birds) earned from sale of eggs and birds for Vanaraja birds were Rs. 11470.00 and the benefit cost ratio (B: C) was recorded 1: 3.06. Vanaraja birds is the promising dual purpose strain of poultry, that can help to reduce malnutrition, increase socio-economic condition of the rural people, which may be popularized in rural and tribal areas of Jharkhand.

Keywords: Backyard, body weight, egg production, indigenous, mortality, Vanaraja

Introduction

Intensive poultry farming has achieved remarkable growth in India, but the backyard poultry farming is still struggling due to their low productivity. The demand for indigenous chicken and eggs is very high as compared to the broilers and layer eggs due to their better taste, texture and flavour as perceived by the local population [1]. Backyard poultry is one of the age old practices, handy and promising enterprise to improve the socio-economic status of farmers in rural areas with low-cost initial investment and high economic return along with improving protein deficiency among the rural people [2]. In rural areas of Jharkhand, poultry birds reared in backyard are mostly non-descriptive type with low egg and meat production, thus making the backyard poultry less economical. The contribution of indigenous chicken is only about 11% of total egg production in India [3]. Due to their low productivity the contribution to total egg production is almost static for the last few decades. The existing backyards poultry farming is unable to meet the ever increasing demand for poultry meat and eggs due to growing population.

The consumption of eggs in the rural areas is far below the national average across the country. Therefore, due to non-availability of poultry products, the prices are up to double in rural areas compared to those prevailing in the other part of the country. There is need of hours for introduction of improved dual purpose strain having capacity to lay more eggs, high body weight gain and thrive well in backyard free-range conditions without exorbitant investment in housing, feeding, supplement, vaccine and medicine. Vanaraja dual purpose variety is a multi colour, long shanks, high general immune competence and better adaptability to local environment developed at Project Directorate on Poultry (PDP) for backyard poultry production in rural and tribal areas. By understanding the potentiality of the Vanaraja poultry variety, a Front Line Demonstration (FLD) was conducted to assess its suitability and performance in the backyard farming system to feed into the mainstream extension.

Corresponding Author:**Sudhanshu Shekhar**Krishi Vigyan Kendra (ICAR-
NRRI), Jainagar, Koderma,
Jharkhand, India

Intervention and process

The present study was conducted in Bandarchokawa and Simarkundi villages of block Markaccho, Koderma, Jharkhand, India during the period 2019-2020. These villages were purposely selected because farmers of these villages were already engaged in backyard poultry rearing. A total 100 farmers were selected randomly who kept a minimum of 10 numbers of indigenous chickens of different ages under backyard system. The selected farmers were trained on different aspect of scientific poultry farming viz. brooding, feeding, housing, disease control, vaccination, bio-security, sanitation, marketing management, poultry products and by-products. A total of 1000 unsexed day old chicks of Vanaraja were reared in deep litter house at progressive farmer's poultry unit up to 4 weeks on starter mash and vaccinated as per the recommended protocol. A total 920 Vanaraja birds of 4 weeks age and average body weight 280-285 gram were demonstrated in 92 selected farmers, each farmer were given, 10 Vanaraja birds and the male and female ratio maintaining 1:1. The birds were let loose in the backyard and provided shelter at night time and allowed free scavenging in backyard during day time. Birds were provided additional supplementary feeds (Mixture of 45% broken rice, 24% broken maize, 30% mustard cake and mineral mixture -1%) at the rate of 30 gram per adult bird, per day along with natural feeding. Routine deworming and vaccination schedule were followed in flocks as per standard practice. The performance of birds at household level was assessed by collecting data on the basis of body weight (gm) at 0 day, 1, 2, 4, 8, 12, 16, 20 and 40 week interval. The other traits like, age at sexual maturity(day), egg production (no.) at 280 day and 500 days, egg weight (gm) at 40 week and mortality of the birds on 0-4 week, 5-20 week and 21- 40 week were recorded.

Economics

Economics analysis of rearing Vanaraja birds in comparison to indigenous birds was recorded. The eggs and birds were sold directly to the consumer at the prevailing market rates. The production cost included: day old chick, feed, vaccine and medicine. Expenses on labour were not calculated as the family members reared poultry birds themselves. The feed cost for Vanaraja chicks includes the amount of broiler starter feed offered up to 30 days of age and multiply into the market price of per kilogram of starter feed and the feed cost for indigenous chicks includes the amount of broken rice offered up to 30 days of age and multiply into the market price of per kilogram of broken rice. The return cost included selling of eggs, live cocks and spent hens. Data was collected from the selected farmers recorded in the register. The net returns were calculated by deducting the returns from net cost of production. The cost benefit ratio was calculated by dividing the total gross return by net cost of production. The mortality rates in Vanaraja and indigenous birds were considered as 10 and 20%, respectively during the whole experimental period. Data were statically analyzed in SPSS (version 16.0) and ANOVA technique used to assess the significance of mean as per the procedures described by Snedecor and Cochran (1994) [4].

Results and Discussions

The mean body weights of different age groups of Vanaraja birds and indigenous birds are presented in Table 1. It clearly indicated that the mean body weights of Vanaraja birds were significantly ($P \leq 0.05$) higher than the corresponding body weights of indigenous birds, which might be due to utilization

of exotic germplasm for the development of Vanaraja birds. The present findings are in accordance with the report of earlier workers [5, 6]. Similar slow growth pattern of adult non-descript local hens in Ethiopia and Bangladesh were reported respectively by earlier workers [7, 8].

The average age at sexual maturity in Vanaraja birds and indigenous birds were recorded to be 185.36 ± 2.71 and 197.12 ± 3.15 days respectively, which might be due to genetic variation between them. The mean egg production at 280 and 500 days in Vanaraja birds were recorded as 55.5 ± 2.4 and 170.15 ± 5.7 numbers respectively, and in case of indigenous birds, the corresponding values were recorded as 23.07 ± 0.12 and 60.15 ± 3.14 days. The significant ($P \leq 0.05$) increase in mean egg production was also due to genetic variation between them. Kumaresan *et al* (2008) [3] reported that annual egg production of Vanaraja birds was 176 ± 9 under the backyard system of rearing. Egg production is important trait from farmers' financial point of view. Chutia (2010) [9] recorded annual egg production of indigenous chicken of Assam was ranged from 53.8 ± 0.23 to 58.4 ± 0.26 . The mean egg weights of at 40 week of Vanaraja birds and indigenous birds were 56.2 ± 0.45 and 30.15 ± 2.34 gram respectively. The lower egg weight might be due to poor genetic potential in indigenous birds. The present findings of Vanaraja birds are comparable with the findings of Islam *et al.* (2005) [5], who reported that the average egg weight of 58 gram under traditional rearing system in Assam.

The mortality rate during 0 to 4, 5 to 20, 21 to 40 and Above 40 weeks of age in Vanaraja birds and in indigenous birds under backyard system of rearing is presented in the Table 2. There was significant ($P \leq 0.05$) low mortality rate in Vanaraja birds as compared to indigenous birds. The low mortality in Vanaraja birds up to 4 weeks of age in comparison to indigenous birds might be due to good brooding, vaccination and balance feed practice. Kumaresan *et al.* (2008) [3] also recorded 8.4% of mortality in Vanaraja birds up to 5th week of age. In contrast to the present findings, Ghosh *et al.* (2005) [10] reported higher mortality percentage of 22.63% in Vanaraja birds up to 6 weeks of age in high altitude of Arunachal Pradesh. The results of study indicate that survivability percentage of Vanaraja birds was well within the standard range 90-95 percent [11] which may be due to presence of good immune competence and disease resistance of Vanaraja birds and proper management practices followed by farmers [12] and adaptability of the chicken under the prevailing agro-climatic conditions of Koderma.

Economics of rearing Vanaraja birds: The production cost i.e. cost of chick, feed and medicines and total income from sale of eggs and birds are presented in Table 3. The results of study revealed that the average expenditure on rearing of Vanaraja birds and indigenous birds per family (10 birds) was calculated Rs. 3747.50 and Rs. 2728.00. The higher production cost in Vanaraja might be due to higher day old chick price feed cost. The total gross income earned from sale of eggs and birds for Vanaraja birds and indigenous birds were Rs. 11470.00 and Rs. 4070.00 respectively. The benefit cost ratio in Vanaraja birds and indigenous birds were recorded as 3.06 and 1.49 respectively. The higher benefit cost ratio in Vanaraja birds was due to more egg production and attainment of better body weight in the given period of time as compared to indigenous birds. Banja *et al.*, (2017) [13] also reported higher benefit cost ratio (4.47 to 5.72) in Vanaraja bird reared in the Khordha district of Odisha.



Fig 1. xxxxxx



Fig 2. xxxxxx

Table 1: Growth Performances (Mean ± SE) of Vanaraja birds in comparison to indigenous birds

Age of bird	Body weight (gram)	
	Vanaraja bird	Indigenous bird
Day old	39.3 ± 1.17 ^a	25 ± 0.84 ^b
1 week	97.3 ± 1.40 ^a	46.4 ± 1.60 ^b
2 week	146.5 ± 1.37 ^a	65.20 ± 3.36 ^b
4 week	280.6 ± 2.05 ^a	160.73 ± 4.32 ^b
8 week	723.9 ± 3.15 ^a	325.3 ± 6.23 ^b
12 week	886.5 ± 18.05 ^a	720.5 ± 12.7 ^b
16 week	1260.0 ± 23.54 ^a	925.5 ± 19.71 ^b
20 week	1680.8 ± 26.34 ^a	1051.5 ± 21.17 ^b
40 week	3170 ± 54.48 ^a	1351 ± 48.12 ^b

Means bearing different superscripts in a row differ significantly ($P < 0.05$)

Table 2: Production Performances (Mean ± SE) of Vanaraja birds in comparison to indigenous birds

Quantitative Traits	Vanaraja bird	Indigenous bird
Age at Sexual Maturity (Days)	185.36 ± 2.71 ^a	197.12 ± 3.15 ^b
Egg Production-280 (Days)	55.5 ± 2.4 ^a	23.07 ± 0.12 ^b
Egg Production-500 (Days)	170.15 ± 5.7 ^a	60.15 ± 3.14 ^b
Egg Weight at 40 weeks (g)	56.2 ± 0.45 ^a	30.15 ± 2.34 ^b
Mortality 0 to 4 week (%)	8.12 ± 1.75 ^b	12.26 ± 1.37 ^a
Mortality 5 to 20 week (%)	2.26 ± 0.73 ^b	4.51 ± 2.37 ^a
Mortality 21 to – 40 week (%)	Nil ^b	3.23 ± 0.37 ^a
Above 40 weeks	Nil	Nil

Means bearing different superscripts in a row differ significantly ($P < 0.05$)

Table 3: Economics of rearing Vanaraja birds in comparison to indigenous birds per family (10 birds) in the backyard condition of Koderma district of Jharkhand

Items	Vanaraja birds	Indigenous bird
Cost of day old chick		
a. Rate of Vanaraja chick-Rs.30 / chick	30.0 x 10.0 = 300.00	20.0 x 10.0 = 200.00
b. Rate of Indigenous chick-Rs.20 / chick		
Cost of feed up 30 days age		
a. 1.25 kg of broiler Starter feed for Vanaraja per bird Rate of feed - Rs. 35 / kg	43.75 x 10.0 = 437.50	5.0 x 10.0 = 50.00
b. 500 gm of broken rice per bird for indigenous bird Rate of broken Rice - Rs.10 / kg		
Cost of vaccine, medicine, feed supplements etc.	100.00 x 10.0 = 1000.00	75.00 x 10.0 = 750.00
Cost of supplement feed		
a. Male birds feed up to 250 days @ 30gm / bird / day = 7.5 kg / bird. Rate of feed - Rs. 20 / kg	a. 7.5 kg x 20.00 x 4 birds = 600.00	a. 7.5 kg x 20.00 x 4 birds = 600.00
b. Female birds feed up to 470 days @ 30gm / bird / day =14.1 kg / bird. Rate of feed-20 Rs/kg	b.14.1 kg x 20.00 x 5 birds = 1410.00	b. 14.1 kg x 20.00 x 4 birds = 1128.00
A. Cost of Production	3747.50	2728.00
Income from sale of eggs (5 nos. of Vanaraja and 4 nos. of Indigenous hens) Price of egg - Rs. 8 / egg	170 eggs / hen x 8.0 x 5 = 6800.00	60 eggs / hen x 8.0 x 4 = 1920.00
Income from sale of cocks (4 nos. of Vanaraja and 4 nos. of local cocks) Price of meat – Rs. 250 / kg	3.17 kg x 250.0 x 4 cocks = 3170.00	1.35 kg x 250 x 4 cocks = 1350.00
Income from sale of spent hens (5 nos. of Vanaraja and 4 nos. of Indigenous hens) Price of Vanaraja- Rs. 250 / hen Price of Indigenous– Rs. 200 / hen	300 Rs. x 5 hens =1500.00	200 Rs. x 4 hens = 800.00
B. Total gross income	11470.00	4070.00
Net income (B-A)	7722.50	1342
B:C ratio	3.06	1.49

Conclusion

Based on this study it can be concluded that Vanaraja birds grows faster, with more body weight, early age of sexual maturity, high egg production and higher survivability percentage in comparison to indigenous poultry birds under backyard system of rearing. Therefore, it can be suggested that Vanaraja poultry birds is one of the most suitable dual purpose backyard variety and can be promoted large scale in rural and tribal areas of Jharkhand.

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