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Performance of Vanaraja and Kaveri poultry birds in tribal villages of Jharkhand

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Abstract

To improve the socio-economic status of the traditional farmer, backyard poultry is a handy enterprise with low-cost initial investment, but high economic return along with guarantee for improving protein deficiency among the poor. A study was conducted to find out the performance of backyard poultry viz. Vanaraja and Kaveri in tribal villages in Jharkhand. In total 117 (76 male and 41 female) tribal backyard poultry farmers were purposively selected for the present study from four villages of Ranchi district. These farmers procured improved variety of egg from institute farm for hatching in traditional method by deshi broody hen during 2015 to 2019. The data were collected for growth, feed intake, egg production, egg weight, egg consumed, egg sold, live bird sold including rearing cost and return on back yard poultry farming. The socioeconomic data reveals that 63.24 % farmers depended on crop and livestock for their livelihood and 24.79 % on a combination of crop, livestock and non-farm sources whereas, a small proportion (11.97 %) depended solely on livestock. The day old body weight of Vanaraja and Kaveri birds were 36.43 ± 1.27 g and 30.32 ± 0.85 g whereas, body weight at 240 days were 1974.35 ± 43.14 g and 1885.12 ± 47.35 g, respectively. The average age of sexual maturity, annual egg production and egg weight at 280 days age was 172.36 ± 2.23 and 190.11 ± 5.25 days, 156.15 ± 15.6 and 144.33 ± 13.14 numbers and 55.85 ± 5.53 and 50.21 ± 3.54 g for Vanaraja and Kaveri, respectively. The comparative benefit-cost (B:C) ratio (gross return/ gross cost) was 2.02 and 1.89 for Vanaraja and Kaveri birds, respectively. The economics of rearing Vanaraja and Kaveri poultry birds at farmer's house was found to be beneficial for income generation and can contribute to rural livelihoods.

Keywords: Backyard poultry, benefit cost Ratio, Kaveri, tribal village, Vanaraja

Introduction

Backyard poultry production is an age old practice in rural India. Most of the backyard poultry production is confined to rearing of indigenous birds with poor producer range of live weight of 1.0-1.5 kg and laying 50-60 numbers of small size eggs (35-40 g) annually in free range farming system^[2]. To improve the socio-economic status of the traditional farmers, backyard poultry is a handy enterprise with low-cost initial investment, but high economic return along with guarantee for improving protein deficiency among the poor^[3,16]. Poultry population has grown spectacularly throughout the world comprises 23 percent in developed and 76 percent in developing countries. Nowadays many researchers and development agents are making a strong consensus that the smallholder chicken production plays a major role in poverty alleviation and food security at household level. Rajkumar *et al.*, (2020)^[27] opined that rural poultry farming with improved chicken varieties is fast growing with its proven potential to improve the livelihood and nutritional security in the country. It provides off-farm employment and income generating opportunity as well as source of gifts and religious sacrifices^[11, 37, 38, 39]. Scavenging chickens also help in waste disposal system by converting leftover of grains and human foods and insects into valuable protein foods-egg and meat^[10]. There is evidence that investments in small-scale poultry farming generate handsome returns and contribute to poverty reduction and increased food security in regions where a large share of the population keeps some poultry birds^[15, 21, 26]. In an average, landless/marginal/small-scale Indian poultry keeping household, keeps an average flock size of 8 to 12 birds. In India, it is estimated that over 50 % of landless and marginal farmers depend on poultry and small ruminant rearing. The majority of farmers in rural areas of Jharkhand rely on rain-fed agriculture. This has led to the food insecurity in the tribal areas due to the lowering of agricultural output.

The investments in back yard poultry farming can generate handsome returns and contribute to increased food and nutrition security among rural population. There is enormous possibility of improvement in back yard poultry to provide employment, livelihood and food security in rural areas. The backyard poultry production can be easily boost up with improved breed of poultry and can promise a better production of meat and egg [17]. Considering the above mentioned facts the present study was undertaken to find out the production performance and economic return from Vanaraja and Kaveri poultry birds raised in tribal villages of Jharkhand.

Material and Methods

The tribal backyard poultry farmers of 117 (76 male and 41 female) were purposively selected for the present study from four villages namely Malti, Tetri, Kutiyatu and Pindarkom in



Fig 1: Egg procured by farmers from ICAR- FSRCHPR, Ranchi for hatching



Fig 2: Deshi hen with chicks at farmers house

Results and Discussion

The findings of socio-economic profile of tribal backyard poultry farmers, bird's growth, their production performance and economic details were tabulated, analyzed and inferences were made.

Socio-economic profile

The education level of the tribal backyard poultry farmers indicated that 24.79 % of farmers were illiterate whereas, who could read and write were 44.44 %, those who studied up to primary level were 12.82 % and 17.95 % studied up to secondary level (Table 1). The small family (up to 4 members) was 62.39 % followed by medium (5 to 6 members) 22.22 % and large family size (more than 6 members) 15.39 %, respectively. More than three-fourth (80.34 %) of the farmer was living in joint families and only 19.66 % lived in nuclear family. About 17.95 % of tribal backyard poultry farmers possessed a land holding of up to 0.25 ha, 25.64 % had 0.25 to 0.50 ha of land, 35.04 % had 0.50 to 1.0 ha and 21.37 % had a land holding of 1.0 ha and above. The highest proportion of farmers (63.24 %) depended

on crop and livestock for their livelihood and 24.79 % on a combination of crop, livestock and non-farm sources whereas, a small proportion (11.97 %) depended solely on livestock. Most of the farmers (47.86 %) lies in medium income group (Rs. 72,000 to 120,000/-), where as 41.03 % of them came under high income group and 11.11 % farmers were found in low income group. Chakrabarti *et al.*, (2020) [4] also reported 8.56 % pig farmers were illiterate whereas, who could read and write were 33.69 %, those who studied up to primary level were 32.62 % and 25.13% studied up to secondary level in village of Jharkhand. Riedel *et al.*, (2012) [29] observed about 50 % of small holder pig farming household members in China had finished primary school. In another study, Haldar *et al.*, (2017) [12] observed that the majority of the beneficiaries (57.87%) were either illiterate or officially just literate who could only read and write his/ her name. Similarly, Devendra and Thomas (2002) [9] reported integrated farming systems being practiced in South East Asian countries with crop and livestock components. Haldar *et al.*, (2017) [12] and Chakrabarti *et al.*, (2020) [4] also reported similar findings of medium income group.

Table 1: Socio-economic status of the tribal backyard poultry farmers

Sr. No.	Profile	Total number =117		Percentage of total farmers			
		M (N=76)	F (N=41)	M	F	Total (N=117)	
1	Education	Illiterate	12	17	10.26	14.53	24.79
		Can read and write	34	18	29.06	15.38	44.44
		Primary level	11	4	9.40	3.42	12.82
		Secondary Level & above	19	2	16.24	1.71	17.95
2	Family size	Small (up to 4)	73		62.39		
		Medium (5 to 6)	26		22.22		
		Large (more than 6)	18		15.39		
3	Family type	Nuclear	23		19.66		
		Joint	94		80.34		
4	Land holding pattern (in ha)	Up to 0.25	21		17.95		

		Between 0.25 to.50	30	25.64
		From 0.50 to 1.0	41	35.04
		More than 1.0	25	21.37
5	Income sources	Livestock only	14	11.97
		Crop + livestock	74	63.24
		Crop + livestock + non-farm	29	24.79
6	Annual Income	Low (up to Rs. 72,000/-)	13	11.11
		Medium (Rs. 72,001 to 120,000/-)	56	47.86
		High (above Rs.120,001/-)	48	41.03

Body weight gain

In present study the day old body weight of Vanaraja bird was 36.43 ± 1.27 and Kaveri 30.32 ± 0.85 g (Table 2) (Fig. 2). Deka *et al.*, (2014) [7] observed the day-old body weight of Vanaraja male and female chicks were 34.36 g and 31.36 g, respectively whereas, Ramana *et al.*, (2010) [28] reported comparatively lower body weight in Vanaraja chicks and this might be due to difference in managerial practices. The total body weight gain at 140 days in Vanaraja bird was 1425.17 g and for Kaveri 1384.64 g, respectively. Daida *et al.*, (2013) [6] reported body weight of 1160.7 g for male and 1006.9 g for

female in Vanaraja chicken at 20th week. Deka *et al.*, (2014) [14] observed that at 24 weeks of age Vanaraja male and female attained an average body weight of 1991.96 and 1489.57 g, respectively. Vanaraja adult female weighed 2070.00 g and 2990.33 g at 40 and 72 weeks of age and the corresponding weight of male was 2603.33 g and 3736.67 g, respectively. Banja *et al.*, (2017) [1] noticed average body weight at sexual maturity (20-24 weeks) in Vanaraja 2100 g and in Kaveri 1875 g, respectively. Singh *et al.*, (2018) [35] observed at 20th week body weight of 1652.55 g (Male) and 1242.30 g (Female) in Vanaraja birds.

Table 2: Growth Performances of improved Breed of Vanaraja and Kaveri

Particulars	Vanaraja (g)	Kaveri (g)
Day old	36.43 ± 1.27^a	30.32 ± 0.85^b
7 days	97.37 ± 1.80^a	69.45 ± 1.70^b
15 days	155.53 ± 1.95^a	139.25 ± 4.46^b
30 days	263.42 ± 2.15^a	222.83 ± 5.82^b
60 days	410.11 ± 6.78^a	360.12 ± 6.32^d
75 days	749.33 ± 19.54^a	680.32 ± 12.35^b
90 days	1132.37 ± 27.49^a	1070.47 ± 21.54^b
140 days	1425.17 ± 37.49^a	1384.64 ± 34.25^b
280 days	1974.35 ± 43.14^a	1885.12 ± 47.35^b

a & b means with different superscripts are significantly different at $p < 0.05$.

Sexual maturity

In present study, Vanaraja attained sexual maturity at an average age of 172.36 ± 2.23 days compared to the 190.11 ± 5.25 days of Kaveri birds (Table 3). Banja *et al.*, (2017) [1] also reported sexual maturity of Vanaraja at 190 days and for Kaveri 185 days. This might be due to

differences in feeding management practices. Similarly, Deka *et al.*, (2014) [8] observed an average age of 178.13 days as sexual maturity in case of Vanaraja birds and corroborating with the present study as results of Sharma and Hazary (2002) [33]. Whereas, Niranjana *et al.*, (2008a) [23] reported age at sexual maturity was 164.79 days for Vanaraja birds.

Table 3: Production Performances of improved Breed of Vanaraja and Kaveri poultry birds

Particulars	Vanaraja	Kaveri
Age at Sexual Maturity (Days)	172.36 ± 2.23^a	190.11 ± 5.25^b
Egg Production at 280 Days	75.91 ± 5.51^a	64.13 ± 6.18^b
Egg Production at 365 Days	156.15 ± 15.6^a	144.33 ± 13.14^b
Egg Weight at 280 days (g)	55.85 ± 5.53^a	50.21 ± 3.54^b
Mortality 0 to 30 days (%)	8.13 ± 1.79	8.11 ± 1.37
Mortality 31 to 140 days (%)	1.43 ± 0.71	1.41 ± 2.37
Mortality 141 to 280 days (%)	1.24 ± 0.773	1.23 ± 0.37
Mortality above 40 weeks	0.07 ± 0.01	Nil
Colour of egg	Brown or creamy white	Light brown
Broodiness	No	No
Egg consumed at home(No.)	76.44 ± 2.31	70.46 ± 3.05
Egg sold in village/ market (No.)	79.71 ± 2.89	73.87 ± 2.78

a & b means with different superscripts are significantly different at $p < 0.05$

Egg production

The egg production performance at 280 days, 365 days were 75.91 ± 5.51 , 156.15 ± 15.6 for Vanaraja and 64.13 ± 6.18 , 144.33 ± 13.14 for Kaveri birds (Table 3) (Fig 3 & 4). Niranjana *et al.*, (2008b) [24] reported almost similar egg production of 149.47 numbers for Vanaraja up to 72 weeks of age. Whereas, Banja *et al.*, (2017) [1] noticed egg production performance of

Vanaraja and Kaveri birds was 150 and 163 eggs/bird/year. The annual egg production of Vanaraja ranged from 119 [31] to 181.12 [30] under backyard system of rearing. Many workers recorded moderate annual egg production in Vanaraja [20, 32]. However, lower annual egg production was also recorded in Vanaraja [1, 7, 8, 18, 19]. The variation in egg production within the same genotype might be due to variation in management

and nutritional status of the birds under different agro-climatic conditions. Further, difference in egg production among different genotypes might be due to difference in their genetic makeup, adoptability, availability of scavenged and supplemental feed resources [14]. However, there was no broodiness observed in Vanaraja and Kaveri birds. Deka *et al.*, (2014) [8] also could not find broodiness in Vanaraja birds in their study.



Fig 3: Fresh egg collected at farmers house



Fig 4: Egg ready for sale at farmers house

Egg weight

The egg weight at 280 days was found 55.85 ± 5.53 g for Vanaraja and 50.21 ± 3.54 g for Kaveri birds (Table 3). Deka *et al.*, (2014) [8] also found egg weight of Vanaraja 51.08 g and 59.06 g at 40 and 72 weeks of age. Niranjana *et al.*, (2008b) [24] also observed egg weight at 40th week 57.06 g and at 72nd week 62.35 g, respectively in Vanaraja birds. Banja *et al.*, (2017) [1] observed egg weight at 40 weeks in Vanaraja and Kaveri were 62 and 56 g, respectively whereas, at 52 weeks, the egg weight was recorded as 58.37 g in Vanaraja [32]. It was found that the egg weight increased with increment of age of the birds. The egg weight varied with different age and genetic materials at different agro-climatic conditions. The difference in egg weight among different genotypes at different ages might be due to the different genetic makeup, age, size and nutritional status of the birds [14]. The present findings were found also in corroboration with previous workers.

Egg colour

The egg colour of Vanaraja was observed brown or creamy white and of Kaveri light brown. Banja *et al.*, (2017) [1] reported egg colour of Vanaraja and Kaveri was brown. Deka *et al.*, (2014) [8] also observed the shell colour of Vanaraja chicken was brown. It was also noticed that on an average, farmers consumed half of the produced egg at home and half of them sold in the market or at home.

Mortality rate

The mortality of Kaveri chicks exhibited superiority in their live ability in the backyard system with a mortality rate of 8.11 % during the critical period of first 30 days of their life compared to the backyard improved strain Vanaraja birds (8.13%) (Table 3). Whereas, mortality from 31 to 140 days, 141 to 280 days and above 40 weeks was 1.41%, 1.23%, 0% in Kaveri and 1.43%, 1.24%, 0.07% in Vanaraja birds, respectively. Banja *et al.*, (2017) [1] observed up to 10 weeks 15%, 20 weeks 18% for Kaveri birds and for Vanaraja 24% and 30%, respectively at village condition in Odisha. Saikia *et al.*, (2017) [30] reported lower mortality rate than Sarma *et al.*, (2018) [32] in Vanaraja under backyard system up to 5 weeks of age. Singh *et al.*, (2018) [35] also noticed lower mortality (5%) in Vanaraja birds up to 6 weeks. However, up to 6 weeks of age the much higher mortality rates were recorded in Vanaraja (14.40%) by Choudhary *et al.*, (2019) [5] in Bihar. The mortality rate reduced with the advancement of age of the birds. They also found lower mortality in Vanaraja during 7 to 32 weeks of age. Similar trends of mortality rates were observed by many workers [5, 13, 30, 32] during 32 to 52 weeks of age in different dual type backyard chicken under different agro-climatic conditions. The higher mortality rate might be attributed to different agro-climatic condition and due to inferior management practices.

Economics of raising birds

In present study the benefit cost ratio was also calculated for raising Vanaraja and Kaveri poultry birds and depicted in Table 4. Banja *et al.* (2017) [1] opined that a benefit-cost ratio (BCR)/Profitability Index Rate is an indicator, used in the formal discipline of cost-benefit analysis that attempts to summarize the overall value for money of a project or proposal. The economics of rearing Vanaraja and Kaveri poultry birds at farmer's house was found to be beneficial for income generation (Fig. 5 & 6). The comparative benefit-cost (B:C) ratio (gross return/gross cost) was 2.02 and 1.89 for Vanaraja and Kaveri birds, respectively. The gross return from a unit of 10 Vanaraja and 10 Kaveri birds were found Rs. 1135.80 and Rs. 1061.60, respectively by sale of eggs and live birds or in house consumption. The findings are also in conformity with Pankaj *et al.*, (2014) [25] that Vanaraja effectively managed for meat and egg production under agro-climatic condition of Assam. Mondal and Kakati (2010) [22] recorded the profit per bird as Rs. 719.26 for Vanaraja under backyard systems. Ramana *et al.*, (2010) [28] recorded that the total income was more than three folds higher for Vanaraja (Rs. 371.20) than desi bird (Rs. 99.90) indicating that rearing Vanaraja chicken was more profitable under backyard system. Deka *et al.*, (2014) [8] observed the benefit cost ratio of Vanaraja chicken was 3.47 which were higher than the present study. Banja *et al.*, (2017) [1] in their adaptive trail found that the B:C ratio with Kaveri was 4.28 compared to 3.81 of local strain. The gross return from a unit of 10 Kaveri birds was Rs. 6860.00 comprising the sale of eggs and live

birds. This economic analysis infers that Kaveri provides better income to the rural poultry farmers and helps in augmenting the production of nutritious food products. In the present investigation, Kaveri was comparatively less performer in terms of B:C ratio than the Vanaraja birds. Jha and Chakrabarti (2017a) ^[16] reported that rearing of Divyan Red bird under backyard system as a source of livelihood in tribal village generated net income of Rs. 232.74 per bird with a benefit cost ratio of 1.169. Singh *et al.*, (2018) ^[25] also

reported higher net profit (Rs. 281.66) per bird with higher benefit cost ratio of 2.96 from backyard poultry farming with Vanaraja and Srinidhi birds. The net profit realized per bird up to 72 weeks of age under scavenging system of rearing was Rs. 536.21 for Vanaraja chicken with corresponding benefit cost ratio of 1.52 ^[34]. Similarly, duck farming also improved tribal people's source of income and significantly contributed to their livelihoods in Jharkhand ^[17].

Table 4: Economic details of raising improved breed of Vanaraja and Kaveri poultry birds

Particulars of Expenditure and Income (considering average 10 birds unit)		
Expenditure	Vanaraja	Kaveri
Cost of 10 day old chicks @Rs.35/- per piece	Rs.350.00	Rs.350.00
a. Cost of feed up to 30 days age - 1.50 kg of Starter feed per bird @ rate of Rs. 33/ kg of feed	a. 1.50 x 10 x 33= Rs.495	a.1.50 x 10 x 33= Rs.495
b. Cost of supplement feed up to 280 days for male @35 g/bird/day- 7.8 kg/bird rate of Rs.30/kg of feed	b. 9.8 x 30.00 x 4 = Rs.1176.00	b. 9.8 x 30.00 x 4 = Rs.1176.00
c. Cost of supplement feed up to 480 days for female @30 g/bird/day-14.1/bird@ Rate of feed-Rs.30/kg of feed	c. 14.4 x 30.00 x 6 = Rs.2592.00	c. 14.4 x 30.00 x 6 = Rs.2592.00
Total Feed cost (Rs.)	4263.00	4263.00
Cost of Medicine, transportation, etc.@ Rs.100/ bird for 10 birds	10 x 100 = Rs.1000.00	10 x 100 = Rs.1000.00
Total Gross Expenditure	Rs.5613.00	Rs.5613.00
Total cost of production per bird	Rs.561.30	Rs.561.30
Income		
Sale of egg @Rs.8/- per egg for 6 hen	156 x 8 x 6 =7488.00	144 x 8 x 6 = 6912.00
Sale of male birds @Rs.250/- per kg on live weight basis (Rs.)	1.95 x 4 x 250 = 1950.00	1.88 x 4 x 250 = 1880.00
Sale of female culled birds @Rs.160/- per kg on live weight basis (Rs.)	2.00 x 6 x 160 = 1920.00	1.90 x 6 x 160 = 1824.00
Gross income (Rs.)	7,488.00 + 1950.00 + 1920.00 = 11,358.00	6912.00 + 1880.00 + 1824.00 = 10,616.00
Gross return per bird (Rs.)	1135.80	1061.60
Net income per bird (Rs.)	574.50	500.30
Benefit cost ratio	1:2.02	1:1.89



Fig 5: Mature bird ready for sale at farmers house



Fig 6: Mature cock at farmers house

Conclusions

The rearing backyard poultry as a subsidiary occupation by adopting poultry farming with one unit comprising 10 Vanaraja or Kaveri birds per family with minimum feed supply offer a good economic return. These birds has a potential to well thrive under traditional farming conditions. The natural vegetation and scavenging is an excellent source of feed supply with minimum expenditure and maintenance. It may be concluded that Vanaraja and Kaveri chicken could be effectively managed under backyard condition for egg and meat production with low expenditure. Moreover, utilizing scavenging system of feeding and with moderate night shelter, utilizing family labour with children or old member of the family can easily maintain a small flock of bird in their backyard with maximum benefit in terms of family nutrition, cash earning and employment in rural villages.

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