



# Comparative Performance, Economics of Divyayan Red and Local Poultry birds under Backyard Poultry Farming in Koderma District of Jharkhand, India

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## ABSTRACT

Front Line Demonstrations (FLD) on Divyayan Red poultry birds were conducted to evaluate the performance and suitability at farmer's field under backyard farming situation in Koderma, Jharkhand, India. The impact of training on poultry farming was significantly high and average knowledge score of the trainees increased from 2.46 to 8.47. The overall mean body weight gain and egg production and egg weight were significantly ( $P \leq 0.05$ ) higher in Divyayan Red poultry birds in comparison to local birds. The overall mortality rate of Divyayan Red poultry birds was significant lower ( $P \leq 0.05$ ) than local birds. The income of small, marginal and landless poultry farmers was increased due to rearing of Divyayan Red poultry birds under backyard through low input and high output venture within a very short span of time. The benefit-cost ratio of rearing in Divyayan Red poultry birds was recorded 2.61 per family.

## KEYWORDS

Divyayan Red, Local birds, Egg Production, Mortality and B: C Ratio

## INTRODUCTION

Poultry is one of the most rapidly escalating segments of the agricultural sector in India. Our country has ranked 3<sup>rd</sup> and 6<sup>th</sup> on the global poultry scenario with respect to egg and poultry meat production (IPME, 2013). Indian poultry sector broadly divided into two sub-sectors, one with a highly organized commercial poultry sector and another unorganized backyard poultry sector (Kisku *et al.*, 2019). Of the total market share, the contribution of commercial poultry sector and backyard poultry sector is about 80% and 20% respectively (Singh, 2019). Despite rapid growth, the commercial poultry industry suffered many setbacks in recent times due to high feed cost, unorganised marketing, emergence of new or re-emerging of existing diseases, fluctuating market price of poultry products, disparities in availability of poultry products, which need to be addressed to make the poultry sector as a sustainable enterprise. Backyard poultry sector plays a pivotal role in supplementary income generation and nutrition security to the poor rural people (Choudhary *et al.*, 2019 and Kisku *et al.*, 2019). Backyard poultry has a unique place in the rural family as they are under the control of women, require low investment, assist in pest control and provide manure for fertilizer (Kisku *et al.*, 2019). In backyard poultry farming, farmer rears 5 to 10 indigenous birds which produce 50-60 egg per year and low meat production. Scientific backyard poultry farming can be comfortably promoted in rural areas, as intensive poultry farming in small scale in rural areas may not be economical (Choudhary *et al.*, 2019). In scientific backyard poultry farming involves rearing of improved backyard variety with good management practices under free-range condition (Kisku *et al.*, 2019).

In rural area of Koderma there is equal demand of poultry meat and eggs, therefore, dual purpose improves backyard variety having capacity to lay more eggs, high body weight gain and thrive well in backyard free-range conditions without expensive inputs like commercial feed, supplement and medicine should be promoted. Divyayan Red, a dual-purpose variety of poultry, has multicolour plumage, better production potential, disease resistance and good scavenging behaviour developed at Divyayan Krishi Vigyan Kendra, Ranchi, Jharkhand giving promising productive and reproductive performance under backyard system of management. The present study is about the promotion of improve dual purpose backyard variety "Divyayan Red" poultry through the mandatory activities of KVK such as trainings and Front-Line Demonstration (FLD) and compared the performance of Divyayan Red poultry with Local poultry.

## MATERIALS AND METHODS

The present study was conducted in Chopnadih and Banshdih villages of block Markachho, Koderma, Jharkhand, India during the period 2016-17. A total of 50 farmers were selected randomly for training from those villages, who kept a minimum of 10 numbers of local birds of different ages under backyard system. Training programmes on different aspect of scientific poultry farming were organized for knowledge up gradation and skill development especially rural youth and farm women. The impact of training or programme was evaluated by Mc Nemara's test (1947). Five hundred (500) unsexed day-old chicks of Divyayan Red 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. KVK-Koderma

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specialist regularly monitors the performance of the chicks besides providing health care and technical support. During the brooding period (i.e. four weeks) body weight and mortality were recorded. A total of 450 Divyayan Red birds of 4 weeks of age were demonstrated in 45 farmers, each having ten birds and the male and female ratio is maintaining 1:1. The birds were let loose in the backyard and provided shelter at night time and allowed free scavenging in the backyard during day time. Birds were provided additional supplementary feeds (45% broken rice, 25% broken maize and 30% mustard cake) at the rate of 30 g 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, Age at Sexual Maturity (day), Egg production (no.) at 280 day and 500 days, Egg weight (gm) at 40-week, Mortality of the birds on 0-4 week, 5-20 week and 21-40 week were recorded. Economics analysis of rearing Divyayan Red birds in comparison to *deshi* birds was recorded. The production cost included cost of day-old chick, feed cost, vaccine and medicine. The cost of labour was not considered for calculation as the family members reared chicken. Data were statistically analysed in SPSS (version 16.0) computer program using one-way ANOVA for more than two groups of observations. Multiple comparisons were also made by Duncan's Multiple Range Tests (Duncan, 1955). Economics analysis of rearing Divyayan Red birds in comparison to local birds was recorded. The production cost included the cost of day-old chick, feed cost, vaccine and medicine. The cost of labour was not considered for calculation as the family members reared chicken.

#### Feed cost was calculated by the following formula:

In case of Divyayan Red chicks

Feed cost = Amount of starter feed offered up to 30 days of age × Market price of per Kg of feed.

In case of local chicks

Feed cost = Amount of broken rice offered up to 30 days of age × Market price of per Kg of broken rice.

Total return cost included the sealing of eggs, live cocks and spent hens. Data were collected from the selected farmers recorded in the register. The net returns were calculated by deducting the total returns from net cost of production. The cost-benefit ratio was calculated by dividing the total return by net cost of production. The mortality rates in Divyayan Red and local birds were considered as 10 and 20 % respectively during the whole experimental period.

## RESULTS AND DISCUSSIONS

### Knowledge level or score of poultry farmer

Most of the farmers are unaware and very a smaller number of farmers using scientific management techniques in his/her poultry farm. The impact of training was significantly high and average knowledge score of the trainees increased from 2.46 to 8.47 (out of 10) Table 1. Earlier workers Chatterjee *et al.*, 2015; Ram *et al.*, 2017 and Shekhar *et al.*, 2019 also highlight the

importance of farmers training for successful poultry farming.

**Table 1:** Knowledge level or score of poultry farmer (based on questionnaire)

Farm Management Practices	Average Score (Out of 10)	
	Before Training	After Training
Breed and breeding of poultry	2.12	8.35
Brooding and Deep litter management.	2.75	9.15
Disease Management and Schedule Vaccination and deworming	3.18	8.75
Poultry feed preparation and Water quality and sanitation	2.15	8.17
Marketing and waste management	2.11	8.21
<b>Overall Average Score</b>	<b>2.46</b>	<b>8.47</b>

### Growth Performances of Divyayan Red in comparison to Local birds

The Mean pooled body weights at 0 day, 1 week, 2 week and 4 weeks were recorded as 38.45 ± 1.27, 98.33 ± 1.80, 156.57 ± 1.97 and 265.62 ± 2.15 gram respectively in Divyayan Red and in case of local birds 27.32 ± 0.85, 49.45 ± 1.70, 69.25 ± 4.46 and 162.83 ± 5.82 gram respectively. Comparative pooled data on body weight of up to 4 weeks of age are presented in Table 2.

**Table 2 :** Growth Performances up to age of 4 weeks

Age of bird	Body weight (g)	
	Divyayan Red (Pooled)	Local bird (Pooled)
Day old	38.45 ± 1.27 <sup>a</sup>	27.32 ± 0.85 <sup>b</sup>
1 week	98.33 ± 1.80 <sup>a</sup>	49.45 ± 1.70 <sup>b</sup>
2 week	156.57 ± 1.97 <sup>a</sup>	69.25 ± 4.46 <sup>b</sup>
4 week	265.62 ± 2.15 <sup>a</sup>	162.83 ± 5.82 <sup>b</sup>

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

### Growth Performances of Divyayan Red in comparison to Local birds

The mean body weight at 20 and 40 weeks of Divyayan Red male were 1536.83 ± 29.74 and 2125.34 ± 34.29 gram respectively and female were 1325.17 ± 37.49 and 1974.35 ± 43.14 respectively, whereas the corresponding weight of local male were 955.55 ± 32.17 and 1215.34 ± 45.14 respectively and female were 854.64 ± 34.25 and 975.12 ± 47.35.

**Table 3 :** Growth Performances of Divyayan Red in comparison to Local birds

Age of bird	Body weight in gram			
	Divyayan Red		Local bird	
	Male	Female	Male	Female
8 week	560.93 ± 7.15 <sup>a</sup>	420.12 ± 6.78 <sup>b</sup>	252.12 ± 8.32 <sup>c</sup>	210.12 ± 6.32 <sup>d</sup>
12 week	780.50 ± 14.12 <sup>a</sup>	645.35 ± 19.59 <sup>b</sup>	635.15 ± 16.6 <sup>c</sup>	540.32 ± 12.35 <sup>d</sup>
16 week	1148.02 ± 31.68 <sup>a</sup>	1032.37 ± 27.49 <sup>b</sup>	795.57 ± 20.71 <sup>c</sup>	670.47 ± 21.54 <sup>d</sup>
20 week	1536.83 ± 29.74 <sup>a</sup>	1325.17 ± 37.49 <sup>b</sup>	955.55 ± 32.17 <sup>c</sup>	784.64 ± 34.25 <sup>d</sup>
40 week	2025.34 ± 34.29 <sup>a</sup>	1874.35 ± 43.14 <sup>b</sup>	1215.34 ± 45.14 <sup>c</sup>	975.12 ± 47.35 <sup>d</sup>

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

The details of mean body of male and female birds of Divyayan Red in comparison to local birds were depicted in Table 3. The body weights of males at different ages were significantly higher as compared to females. Sexual dimorphism for body weight in chickens is very well recognized and reported in literature (Padhi et al., 1998) and (Haunshi, 2009). The present findings are in accordance with the findings of Ghosh and Sahu (2017). The difference in body weights may be due to varied in agro-climatic conditions, availability of feeding materials and management practices adopted by the farmers. The average age at sexual maturity in Divyayan Red birds and local birds were recorded to be  $170.36 \pm 2.23$  and  $195.12 \pm 5.25$  days respectively. Divyayan Red birds attained sexual mature 25 days earlier than local birds. Lower age at sexual maturity of Divyayan Red birds observed in studies may be attributed to the good management practices adopted by the farmers. Ghosh and Sahu (2017) recorded age of sexual maturity 168 days in Divyayan Red birds. The mean egg production at 280 and 500 days in Divyayan Red birds were recorded as  $56.94 \pm 0.51$  and  $158.15 \pm 5.7$  numbers respectively and in local birds, the corresponding values were recorded as  $20.15 \pm 1.18$  and  $55.35 \pm 3.14$  numbers respectively.

The mean egg production of Divyayan Red birds was also significantly ( $P \leq 0.05$ ) higher than local birds, which might be due to different genetic makeup and management practices of two groups. In contrast to present findings high egg production of Divyayan Red was recorded in 72 weeks by Ghosh and Sahu (2017). There were significant higher ( $P < 0.05$ ) egg weight of Divyayan Red in comparison to local birds at 40 weeks. The mortality rate during 0 to 4, 5 to 20, 21 to 40 and Above 40 weeks of age in Divyayan Red birds and in local birds under backyard system of rearing is presented in the Table 3.

#### Performances of Divyayan Red in comparison to Local birds

There was significant ( $P \leq 0.05$ ) low mortality rate in Divyayan Red birds as compared to local birds (Table 4). The results of study indicate that survivability percentage of Divyayan Red birds in prevailing agro-climatic conditions of Koderma was well within the standard range 90-95 percent (Khan, 2008) which may be due to disease resistance of Divyayan Red birds and proper management practices followed by farmers.

**Table 4:** Production Performances (Mean  $\pm$  SE) of Divyayan Red in comparison to Local birds

Quantitative Traits	Divyayan Red	Local bird
Age at Sexual Maturity (Days)	$170.36 \pm 2.23^b$	$195.12 \pm 5.25^a$
Egg Production-280 (Days)	$56.94 \pm 0.51^a$	$20.15 \pm 1.18^b$
Egg Production-500 (Days)	$158.15 \pm 5.7^a$	$55.35 \pm 3.14^b$
Egg Weight at 40 weeks (g)	$56.15 \pm 1.51^a$	$28.25 \pm 3.54^b$
Mortality 0 to 4 week (%)	$8.15 \pm 1.85^b$	$12.36 \pm 1.37^a$
Mortality 5 to 20 week (%)	$1.46 \pm 0.73^b$	$4.21 \pm 2.37^a$
Mortality 21 to 40 week (%)	$1.25 \pm 0.73^b$	$3.23 \pm 0.37^a$
Above 40 weeks	Nil	Nil

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

#### Economics of rearing Divyayan Red

The economic study revealed that the average expenditure on rearing of Divyayan Red and local birds per family (10 birds) was calculated Rs. 3782.50 and Rs. 2728.00. The higher production cost in Divyayan Red birds might be due to higher feed and chick cost. The total gross income earned from the sale of eggs and birds for Divyayan Red and local birds were Rs. 9900.00 and Rs. 3770.00, respectively. The benefit cost ratio in Divyayan Red and local birds were recorded as 2.61 and 1.38, respectively (Table 5). The higher benefit cost ratio in Divyayan Red birds was due to high body weight and more egg production in the given period of time as compared to local birds.

**Table 5 :** Economics of rearing Divyayan Red comparison to Local birds per family (10 birds) under backyard

Items	Divyayan Red	Local bird
<b>Cost of day old chick</b>	30.0 x 10.0 -	20.0 x 10 -
a. Rate of Divyayan Red chick-Rs.30/chick	300.00	200.00
b. Rate of Deshi chick-Rs.20/chick		
<b>Cost of feed 30 days age</b>	47.25 x 10 -	5.0 x 10 -
a. 1.35 kg of broiler Starter feed for Divyayan Red per bird	472.50	50.00
Rate of feed- Rs. 35/ kg		
b. 500 gm of broken rice per bird for Deshi bird		
Rate of broken rice-Rs.10/kg		
Cost of vaccine, medicine, feed supplements etc.	100.00 x 10 -	75.00 x 10-
	1000.00	750.00
<b>a. Cost of supplement feed up to 250 days for male</b>	a. 7.5 x 20.00 x 4 - 600.00	a. 7.5 x 20.00 x 4 - 600.00
@30gm/bird/day- 7.5 kg/bird		
Rate of feed-20 Rs/kg	b. 14.1 x 20.00 x 5 - 1410.00	b. 14.1 x 20.00 x 4 - 1128.00
<b>b. Cost of supplement feed up to 470 days for female</b>		
@30gm/bird/day-14.1/bird@		
Rate of feed-20 Rs/kg		
<b>Cost of Production</b>	<b>3782.50</b>	<b>2728.00</b>
Income from sale of eggs (5 nos. of Divyayan Red and Deshi hens 4 nos. of)	157 eggs/hen x 8.0 x 5 - 6280.00	55 eggs/hen x 8.0 x 4 - 1760.00
Price of egg- 8 Rs/egg		
Sale of cocks (4 nos. of Divyayan Red and 4 nos. of local cocks)	2.12 kg x 250 x 4 - 2120.00	1.21kg x 250 x 4 - 1210.00
Price of meat -250 Rs/kg		
Sale of spent hens (5 nos. of Divyayan Red and local 4 nos. of hens)	300Rs.x 5 - 1500	200 Rs. x 4 - 800.00
Price of Divyayan Red a-250 Rs /hen		
Price of Deshi bird -200Rs/hen		
<b>Total gross income</b>	<b>9900.00</b>	<b>3770.00</b>
<b>Net income</b>	<b>6117.50</b>	<b>1042.00</b>
<b>B:C ratio</b>	<b>2.61</b>	<b>1.38</b>

**CONCLUSION**

It may be concluded that if proper management and care provided, Divyayan Red strain could serve as an outstanding dual-purpose poultry breed in backyard system. The perception of Divyayan Red birds is very high in poultry farming community, it's might be due to plumage colour of Divyayan Red birds very similar to local birds, high body

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