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Study the performance, suitability and economics of Cari-Nirbheek under backyard poultry farming in Koderma district of Jharkhand, India

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Abstract
The present investigation is about the Front Line Demonstrations (FLD) conducted at farmer's field on backyard poultry by Krishi Vigyan Kendra (KVK) - Koderma, Jharkhand, India. The impact of training on poultry farming was significant high and average knowledge score of the trainees increased from 3.22 to 8.58. The performance of dual purpose strain CARI-Nirbheek was better under backyard poultry farming. The overall mean body weight, the mean eggs production were significantly ($P \leq 0.05$) higher in CARI-Nirbheek birds than native birds. The overall mortality rate of CARI-Nirbheek birds were significant lower ($P \leq 0.05$) than native birds. The benefit cost ratio of rearing in CARI-Nirbheek was recorded 1: 3.01 per family. The income of small, marginal and landless poultry farmers were increased due to rearing of CARI-Nirbheek birds under backyard through low input and high output venture within a very short span of time. CARI-Nirbheek is one of the promising dual purpose strains of poultry, which can be popularized in rural areas of Koderma.

Keywords: Backyard poultry, Cari-nirbheek, native birds, egg production, growth performance, mortality B:C ratio and koderma

Introduction
Indian poultry industry has made a tremendous growth during the last four decades. India ranked 3rd and 6th on the global poultry scenario with respect to egg and poultry meat production [1]. This increase in poultry production has enhanced the per capita availability to 55 eggs and 2.4 kg poultry meat per annum [2], whereas the ICMR recommendation is the consumption of 180 eggs and 10.8 kg poultry meat per person per annum. Therefore, to bridge the gap between availability and requirement, the layer and broiler industry has to be up scaled by 5 and 10 folds, respectively [3]. Of the total population of India, approximately 70% population are living in rural areas and 30% population are living urban areas. However, in the present scenario most of the commercial poultry production is concentrated in urban and pre - urban areas. There is wide gap for the per capita availability of eggs in rural and urban India. Only 30% population living in urban areas consumes about 70-75% of poultry products. Less availability of poultry products and low purchasing power of the rural people devoid those to access highly nutritious products like egg and meat, resulting in malnutrition. In spite of rapid growth, the intensive 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 (egg and meat), which need to be addressed to make the poultry sector as a sustainable enterprise. In traditional backyard poultry farming, farmer rears 5 to 10 indigenous birds which produce only 60 to 70 eggs per year and low meat production. The contribution of backyard poultry is only 11% of total eggs production of the country [4]. The existing backyards poultry farming is uneconomical so, there is need of improvement in traditional backyard poultry farming. Backyard poultry farming can be comfortably promoted in rural areas, as intensive poultry farming in small scale in rural areas may not be economical. Scientific backyard poultry farming can be used as a powerful tool for alleviation of rural poverty, eradication of malnutrition and creation of remunerative employment in vast rural areas [5, 6]. In scientific backyard poultry farming involves rearing of improved variety poultry with good management practices under free range condition. In rural area of Koderma there is equal demand of poultry meat and eggs therefore, dual purpose improve 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. CARI Nirbheek a dual purpose variety of poultry has better production potential, disease resistance, good scavenging behaviour and multi colour plumage for camouflage, developed at Central Avian Research Institute, Izatnagar, Bareilly, Uttar Pradesh giving promising productive and reproductive performance under backyard system of management. By understanding the potentiality of the CARI Nirbheek KVK-Koderma conducted Front Line Demonstration to assess its suitability and performance in the backyard farming system to feed into the mainstream extension.

Intervention and process

The present study was conducted in Santh, Gopaldih and Irgobad villages of block Jainagar, Koderma, Jharkhand, India during the period 2017-18. These villages were purposely selected because farmers of these villages were already engaged in backyard poultry rearing. Before start Front Line Demonstration (FLD) ON and OFF campus 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 training methodologies adopted included, lectures followed by questions and answers, grouped discussion and instruction through audio-visual aids. Data related to training collected from 50 trained farmers. The data was obtained from the questionnaire filled by the farmer before and end of the training. For each question, nominal data were collected (1 or 0). Code "1" represented the most appropriate answer and code "0" for each wrong answer. The averages of all score are summarized in table 1. The impact of training or programme was evaluated by Mc Nemara's test [7]. To conducted FLD 500 unsexed day old chicks of CARI-Nirbheek 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 specialist regularly monitors the performance of the chicks besides providing health care and technical support. During brooding period (i.e. 4 week) body weight and mortality were recorded. A total 46 trained farmers were selected randomly from Santh, Gopaldih and Irgobad villages, who kept a minimum of 10 numbers of indigenous chickens of different ages under backyard system. A total 460 CARI-Nirbheek birds of 4 weeks of age were demonstrated, each farmer having 10 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 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 CARI-Nirbheek birds in comparison to native 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.

Feed cost was calculated by the following formula:

In case of CARI-Nirbheek chicks - Feed cost = Amount of broiler starter feed offered up to 30days of age x 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 x Market price of per Kg of broken rice.

Total return cost included 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 CARI-Nirbheek and local birds were considered as 10 and 20% respectively during the whole experimental period. The data for different traits were analyzed using standard statistical procedures as described by Snedecor and Cochran, 1994 [8].

Results and discussions

Most of the farmers are unaware and very less number of farmers using scientific management techniques in his/her poultry farm. The impact of training was significant high and average knowledge score of the trainees increased from 3.22 to 8.58 (out of 10; Table 1). Importance of farmers training for successful poultry farming was also highlights by earlier workers [9, 10,11]. Comparative data on body weight of different age groups (0 day to 40weeks) are presented in Table 2. The average body weights at 0 day, 4 week, 20 week and 40 weeks were recorded as 39.35 ± 1.17, 280.62 ± 2.05, 1680.85 ± 36.34 and 2860.13 ± 34.48 gram respectively in CARI-Nirbheek birds and in case of 26.32 ± 0.85, 165.73 ± 5.32, 981.5 ± 31.17 and 1235.15 ± 37.12 gram respectively. It clearly indicated that the body weights of CARI-Nirbheek birds were significantly ($P \leq 0.05$) higher than the corresponding body weights of native birds. The higher body weight of CARI-Nirbheek in backyard system might be due to utilization of 50% native and 50% exotic blood for the development of CARI-Nirbheek birds, incorporation of supplement diet and proper management practices. The present findings are in accordance with the report of earlier workers [12, 13]. 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. More or less comparable body weight of native birds at 40 weeks of age is reported earlier worker [14]. The average age at sexual maturity in CARI-Nirbheek birds and native birds were recorded to be 180.36 ± 2.81 and 196.12 ± 3.25 days respectively, (Table 2) which might be due to the genetic difference between two groups of birds. Low age of sexual maturity 173 and 169 days recorded by earlier workers [12, 13] respectively. Higher age at sexual maturity of CARI-Nirbheek birds observed in studies may be attributed to the environmental reasons prevailed to the study area. The mean egg production at 280 and 500 days in CARI-Nirbheek birds were recorded as 58.5 ± 2.6 and 175.15 ± 5.7 numbers respectively and in native birds, the corresponding values were recorded as 21.07 ± 1.12 and 60.15 ± 3.14 numbers respectively. The mean egg production of CARI-Nirbheek birds was also significantly ($P \leq 0.05$) higher than native birds, which might be due to different genetic makeup of two groups. In contrast to present findings low egg production of

54.94 and 167.89 was recorded in 40 and 72 weeks respectively by earlier worker [12]. The mean egg weights of at 40 week of CARI-Nirbheek birds and native birds were 55.25 ± 1.51 and 30.25 ± 2.54 gram respectively. The mortality rate during 0 to 4, 5 to 20, 21 to 40 and Above 40 weeks of age in CARI-Nirbheek birds and in native birds under backyard system of rearing is presented in the Table 3. There was significant (P≤0.05) low mortality rate in CARI-Nirbheek birds as compared to indigenous birds. The results of study indicate that survivability percentage of CARI-Nirbheek birds in prevailing agro-climatic conditions of Koderma was well within the standard range 90-95 percent [15], which may be due to presence of good brooding, timely vaccination, good immune competence, disease resistance, ability to protect from predator and proper management practices followed by farmers. The production cost i.e. cost of chick, feed and medicines and total income from sale of eggs and birds are presented in Table 4. The results of study revealed that the average expenditure on rearing of CARI-Nirbheek birds and native birds per family (10 birds) was calculated Rs. 3747.50 and Rs. 2728.00. The higher production cost in CARI-Nirbheek birds might be due to higher feed and chick cost. The total gross income earned from sale of eggs and birds for CARI-Nirbheek and native birds were Rs. 11300.00 and Rs. 3920.00 respectively. The benefit cost ratio in CARI-Nirbheek birds and native birds were recorded as 3.01 and 1.43 respectively. The high benefit cost ratio 4.68 in CARI-Nirbheek birds was recorded by earlier worker [12]. The higher benefit cost ratio in CARI-Nirbheek birds was due to more egg production and body weight in the given period of time as compared to native birds. The comparative analysis revealed that the performance of CARI-Nirbheek is very promising, can be promoted in large scale in the backyard poultry farming system.

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

S. No.	Farm Management Practices	Average Score (Out of 10)	
		Before Training	After Training
1.	Backyard poultry breed, Brooding and Housing	4.51	8.12
2.	Disease Management and Schedule Vaccination and deworming	2.75	9.75
3.	Poultry Nutrition and Feed formulation	4.58	8.75
4.	Bio- security and sanitation	2.15	8.07
5.	Marketing and waste management	2.11	8.21
Overall Average Score		3.22	8.58

Table 2: Growth Performances (Mean ± SE) of CARI-Nirbheek in comparison to native birds

Age of bird	Body weight in gram	
	CARI-Nirbheek	Native bird
Day old	39.35 ± 1.17[a]	26.32 ± 0.85[b]
1 week	97.33 ±1.40[a]	48.45±1.70[b]
2 weeks	146.57 ± 1.37[a]	67.20 ± 4.36[b]
4 weeks	280.62 ± 2.05[a]	165.73 ± 5.32[b]
6 weeks	450.23± 3.05[a]	215.12± 6.32[b]
8 weeks	625.95 ± 3.15[a]	350.3 ± 7.23[b]
10 weeks	755.32± 4.158[a]	475± 5.23[b]
12 weeks	925.53 ±16.05[a]	610.5±13.4[b]
14 weeks	1125.32±25.96[a]	755.15±16.6[b]
16 weeks	1280.42 ± 24.54[a]	875.5 ±20.71[b]
18 weeks	1535.15± 26.34[a]	910.32±32.71[b]
20 weeks	1680.85 ± 36.34[a]	981.5 ± 31.17[b]
40 weeks	2860.13 ± 34.48[a]	1235.15 ± 37.12[b]

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

Table 3: Production Performances (Mean ± SE) of CARI-Nirbheek in comparison to native bird

Quantitative traits	CARI-Nirbheek	Native bird
Age at Sexual Maturity (Days)	180.36 ± 2.81[b]	196.12 ± 3.25[a]
Egg Production-280 (Days)	58.5 ± 2.6[a]	21.07 ± 1.12[b]
Egg Production-500 (Days)	175.15 ± 5.7[a]	60.15 ± 3.14[b]
Egg Weight at 40 weeks (g)	55.25 ± 1.51[a]	30.25 ± 2.54[b]
Mortality 0 to 4 week (%)	7.85 ±1.85[b]	13.36 ±1.37[a]
Mortality 5 to 20 week (%)	2.26 ±0.73[b]	4.21 ± 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 4: Economics of rearing CARI-Nirbheek comparison to native birds per family (10 birds) under backyard condition of Koderma district of Jharkhand, India

Items	CARI-Nirbheek	Native bird
Cost of day old chick a) Rate of CARI-Nirbheek chick-Rs.30/chick b) Rate of Native chick-Rs.20/chick	30.0 x10.0 - 300.00	20.0 x10 - 200.00
Cost of feed up 30 days age a) 1.25 kg of broiler Starter feed for CARI-Nirbheek per bird Rate of feed-Rs. 35/ kg b) b. 500 gm of broken rice per bird for Native bird Rate of broken rice-Rs.10/kg	43.75 x10 - 437.50	5 .0 x 10 - 50.00
Cost of vaccine, medicine, feed supplements etc.	100.00 x 10 -1000.00	75.00 x 10- 750.00
a) Cost of supplement feed up to 250 days for male @30gm/bird/day- 7.5 kg/bird Rate of feed-20 Rs/kg b) b. Cost of supplement feed up to 470 days for female @30gm/bird/day-14.1/bird@ Rate of feed-20 Rs/kg	a) 7.5 x 20.00 x 4 - 600.00 b) b. 14.1 x 20.00 x 5 – 1410.00	a) 7.5 x 20.00 x 4 - 600.00 b) 14.1 x 20.00 x 4 - 1128.00
Cost of Production	3747.50	2728.00
Income from sale of eggs (5 nos. of CARI-Nirbheek and local hens 4 nos. of) Price of egg- 8Rs/egg	175 eggs/hen x 8.0 x 5 – 7000.00	60 eggs/hen x 8.0 x 4 - 1920.00
Sale of cocks (4 nos. of CARI-Nirbheek and 4 nos. of local cocks) Price of meat -250 Rs/kg	2.8 kg x 250 x 4 - 2800.00	1.2kg x 250 x 4 - 1200.00
Sale of spent hens (5 nos. of CARI-Nirbheek and local 4 nos. of hens) Price of CARI-Nirbheek a-250 Rs /hen Price of Native bird -200Rs/hen	300Rs.x 5 – 1500	200 Rs. x 4 – 800.00
Total gross income	11300.00	3920.00
Net income	7552.50	1192.00
B:C ratio	3.01	1.43

CARI, Nirbheek egg

CARI, Nirbheek birds

Conclusion

It can be concluded from the study that training was one of the most important tools for knowledge up gradation and skill development among the poultry farmers. The CARI-Nirbheek bird a dual purpose strain performs better than native bird. The phonotypical similarity particularly multi-coloured plumage, better adaptability and protected well from predator of CARI-Nirbheek bird, it is well adopted by the farmers of the Koderma. The income of small, marginal and landless farmers was increased due to rearing of CARI-Nirbheek birds under backyard poultry farming of Koderma through low input and high output venture within a very short span of time.

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