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Doubling Farmers' Income through Introduction of Climate Resilient Backyard Poultry Breeds in Ri-Bhoi District of Meghalaya: A success story

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ABSTRACT

Technology demonstrations on climate resilient backyard poultry breeds *viz.* Vanaraja & Kuroiler birds were undertaken during 2011-18 at farmers' field of Ri-Bhoi district to study the growth and production performance in comparison with indigenous birds under backyard system of rearing. A total of 1520 numbers of unsexed 0 to1 week age old Vanaraja & Kuroiler chicks were distributed among 102 numbers of farmers, each with 10 to 20 numbers of chicks. Data on body weight gain, egg production performance, mortality rate and economic return were recorded as per the standard method. The results of the demonstration revealed that the overall mean body weight was significantly ($p<0.05$) higher in Vanaraja and Kuroiler than in indigenous birds. The overall mean body weight gain of Vanaraja, Kuroiler and indigenous birds were recorded at 18 months of age as 4.50±1.05, 3.81 ±1.15kg and 1.84±1.23kg, respectively. The overall mean annual egg production was significantly ($p<0.05$) higher in Vanaraja and Kuroiler birds compared to indigenous bird; the highest egg production being recorded in Vanaraja birds. There was no significant difference in mortality rates among three poultry birds during 0 to 4, 5-12 and 13 to 24 weeks of age. The mortality rates were decreased with the advancement of age of the birds in all three cases. The economic analysis of poultry rearing revealed that the gross return/bird was found to be Rs. 2536, Rs 2227 and Rs. 1060 for Vanaraja, Kuroiler and indigenous bird, respectively with benefit- cost ratios of 3.90, 3.42 and 2.58, respectively. Comparing all the above parameters, Vanaraja bird was proved to be more profitable with profit percentage of 290% compared to Kuroiler (242.61%) and Indigenous (134.30%) birds under backyard system of poultry rearing for doubling the farmers' income. Finally, it could be concluded that the performance of Vanaraja & Kuroiler chicken was found better than indigenous bird in terms of body weight, egg production and profitability under backyard system of rearing in aberrant weather in Ri-Bhoi district of Meghalaya.

Introduction

The poultry industry in India represents a major success story in the present era in agricultural production arena. India has 72.22 percent of its population living in rural areas and about 89 percent rural livestock householders' rear poultry as an important supplementary source of cash income. Livestock and poultry sector provide a major contribution to India's economy (Nath *et al.,* 2012). In poultry sector impressive growth has been achieved in the intensive poultry farming in India, but the rural poultry sector remained rather stagnant. The unorganized sector of poultry also referred to as backyard poultry plays a key role in supplementary income generation and family nutrition to the poorest of the poor.

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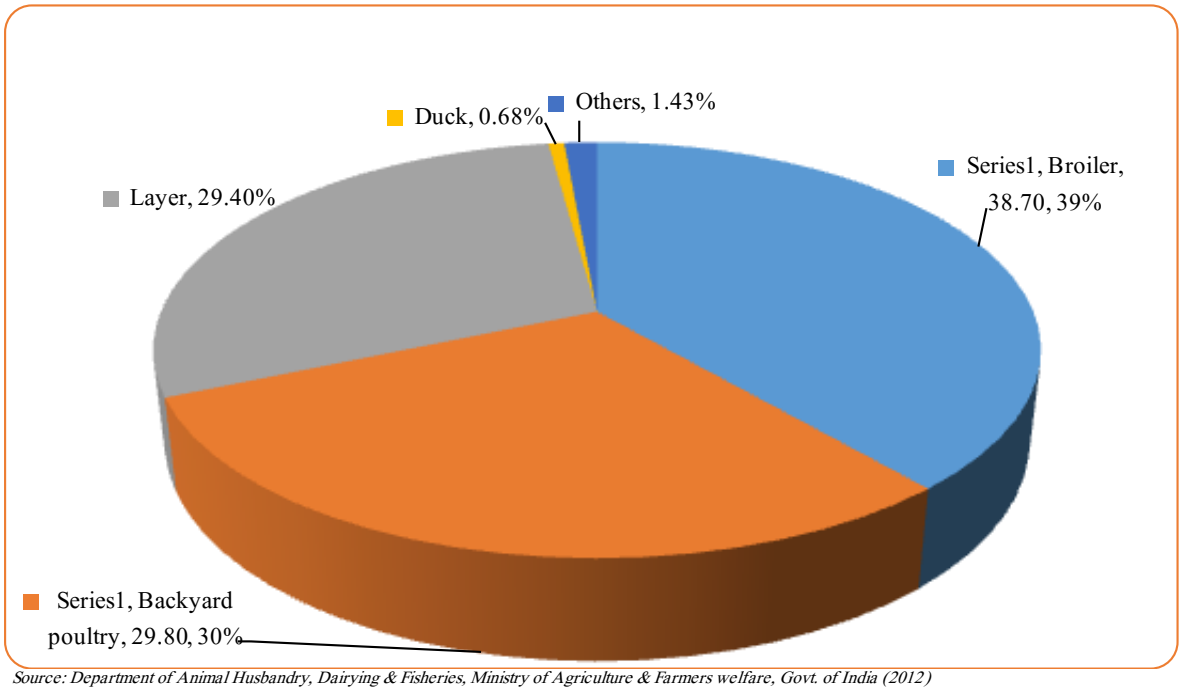
It is estimated that with poultry population of 729 million (30% layers at around 215 million and 40% broilers at around 480 million) small and medium farmers are mostly engaged in contract farming system under larger integrators and there are around 30 million farmers engaged in backyard poultry as per 19th Livestock Census (2012). However, despites this rapid growth, the per capita availability of poultry meat and egg is 2.8 kg and 55 numbers as against the requirement of 10.8 kg of poultry meat and 180 eggs/head/annum as per ICMR recommendation (2013).

These situations demands to promote more productive and efficient and climate resilient breeds like Vanaraja & Kuroiler in order to provide more net profit to poor and marginal farmers and strategise the objective to double the farmers' income by 2022. The native chicken varieties adopted in free- range backyard conditions for centuries contribute about 11% of total egg production in India (Kumaresan *et al.,* 2008). Due to their low productivity (annual egg production: 50-60 nos.), their contribution to the total egg output was almost static for the last few decades. For developing the rural poultry farming, improved backyard poultry like Vanaraja/Kuroiler birds rearing is of utmost important. These improved birds can rear in both intensive and free ranging system. This bird lays more number of eggs than native chickens and eggs are tinted brown in colour and heavier than native chicken eggs. The backyard poultry in the Ri-Bhoi district covered 29.80 per cent followed by broiler and layer (Figure 1). So, considering the low profit in rearing indigenous birds due to low growth rate of body weight & egg production, the technology demonstrations were undertaken to study the growth and production performance in comparison with indigenous birds under backyard system of rearing.

Materials and Methods

The technology demonstrations on climate resilient backyard poultry breeds *viz.* Vanaraja & Kuroiler were undertaken during 2011-18 at farmers' field under backyard system of rearing. The demonstrations were done by the rural tribal peoples at Kyrdem & Sohriewblei villages with latitude 25° 41′487″N, longitude 92°04′308″E and 864 m above MSL elevation in Ri-Bhoi district of Meghalaya under National Initiatives in Climate Resilient Agriculture (NICRA) project. The Ri-Bhoi district is divided into two agro climatic zones *viz.* Sub- Tropical Hill Zone and Mild Tropical Hill Zone and receives an average annual rainfall of 1636.46 mm and temperature ranges from 2°C to 36°C. A total of 1520 numbers of unsexed 0-1 week age old Vanaraja & Kuroiler chicks were procured from a reputed hatchery of Poultry Division of ICAR Umiam and Kyrdemkulai State Veterinary Farm , Meghalaya and were distributed among 102 numbers of farmers, each with 10 to 20 numbers of chicks. The farmers were selected randomly who kept a minimum of 5 numbers of indigenous chickens of different ages under backyard system.



Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers welfare, Govt. of India (2012)

Figure 1. Population of different birds in the Ri-Bhoi district

Thus, a total of 510 numbers of indigenous chickens of different ages were covered under the present study. Vanaraja and Kuroiler chicks were brooded under the wooden/bamboo cage fitted with electric bulbs up to 4th week of age. During brooding, chicks were provided with sufficient clean drinking water and commercial feed up to 4th week of age. The chicks were also vaccinated against Ranikhet and Gumboro diseases as per standard vaccination schedule. After brooding chicks were let loose in the backyard and supplemented with the concentrated feed were let loose during day time with supplemental feeding for 4 to 5 days until they were able to feed through natural feed resources. The body weights up to 18 weeks of age, annual egg production, mortality rate at 0 to 4, 5 to 12 and 13 to 24 weeks of age and economic of poultry rearing were recorded. Data on different parameters were analysed as per the standard statistical method (Snedecor and cochran, 1994).

Results and Discussion

In the present study the overall mean body weight gain at 18 months of age was significantly (P<0.05) higher in Vanaraja (4.50±1.05) and Kuroiler (3.81±1.15) chicken than in indigenous chicken (1.84±1.23) (Table 1). However, there was no significant different in overall mean body weight between Vanaraja and Kuroiler chicken at 18 months of age. The significantly higher body weight gain recorded in Vanaraja and Kuroiler birds than indigenous birds might be due to propagation of superior exotic germ-plasm for the development of Vanaraja and Kuroiler chicken. Moreover, supplementation of some extent (20-30%) of concentrate feed like broken rice, maize, wheat bran, *etc.* to vanaraja & kuroiler birds might also contribute the higher body weight gain as compared to Indigenous chicken. Various researchers (Deka *et al.,* 2014, Islam *et al.,* 2014, and Sarma *et al.,* 2017) also reported the higher body weight gained in Vanaraja than in local chicken. The overall mean egg production was recorded in Vanaraja (137.83a±1.25), Kuroiler (126.40b±1.56) and indigenous birds (59.31c±1.44) are presented in table 2. The overall mean egg production of Vanaraja was significantly (P<0.05) higher than Kuroiler and Indigenous chicken. However, the overall mean egg production of Kuroiler was significantly (P<0.05) higher than Indigenous chicken. This difference in egg production might be due to different genetic makeup of Vanaraja, Kuroiler and indigenous birds. The present findings were comparable with the findings of Suresh *et al.* (2005) who reported that the average egg production was 147 eggs /hen/annum under traditional system in Manipur. On contrary, Kumaresan *et al.* (2008) reported that the annual egg production of Vanaraja birds under the backyard system of rearing was 176± 90.

It was found in the current study that there was no significant (P>0.05) difference in mortality rate among Vanaraja, Kuroiler and indigenous chicken during 0 to 4 weeks, 5 to 12 weeks and 13 to 24 weeks of age (Table 2). The mortality rate was recorded highest during 0 to 4 weeks of age in the all the three breeds. Later on the mortality rate decreased with the advancement of age in all. The higher early chick mortality up to 4th week of age might be attributed to cold shock and faulty brooding management. Kalita *et al.* (2012) reported 6 to 10 % of chick mortality in indigenous chicken of Assam. Kumaresan *et al.* (2008) also recorded 8.4% of mortality up to 5th week of age in case of Vanaraja birds. In contrast to the present findings, Ghosh *et al.* (2005) reported higher mortality percentage of 22.63% in Vanaraja up to 6 weeks of age in high altitude of Arunachal Pradesh. They also recorded the highest mortality during the brooding period. Both Vanaraja and Kuroiler poultry breeds seem to be well adopted in the climatic condition of Ri-bhoi district of Meghalaya as evidenced from the mortality rate comparable to indigenous chicken. The economic performance of Vanaraja and Kuroiler bird compared with indigenous birds showed that cost of rearing for Vanaraja and Kuroiler bird was same (Rs. 650/bird), whereas for indigenous local bird the cost of rearing was less by 36.92% per bird (Table 3). The sale price for meat was most profitable for Vanaraja bird (Rs. 1440/bird) followed by Kuroiler (Rs. 1219/bird) compared to

Table 1. Mean body weight gain and egg production performance of backyard poultry breeds

Year	Body weight gain (Mean ± SE) at 18 months (kg)			Egg production (Mean ± SE) (nos/bird/year)		
	Vanaraja	Kuroiler	Indigenous	Vanaraja	Kuroiler	Indigenous
2011-12	4.47±0.51	3.81±0.76	1.93±0.85	134.40±1.05	122.42±1.06	57.12±0.95
2012-13	4.40±0.62	3.76±0.71	1.90±0.73	139.50±0.96	123.53±0.94	55.65±.084
2013-14	4.36±0.49	3.94±0.95	1.85±1.01	142.82±0.72	129.22±0.65	59.30±0.69
2014-15	4.44±0.83	3.64±0.32	1.83±0.89	132.46±0.95	127.60±0.77	61.01±0.94
2015-16	4.51±0.96	3.86±0.85	1.74±0.97	129.28±0.55	130.25±0.92	59.50±0.83
2016-17	4.48±0.55	3.70±0.69	1.65±0.88	145.10±0.69	125.63±0.55	62.21±0.97
2017-18	4.89±64	3.99±0.55	2.02±0.75	141.29±0.98	126.20±0.74	60.38±0.91
Overall	4.50^{a}±1.05	3.81^{a}±1.15	1.84^{b}±1.23	137.83^{a}±1.25	126.40^{b}±1.56	59.31^{c}±1.44

$^{a, b, c}$ Means bearing different superscripts differ significantly (P < 0.05).

to indigenous bird (Rs. 589/bird). The number of egg produced/bird was also recorded highest for Vanaraja bird (137 nos/year), followed by Kuroiler (126 nos/year) than indigenous bird (59 nos/year). The gross return/bird was found to be Rs. 2536, Rs. 2227 and 1060 for Vanaraja and Kuroiler and indigenous bird, respectively. The benefit- cost ratios of Vanaraja and Kuroiler and indigenousbirds were 3.90, 3.42, and 2.58, respectively. Comparing all the above parameters Vanaraja bird was proved to be more profitable with profit percentage of 290% compared to Kuroiler (242.61%) and Indigenous (134.30%) under backyard poultry system for doubling the farmers' income.

Table 2. Per cent mortality of poultry birds at different ages

	Mortality (Mean ± SE)		
Age	**Vanaraja**	**Kuroiler**	**Indigenous**
0 to 4th week	12.50±1.42	11.35±1.69	10.10±1.82
5th to 12th week	4.22±0.23	4.62±0.20	3.02±0.09
13th to 24th week	2.40±0.13	2.89±0.11	2.12±0.06
Overall	6.37±1.96	6.28±2.01	5.08±1.84

Impact of Technology Demonstrated

Krishi Vigyan Kendra, Ri-Bhoi, Meghalaya had introduced and popularised the climate resilient backyard poultry breeds under National Innovations in Climate Resilient Agriculture (NICRA) project for enhancing farmers' income since 2011-2018 at Kyrdem and adjoining Sohriewblei villages covering 102 farmers/farm women as individual and tribal Women Self-Help Groups with Vanaraja & Kuroiler birds. Building on a social capital base is an essential requirement of backyard poultry, as it is widely propagated across many households. The Self-Help Groups of women and their Federations provided the right platform for initiating the programme with the focus mainly on "Area Approach" where support systems were institutionalized on an area basis rather than on an "individual family" based approach.

Three progressive farmers Mr. Colbert Shadap with 200 Vanaraja birds, Mrs. Biona Lymphuid with 90 Vanaraja birds and Mrs. Valarie Maring with 80 Kuroiler birds started their backyard poultry enterprise on commercial scale as an alternative source of income. Farmers were economically motivated after seeing the worth of the technology and decided to form two new SHGs comprising of 20 women farmers to take backyard poultry as a venture for additional income with hatching of fertile eggs of Vanaraja and Kuroiler by local non-descript hen due to their broodiness character. However, the tribal rural farm women designated Vanaraja & Kuroiler birds as their "Credit Card" that instantly available for sale with very high demand especially for eggs & meat. This initiative taken by KVK Ri-Bhoi was able to attract farmers from the adjoining villages also because of less capital intensive with sustainable economic returns and acts as livelihood oriented enterprise for small and marginal farmers of the district.

Conclusion

Vanaraja and Kuroiler birds have found to be adopted well in agro-climatic situations in Ri-Bhoi district of Meghalaya and could be reared in small scale backyard system as a profitable venture for doubling the income of small and marginal tribal farmers.

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Table 3. Economic performance of climate resilient backyard poultry birds

Sl No	Particulars	Vanaraja	Kuroiler	Indigenous
1.	Average weight (kg/bird)	4.5	3.81	1.84
2.	Egg production/bird/year(nos)	137	126	59
3.	Cost of rearing (Rs/bird)	650	650	410
4.	Sale Price for meat(Rs/bird)	1440	1219	589
5.	Sale price for eggs (Rs./egg)	1096	1008	472
6.	Gross Returns (Rs/bird)	2536	2227	1060
7.	Net Profit (Rs/bird)	1886	1577	550
8.	Profit percentage	290	242.61	134.30
9.	Benefit cost ratio	3.90:1	3.42:1	2.58:1

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