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Impact of Rearing Rajasri Birds on the Livelihood and Nutritional Security of BPL Families in Warangal, Hanmakonda and Mulugu Districts of Telangana State

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ABSTRACT

The present experiment was conducted during January, 2022 to December, 2023 in Mulugu, Warangal and Hanmakonda districts of Telangana state, India to study on the generation of self-employment, provide supplementary income, and ensure access to protein food at a low cost. Backyard Poultry (BYP) was introduced by Krishi Vigyan Kendra Mamnoor as a livelihood initiative to improve the socio-economic conditions of Scheduled Caste and Scheduled Tribe communities. In 2022 and 2023, over 9,870 vaccinated Rajasri birds were distributed to 987 beneficiaries across the 11 villages under the Scheduled Caste and Tribal Sub Plan programs. Each farmer received a unit of 10 Rajasri birds, valued at ₹ 1000, along with supplementary medicines and vaccines. The study found that Rajasri birds attained sexual maturity at 165 days, with an average body weight of 1200–1300 g under scavenging conditions. They produced an average of 1200–1300 eggs per unit over 52 weeks, with each egg weighing 45–50 g. This generated a net average annual income of ₹ 7,930.27 from the sale of eggs and male birds through Backyard Poultry. There was also a notable increase in egg and meat consumption among SC/ST families. On average, each unit of Backyard Poultry produced 933 eggs annually. The per capita egg consumption in the villages increased effectively along with supplementary income, chicken meat, and eggs as well as poultry manure for enhancing soil fertility.

KEYWORDS: Rajashree birds, backyard poultry, livelihood, nutrition, sustainable income

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1. INTRODUCTION

Backyard poultry is a viable option for sustainable livelihoods and has been effectively demonstrated for improving food security (Banja et al., 2017). Unlike large-scale commercial poultry operations, backyard poultry farming is characterized by its low-cost inputs, minimal infrastructure requirements, and the utilization of available resources within a household's immediate environment. The productivity of native indigenous chickens is relatively low because of their naturally limited genetic potential (Islam et al., 2020). This farming method involves raising a small number of chickens or other poultry primarily for personal consumption or local sale. In traditional backyard poultry farming, farmers tend to raise 5 to 10 indigenous birds, which yield only 60 to 70 eggs annually and have limited meat production (Shekar and Ranjan, 2020). Backyard poultry keeping is primarily a social activity that emphasizes family involvement rather than business intentions. The flocks are typically small in size and are often managed as a supplementary endeavor, without the benefit of dedicated infrastructure or a competitive approach to resource allocation and management (Awasthi et al., 2015). The benefits of backyard poultry farming extend beyond economic gains. It offers a sustainable way to supplement household income, especially in regions where traditional agricultural practices are facing challenges such as erratic weather patterns, pest infestations, and fluctuating market prices. These birds offer an additional source of income and enhance nutritional security for rural communities (Sarma et al., 2017). Additionally, backyard poultry farming promotes self-reliance and resilience among rural families. With the ability to rear poultry on available natural feed and in simple, low-cost housing, families can create a steady supply of high-quality food without heavy financial investments (Ahuja and Sen, 2007). This method also supports environmental sustainability by reducing the need for commercial feed and other inputs. Given its potential for addressing rural economic and nutritional challenges, backyard poultry farming stands out as an accessible and effective tool for improving the overall quality of life in underserved communities. Scientific backyard poultry farming focuses on raising improved varieties of birds, utilizing effective management practices in free-range conditions (Shekar et al., 2020).

Promoting backyard poultry farming with improved chicken varieties offers a promising solution to enhance rural livelihoods. Moreover, higher market prices available for local poultry, which provide positive economic return, even in the face of increasing competition (Chatterjee and Rajkumar, 2015). The Rajashri breed, developed by P.V. Narsimha Rao of Telangana Veterinary University, Rajendranagar, Hyderabad, is specifically designed for backyard rearing. This medium-sized bird features long shanks and colourful plumage similar to indigenous varieties. It is a dual-purpose breed, capable of laying 160–180 brown eggs annually, akin to those of traditional desi chickens. Under scavenging conditions, Rajasri birds can produce 140–150 eggs year^{-1} (Srinivas et al., 2017). The Rajashri chicken is particularly resilient, able to withstand adverse climate conditions and adapt to various environments. By utilizing natural resources, while scavenging in grass fields, these birds have access to insects, white ants, green grass, grass seeds, and waste grains. As a result, their supplemental feed requirements are lower than those of birds raised in intensive poultry farming and can boost income and provide balanced nutrition in rural areas (Singh et el., 2018). The Krishi Vigyan Kendra (KVK) Mamnoor supports this initiative by providing Rajashri chicks to farmers at a subsidized cost. These day-old chicks are reared for four weeks and received necessary vaccinations. The objective of this study was to assess the impact of raising Rajashri chickens on the livelihoods of participating farmers (Table 1).

Table 1: Characteristic features of Rajasri backyard poultry birds

Sl. No.	Characteristics	Values
1.	Body weight at 10 weeks	550–650 g
2.	Body weight at 18 weeks	1.5 kg
3.	Age at sexual maturity	165 days
4.	Body weight at sexual maturity	1.5 kg
5.	Age at first egg (in days)	165
6.	Hen day egg production	150 eggs a year
7.	Egg weight	52 g

2. MATERIALS AND METHODS

The study was conducted during January, 2022 to December, 2023 in Mulugu, Warangal and Hanmakonda districts of Telangana state, India. Farmers with varying socio-economic backgrounds who showed interest and had knowledge in backyard poultry rearing were selected for the Rajasri backyard poultry farming initiative in the adopted villages: Jaggannapeta, Potlapur, Puligundam, Chityala, and Mahmmad Gousepalle in Mulugu District; Mahabubnagar, Jayaram Thanda, Chandru Thanda, and Gavicharla in Warangal District; and Malakpally and Chintal Thanda in Hanmkonda District, including other tribal hamlets. Characteristic features of these birds were mentioned in the Table 1 (Daida et al., 2012). Prior to distribution, Krishi Vigyan Kendra, Mamnoor conducted both on and off-campus training and demonstration

programs on "Scientific Backyard Poultry Rearing" for these farmers. In 2022 and 2023, over 9,870 Rajasri birds which were vaccinated were distributed to 987 beneficiaries across 11 villages under the Scheduled Caste Sub Plan (SCSP) and Tribal Sub Plan (TSP) programs mentioned in the Table 2. The performance of backyard poultry across these 11 villages was evaluated to assess its impact on sustaining livelihoods, improving household nutrition, and empowering individuals. The poultry units were distributed across various villages in the districts and purposive sampling was employed to select the study sample. A total of 50 backyard poultry rearers were chosen, and each unit was visited personally using a pre-tested interview schedule to collect data on body weight, annual egg production per bird, revenue from egg sales, egg hatching rates, mortality rates, market sales, expected income, and actual income generated by women farmers. The collected data were analysed statistically as per the methods Snedecor and Cochran (1994) to draw conclusions.

Table 2: Backyard poultry units distributed in Mulugu, Warangal and Hanmkonda districts in the years 2022 and 2023

Sl. No.	Year	Districts	Villages	No. of birds distributed	No. of beneficiaries covered	Unit size (No. of birds)
1.	2022	Mulugu	1. Jaggannapeta 2. Potlapur 3. Puligundam 4. Chityala	3730	373	10
2.	2023	Warangal	1. Mahabubnagar 2. Jayaram Thanda 3. ChandruThanda 4. Gavicharla	4250	425	10
3.	2023	Mulugu	1. Mahmmad Gousepalle	500	50	10
4.	2023	Hanmkonda	1. Chintal Thanda 2. Malakpally	1390	139	10

3. RESULTS AND DISCUSSION

A group of ten Rajasri poultry birds (one male and nine females), all 6 weeks old, was provided to the farmers following deworming and vaccination against Ranikhet disease. The beneficiaries also received training on selection of eggs, pre-incubation storage method of eggs, vaccination and deworming of birds. Production parameters observed in Rajasri birds in the study area were mentioned in Table 3.

3.1. Production parameters of Rajasri

3.1.1. Age at sexual maturity (ASM)

In the current study, the age at sexual maturity (ASM) for Rajasri birds under scavenging conditions ranged from 150 to 180 days, with a mean of 165 days (Table 3). Gosh and Sahu (2017) reported that ASM ranged from 172 to 185 days, with a mean of 179.65 days for Vanaraja birds under similar conditions. Rajkumar et al. (2021) found ASM to be between 167.3 and 169.3 days. Loknath and Murthy (2002) noted that ASM for Giriraja and Girirani birds was 177 and 174 days, respectively, under field conditions. Some beneficiaries (18%) reported that their birds reached sexual maturity later than 180 days, which may be attributed to inadequate scavenging feed base resources (SFBR) in those areas. The early ASM of 150–165 days in 19% of Rajasri birds and 165–180 days in 73% of Rajasri birds can likely be attributed to supplementary feeding (20%) with maize and broken rice, as well as the availability of good SFBR. In contrast, Dilip et al. (2013) reported that ASM in Rajasri birds was lower compared to Aseel (187.43 days) and Kadaknath (196.12 days) birds.

3.1.2. Body weight at first egg production

Among the beneficiaries' majority (58.47%) of their birds reached a body weight of 1200–1300 grams at the time of their first egg production. Similar findings were noted by Kassa et al. (2021) and Sanka et al. (2020). In contrast, Islam et al. (2020) reported that Vanaraja birds weighed 3410 grams for males and 2550 g for females at 190 days of age under free-range conditions. Achieving a lower body weight at sexual maturity is considered advantageous for producing a higher number of eggs.

3.1.3. Egg production and egg weight

Among the beneficiaries, 53% reported that egg production ranged between 1200 and 1300 eggs up to 52 weeks, while 41.03% observed egg production between 1400 and 1500 eggs over the same period. Additionally, 68% of the beneficiaries reported that egg weights were between 45 and 50 g, while 32% observed egg weights between 50 and 55 g. These findings are consistent with the study by Kassa et al. (2021), who found that scavenging birds had significantly lower egg weights (45.3 g) compared to those under semi-scavenging conditions. These findings are comparable

Table 3: Production parameters observed in Rajasri birds in the study area

Sl. No.	Particulars	Overall (%)
1. Age at sexual maturity		
	150–165 days	19
	165–180 days	73
	>180 days	18
2. Age at First egg		
	1) 21–24 wks	26.5
	2) 25–28 wks	73.5
3. Body Weight at first egg female		
	1)1000–1200	41.53
	2) 1200–1300	58.47
4. Time of collection of eggs		
	1) Morning	20
	2) Evening	80
5. Egg production up to 52 weeks		
	1) 800–900	5.97
	2) 1200–1300	53
	3) 1400–1500	41.03
6. Egg Weights up to 52 weeks		
	1) 45–50 g	68
	2) 50–55 g	32
7. Mortality		
	1–3	74
	4–6	26
8. Training programme		
	Rajasri Chick/ Grower management	
	a) Before training-1) Poor	100
	b) After training	
	1) Poor	9.83
	2) Good	55.84
	3) Very Good	20.99
	4) Excellent	13.34
9. Rajasri layer birds management		
	a) Before training-1) Poor	100
	b) After training	
	1) Poor	8.9
	2) Good	75.83
	3) Very good	10.54
	4) Excellent	4.73

to those of Singh et al. (2007) in CARI-Nirbhik under village condition (163 eggs year^{-1}) and Naga Raja Kumari and Subrahmanyeswari (2014), who found that the average egg weight in Andra Pradesh under traditional rearing conditions was 55 g.

3.1.4. Mortality

In the present study, Rajasri birds were found to be less susceptible to environmental stress and more adept at evading predators. The average mortality rates were 1% to 3% for 74% of the birds, and 4% to 6% for 26%. Similarly, Subrahamanyam and Murthy (2006) reported an annual mortality rate of 5.28%, while Bamidele et al. (2020) noted a mortality rate of 3% to 5% under field conditions. In contrast, Kumar et al. (2022) report 20.0% mortality in Vanaraja birds.

3.2. Training programme

These training programmes equipped the farmers with high confidence and played a crucial role in making the farmers more technically oriented. Majority (55.84) of the beneficiaries acquired valuable skills and good at knowledge in brooding chicks, and managing both grower and layer birds (75.83%).

3.3. Food security

In an era where food security is increasingly critical, backyard poultry farming presents a promising solution. This approach not only enhances household food availability but also contributes to economic stability and nutritional improvement. By maintaining a local source of protein, backyard poultry farming can buffer families against market fluctuations and disruptions in food supply chains, enhancing overall food security. Before the distribution of birds, 94% of beneficiaries consumed 1–2 eggs week^{-1}

Table 4: Study on food security in the study area

Sl. No.	Particulars	Percentage (%)
1. Before distribution of bird's egg consumption per week per person		
	1) 1–2	94
	2) 3–6	6
2. After distribution of Rajasri birds egg consumption per week per person		
	1) 1–2	8.5
	2) 3–6	91.5
3. Health status (After distribution of birds)		
	1) Very good	31.92
	2) Good	56.24
	3) Average	11.84
	4) Poor	Nil

person^{-1}. After receiving the birds, this number increased to 3–6 eggs week^{-1} person^{-1} for 91.5% of the beneficiaries (Table 4). This clearly demonstrates that programmes such as the distribution of poultry birds to underprivileged communities have a direct impact on food security, significantly enhancing the availability of nutritious food.

3.4. Economics

The results presented in Tables 5 and 6 indicated that Rajasri poultry farming in the backyard had provided significant benefits to farmers in Malakpally village. They achieved an annual egg yield of 750 to 1190 eggs with minimal investment, making it a valuable source of domestic eggs to help address protein-energy malnutrition among them. Additionally, selling eggs and birds provided an extra source of income, ranging from ₹ 4440 to 8060 annum^{-1} beneficiary^{-1}. During two seasons, beneficiaries incubated 20 to 24 eggs under local birds, resulting in an average survival rate of 6 to 10 chicks year^{-1}. The expected income from these poultry birds in the future is estimated to be between ₹ 1100 and 2200. On average, a backyard poultry unit with 10 Rajasri birds generated an annual income ranging from ₹ 5860 to 9458. The economic analysis of backyard poultry farming in Malakpally village, as shown in Table 5, revealed a mortality rate of 33.2% for the birds and 25.44% for the chicks after hatching. The average income generated by farmer^{-1} annum^{-1} in the village was ₹ 7930.27, with an initial investment of ₹ 1000 provided by KVK, Mamnoor. The total revenue generated by 50 beneficiaries in the village amounted to ₹ 3,96,513.50. Roy et al. (2018) reported that RIR birds' mortality at 72 weeks was 25.73%.

Table 5: Economics of Rajasri backyard poultry farming in Malakpally village, Hanamkonda districts

Sl. No.	Particulars	Economic value
1.	Number of beneficiaries	50
2.	Number of Rajasri birds distributed	500 (10 birds/beneficiary)
3.	Mortality rate (in a year)	33.2%
3.	Average of number of birds sold in market	3–6
4.	Average income generated by farmer for selling birds @ cost of 550 per birds (weight of bird: 4–5 kg)	1958.52
5.	Number of eggs laid per annum bird^{-1}	150–165
6.	Average revenue generated from eggs sold in the market annum^{-1} @ ₹ 4.5 egg^{-1}	4200.75
7.	Average number of chicks produced from eggs farmer^{-1}	7–8
8.	Mortality rate in chicks (%)	25.44%
9.	The average expected income from the existing birds (2–4 birds)	1771.0
10.	Total average income farmer^{-1} annum^{-1}	7930.27
11.	Total initial investment by KVK for this intervention (per birds @ ₹ 100)	50000
12.	Total average revenue output produced by 50 farmers annum^{-1}	396513.5
13.	B:C ratio	8:1

Table 6: Beneficiary wise Rajasri backyard poultry performance

Sl. No.	NB	BS	TELB	TRGE	IGA	NBD	NCPE	PNB	TAEIE	TAIF	MR	MRC
1.	10	1650	775	3487.5	5137.5	3	7	4	2200	7337.5	30	23
2.	10	1650	990	4455	6105	4	8	3	1650	7755	40	27
3.	10	1650	850	3825	5475	3	10	3	1650	7125	30	33
4.	10	1100	1020	4590	5690	5	8	3	1650	7340	50	27
5.	10	2750	805	3622.5	6372.5	2	9	3	1650	8022.5	20	30
6.	10	2200	750	3375	5575	3	7	3	1650	7225	30	23
7.	10	1650	790	3555	5205	3	8	4	2200	7405	30	27
8.	10	2200	894	4023	6223	3	6	3	1650	7873	30	20

Table 6: Continue...

Sl. No.	NB	BS	TELB	TRGE	IGA	NBD	NCPE	PNB	TAEIE	TAIF	MR	MRC
9.	10	1650	960	4320	5970	4	8	3	1650	7620	40	27
10.	10	1100	1050	4725	5825	5	8	3	1650	7475	50	27
11.	10	1650	850	3825	5475	3	7	4	2200	7675	30	23
12.	10	1100	960	4320	5420	5	8	3	1650	7070	50	27
13.	10	2750	680	3060	5810	1	8	4	2200	8010	10	27
14.	10	550	1020	4590	5140	6	5	3	1650	6790	60	17
15.	10	3300	1190	5355	8655	2	8	2	1100	9755	20	27
16.	10	1650	960	4320	5970	3	8	4	2200	8170	30	27
17.	10	2200	1020	4590	6790	2	8	4	2200	8990	20	27
18.	10	1650	990	4455	6105	5	6	2	1100	7205	50	20
19.	10	2200	1120	5040	7240	2	8	4	2200	9440	20	27
20.	10	3300	1127	5071.5	8371.5	1	8	3	1650	10021.5	10	27
21.	10	2200	990	4455	6655	2	7	4	2200	8855	20	23
22.	10	1650	790	3555	5205	3	8	4	2200	7405	30	27
23.	10	2750	960	4320	7070	2	7	3	1650	8720	20	23
24.	10	2750	1085	4882.5	7632.5	2	10	3	1650	9282.5	20	33
25.	10	1100	640	2880	3980	4	8	4	2200	6180	40	27
26.	10	2200	800	3600	5800	3	7	3	1650	7450	30	23
27.	10	2750	1020	4590	7340	2	8	3	1650	8990	20	27
28.	10	2750	960	4320	7070	2	8	3	1650	8720	20	27
29.	10	2200	900	4050	6250	3	5	3	1650	7900	30	17
30.	10	550	972	4374	4924	6	8	3	1650	6574	60	27
31.	10	1650	942	4239	5889	4	7	3	1650	7539	40	23
32.	10	2200	972	4374	6574	2	6	4	2200	8774	20	20
33.	10	1100	1176	5292	6392	5	8	5	2750	9142	50	27
34.	10	2750	800	3600	6350	4	7	1	550	6900	40	23
35.	10	1650	835	3757.5	5407.5	5	8	2	1100	6507.5	50	27
36.	10	2350	980	4410	6760	3	7	4	2200	8960	30	23
37.	10	1100	933	4198.5	5298.5	4	8	3	1650	6948.5	40	27
38.	10	2750	1037	4666.5	7416.5	3	10	3	1650	9066.5	30	33
39.	10	2200	872	3924	6124	5	8	3	1650	7774	50	27
40.	10	1650	1139	5125.5	6775.5	2	9	3	1650	8425.5	20	30
41.	10	2200	790	3555	5755	3	7	3	1650	7405	30	23
42.	10	1650	960	4320	5970	3	8	4	2200	8170	30	27
43.	10	1250	1085	4882.5	6132.5	3	6	3	1650	7782.5	30	20
44.	10	1750	640	2880	4630	4	8	3	1650	6280	40	27
45.	10	3225	800	3600	6825	5	8	3	1650	8475	50	27
46.	10	2500	1020	4590	7090	3	7	4	2200	9290	30	23
47.	10	1153	937	4216.5	5369.5	5	8	3	1650	7019.5	50	27
48.	10	1748	774	3483	5231	1	8	4	2200	7431	10	27

Table 6: Continue...

Sl. No.	NB	BS	TELB	TRGE	IGA	NBD	NCPE	PNB	TAEIE	TAIF	MR	MRC
49.	10	2550	973	4378.5	6928.5	6	5	3	1650	8578.5	60	17
50.	10	1650	1092	4914	6564	2	8	2	1100	7664	20	27
Average	500	1958.52	933.5	4200.75	6159.27	3.32	7.6	3.22	1771	7930.27	33.2	25.44

NB: Number of birds; BS: Birds sold @ ₹ 550 (3–6 birds); TELB: Total eggs layed by bird 160/Annum(5–6 birds); TRGE: Total revenue generated from eggs (₹ 4.5/egg); IGA: Income generated per annum; NBD: Number of birds died; NCPE: Number of chicks produced from eggs; PNB: Present number of birds; TAEIE: The average expected income from the existing; TAIF: Total average income per farmer/annum; MR: Mortality rate (%); MRC: Mortality rate in chicks (%); 1US$=INR 82.25 during March, 2023

4. CONCLUSION

Rajasri birds performed effectively under scavenging conditions, contributed positively to the socio-economic status of Below Poverty Line (BPL) families. A significant growth in extra income came from selling eggs and male birds, alongside a notable increase in egg and meat consumption. The cost-benefit ratio of 1:8 demonstrated that this farming method was a sustainable livelihood option for BPL families. Integrating backyard poultry into farming systems offered special chances to increase biodiversity and has the potential to increase farm income by twofold.

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