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Impact Study on Rajasri Birds as Backyard Poultry in Nandyal District of Andhra Pradesh

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ABSTRACT

A Study was conducted during the month of June, 2023 to March, 2024 to examine the socio-economic status, nutritional security, employment generation, and adoption constraints among marginal and landless farmers who reared Rajasri birds in backyard poultry in Nandikotkur, Jupadu Bunglow, and Kothapalli mandals of Nandyal district, Andhra Pradesh. Using a purposive and stratified random sample of 60 farmers across six villages, data were collected through structured interviews and analyzed using descriptive statistics, paired t-tests with Cohen's d effect size, and Rank Based Quotient (RBQ) for constraint ranking. Results showed that of 30 chicks purchased, mortality stood at 16.66%, 36.66% were sold, 16.66% consumed, and 30% retained. Egg production generated both income (77.97% of 168 eggs sold monthly) and home nutrition (15.47% consumed). Significant improvements were observed post adoption: meat consumption frequency (d=2.38), egg consumption frequency (d=3.94), and annual egg intake nearly doubled (d=12.33); annual income rose by ₹ 16,634 (d=0.70). Employment generated 36.54 mandays annually, and was largely contributed by women and children. Major constraints included lack of broodiness, predator threats, low market acceptance, not consider as desi bird, high feed cost, and management difficulties. The study concluded that Rajasri's backyard poultry substantially enhanced household wellbeing but required targeted support to overcome adoption barriers,and promote sustainable livlihood opportunities for small and marginal farming communities in the region.

KEYWORDS: Backyard poultry, rajasri, RBQ, Cohen's d effective size, socio-economic

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Data Availability Statement: Legal restrictions are imposed on the public sharing of raw data. However, authors have full right to transfer or share the data in raw form upon request subject to either meeting the conditions of the original consents and the original research study. Further, access of data needs to meet whether the user complies with the ethical and legal obligations as data controllers to allow for secondary use of the data outside of the original study.

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1. INTRODUCTION

Since time immemorial, Backyard poultry (BYP) has influenced man's civilization in many ways. Poultry employs about 6 million people, and many among them are Small and marginal farmers in India (Anonymous, 2024). Backyard poultry refers to the small-scale rearing of native, crossbred, or improved/commercial birds around the household or homestead, typically under free-range or semi-intensive systems to supply eggs, meat, and small cash income to the family (Singh et al., 2022). Whereas, Rao and Preetam (2009) considered back yard poultry in India as a system characterized by a small flock size consisting of 5–10 predominantly non-descript birds maintained in an extensive system under zero input conditions. In traditional backyard poultry farming, with indigenous birds farmers tend to get yield only 60 to 70 eggs annually and have limited meat production (Shekhar and Ranjan, 2020). The BYP was contributing to 21% of the total egg production in India (Anonymous, 2011). Recent studies also highlighted the increasing relevance of backyard poultry in improving nutritional security among rural households (Bhukya et al., 2021). Backyard poultry farming has helped the farmers, both small and marginal, in uplifting their socio-economic status through supplementary income, self-employment, and production of nutritious food (Rajkumar et al., 2021). More than 50% of the landless and marginal farmers at the bottom end of the small-holding spectrum eke out their living from poultry and small ruminants. Backyard poultry hardly requires any infrastructure and is a potent tool for the upliftment of the poor. It is a low-input, low-output traditional farming system which provides supplementary income to the family (Nandi et al., 2007). In most of the developing countries, indigenous poultry genotypes constitute between 80 and 99% of the poultry populations that are kept in villages (Sonaiya and Swan, 2004). Recent evidence also shows that improved backyard strains significantly enhance income and women's participation in livestock-related decisions (Gupta et al., 2022). Promoting BYP farming through improved chicken varieties offers a promising solution to enhance rural livelihoods. Moreover, higher market prices available for local poultry provide positive economic return, even in the face of increasing competition (Chatterjee and Rajkumar, 2015). Studies further suggest that local poultry breeds continue to remain competitive due to consumer preference for native eggs and meat (Berkhoff et al., 2020). The Rajashri breed, developed by P.V. Narsimha Rao of Telangana Veterinary University, Rajendranagar, Hyderabad, was 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). Recent comparative evaluations confirmed the suitability of Rajasri for low-input rural systems (Aparna et al., 2021). Recognizing this, Krishi Vigyan Kendra (KVK), Yagantipalle, has been actively promoting backyard poultry as an allied agricultural activity. With declining landholdings and limited opportunities for income diversification, promoting poultry farming has become imperative to ensure livelihood security. KVK has introduced quality breeds such as Aseel, Kadaknath, and Rajasri to enhance productivity and profitability in backyard systems. Rajasri, in particular, has been promoted for its adaptability, egg production capacity, and suitability to rural conditions. By supplying these improved birds to farmers, KVK aimed at uplifting the socio-economic status of marginal and landless farmers in Nandyal district. This initiative aimed to improve household nutrition and income while empowering rural women, the primary caretakers of poultry in most villages. In this context, the present study was undertaken to assess the socio-economic status of marginal and landless farmers engaged in backyard poultry and identify constraints in the adoption of Rajasri birds in the backyard system.

2. MATERIALS AND METHODS

The Present study was conducted in three mandals, viz., Nandikotkur, Jupadu Bungalow, and Kothapalli of Nandyal district, Andhra Pradesh, that are in the jurisdiction of Krishi Vigyan Kendra, Yagantipalle. These mandals were purposively selected based on marginal and landless farmer beneficiaries of Rajasri birds from these areas. A combination of purposive and simple random sampling procedures was employed for selection. A total of three blocks were selected for the study. These blocks served as the representative unit for the present study. A list of poultry farmers was procured from the selected blocks. Twenty farmers from each block were selected by using a proportionate stratified random sampling technique. Data were collected with the help of a structured and pre-tested interview schedule. Based on the practicing poultry farmers with Rajasri birds, two villages having a greater number of farmers under BYPF in each selected block were purposefully selected for the study. Thus, a total of 6 villages were selected. From each village, ten farmers were randomly selected. Thus, a total of 60 respondents were selected for the study. Thereafter, data were tabulated, analyzed, and inferences were drawn in light of the objective.

2.1. Methods of data analysis

The data were processed and analyzed using appropriate statistical tools to fulfill the objectives of the study. The quantitative data were analyzed using descriptive statistics, including mean and frequency, and a paired t-test was used

to assess the before-and-after variation in socio-economic, nutritional, and employment status of the adopted farmers. Cohen's d effect size was used to measure the size of the difference between the before and after mean score with standard deviation, given by Cohen (1988), with the following formula.

Cohen' s d=Mean difference/Pooled standard deviation

As per this, effect sizes are categorized as small (around 0.2), medium (around 0.5), and large (around 0.8), though these values are arbitrary benchmarks and should be interpreted in context.

Understanding Man-days Calculation

A man-day is a unit of measurement that expresses the amount of work done by one person in one day (usually 8 hours).

with the formula mentioned: Mandays=Total time spent (hrs)/8 hours

Where: Total Time Spent=Sum of hours spent on activity across the year, 8 hours=Standard workday.

n=Number of households/respondents. So, each activity, like Feeding, watering, Vaccination, and Scavenging, was first recorded in hours, converted into man-days, and averaged over 60 households.

Constraints were analyzed with the help of Rank Based Quotient (RBQ) method given by given by Sabarathanam (1988).

RBQ=(fi(n+1-R))/(N×n)×100

Where, i=Concerned ranks, N=Number of farmers, n=Number of ranks, fi=Frequency of farmers for ith rank.

3. RESULTS AND DISCUSSION

3.1. Disposal of birds

The study revealed (Table 1) that out of 30 chicks purchased, 5 (16.66%) died, 11 (36.66%) were sold, 5 (16.66%) were consumed, and 9 (30%) were retained as present stock. This indicates that mortality was moderate, but a major share of birds (over one-third) was sold, showing their economic utility.

Table 1: Disposal of birds: (n=60)

Sl. No.	Birds	Total no. of birds	Percentage
1.	Chicks purchased	30	-
2.	Died	5	16.66
3.	Sold	11	36.66
4.	Consumed	5	16.66
5.	Present stock	9	30.00

3.2. Disposal of eggs

Table 2 revealed that egg production contributed significantly to household nutrition and income. Out of 168 eggs per month, 77.97% were sold (₹ 1965 value), 15.47% were consumed at home, and 6.54% were retained for incubation. This indicates Rajasri poultry acts more as a source of income generation than only home nutrition. These results align with Preetham et al. (2018), Srinivas and Swathi (2018).

Table 2: Disposal of eggs (Household/Month): (n=60)

Sl. No.	Disposal of eggs	No. of eggs	Estimated value of eggs (₹)	Per-centage
1.	Household consumption	26	390.00	15.47
2.	Sold	131	1965.00	77.97
3.	Gifted	0	0	0
4.	Retained for incubating	11	165.00	6.54
			2520.00	

3.3. Socio-economic and nutritional security

The paired t-test analysis presented in Table 3 revealed a significant improvement in the socio-economic and nutritional security of respondents after adopting Rajasri birds in backyard poultry. The frequency of meat consumption declined from 10.25 days to 6.4 days, indicating that households consumed meat more frequently than before. This change was statistically significant ($t=23.55$, $p<0.001$) with a large effect size (Cohen's $d=2.38$). Similarly, the quantity of meat consumed increased by 1.4 kg year^{-1} ($t=21.34$, $p<0.001$; $d=0.88$), reflecting enhanced dietary diversity and protein intake. These findings align with Chaturvedani et al. (2017), Smith and Jones (2024).

Egg consumption also improved remarkably. The interval between egg consumption reduced from 8.46 days to 4.81 days ($t=43.94$, $p<0.001$; $d=3.94$), while the annual egg intake nearly doubled from 18.46 to 36.96 eggs per household ($t=141.04$, $p<0.001$; $d=12.33$). These findings highlight a substantial nutritional gain from backyard poultry. These findings line with the results of Verma et al. (2023), Chaturvedani et al. (2017), Nordhagen and Alderman (2018) Figure 1.

In addition to nutrition, backyard poultry contributed significantly to household income, which increased from ₹ 44,389 to ₹ 61,023 per annum, marking an average rise of ₹ 16,634. This improvement was also statistically significant ($t=-47.89$, $p<0.001$; $d=0.70$), demonstrating the role of Rajasri poultry in enhancing economic security. Findings line with the results of Chaturvedani et al. (2017), Saikiran et al. (2025)

Table 3: Distribution of respondents on socio-economic and nutritional security: (n=60)

Variable	Mean before	Mean after	Mean difference	Pooled SD	t-value	*p*-value	Cohen's d effect size
Meat consumption frequency (days)	10.25	6.4	3.85	1.615	23.55	2.23E-31	2.38
Meat consumption quantity (kg)	11.83	13.23	1.4	1.595	21.34	3.72E-29	0.88
Egg consumption frequency (days)	8.46	4.81	3.65	0.925	43.94	3.16E-46	3.94
Egg consumption per year	18.46	36.96	18.5	1.5	141.04	2.88E-75	12.33
Income	44389	61023.38	16634.38	23728.14	-47.89	2.46E-48	0.7

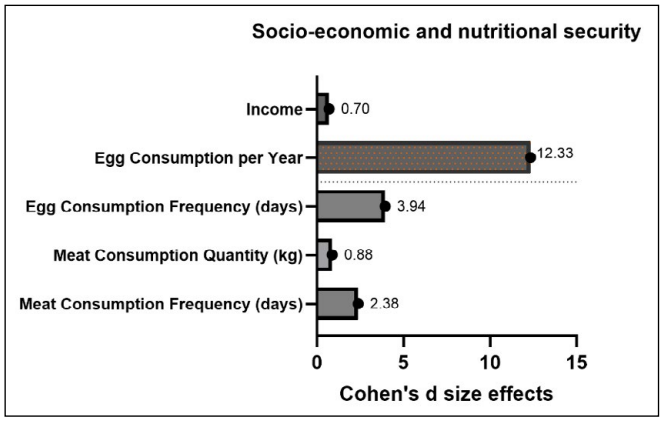

Figure 1: Cohen's d effect size data on socio-economic and Nutritional security

Overall, the results confirm that the adoption of Rajasri birds in backyard poultry has positively influenced both dietary practices and household income in the study area. The very low p-values (expressed in scientific notation in the table) reinforce the robustness of these findings, while effect sizes suggest not only statistical but also practical significance, especially in egg consumption patterns.

3.4. Employment generation

A total of 36.54 man-days/year were additionally generated, distributed among family members: Females contributed the highest 54.84% with 20.04 Mandays, followed by children (8.86 days), and males (7.64 days). This shows backyard poultry supports women and child participation, strengthening livelihood security at the household level. Islama et al. (2015), Bagnol et al. (2009), Nirmala et al. (2020), Pooja et al. (2024) reported similar results (Table 4 and Figure 2).

3.5. Constraints in the adoption of the Rajasri breed in BYP

The major constraints ranked by farmers were: Lack of broodiness in Rajasri with RBQ_Score of 96.67 as a top constraint, Unable to escape from predators (Rank II), Not considered as desi birds (Rank III), High cost of feed and difficulty in management (Rank IV), Pecking behavior and lower market price (Rank V) (Table 5). These constraints highlight the need for management interventions, especially

Table 4: Employment generation of the BYP per annum: (n=60)

Sl. No.	Employment	Feeding & watering	Vaccination	Scavenging	Total man-days	Percentage
1.	Male	1.4	0.5	5.74	7.64	20.90
2.	Female	6.4	2.4	11.24	20.04	54.84
3.	Children	7.56	0	1.3	8.86	24.24
					36.54	100.00

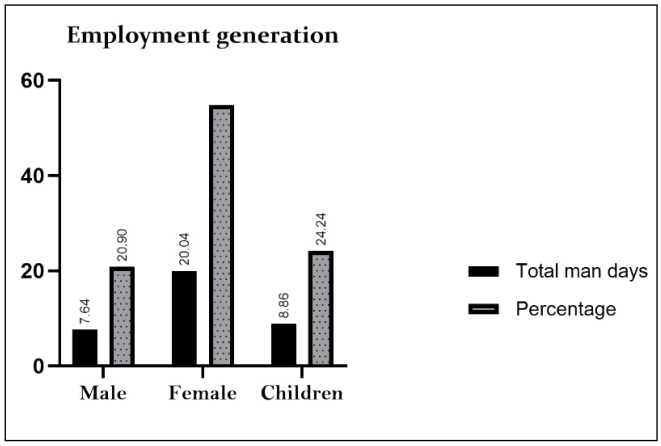

Figure 2: Employment generation of the BYPF

Table 5: Distribution of respondents based on perceived constraints: (n=60)

Sl. No.	Constraint	F	RBQ_ score	Rank
1.	Predators problem	46	38.33	VI
2.	Lack of broodiness in Rajasri	58	96.67	I
3.	Pecking behavior of the birds	48	48.00	V
4.	Difficult to manage Rajasri compared to the local birds	49	57.17	IV
5.	Unable to escape from predators	56	84.00	II
6.	Inadequate space for scavenging	19	12.67	VII
7.	High cost of feeding materials	49	57.17	IV

Table 5: Continue...

Sl. No.	Constraint	F	RBQ_ score	Rank
8.	Lower market price for Rajasri birds	48	48.00	V
9.	More diseases in poultry	46	38.33	VI
10.	Rajasri birds are not considered a desi bird	54	72.00	III

in broodiness, feed cost, and market recognition. These findings are in line with the findings of Jyoti et al. (2019), Sharma et al. (2018), Rajyalakshmi and Rao (2023).

4. CONCLUSION

The introduction of Rajasri birds in backyard poultry in Nandyal District significantly enhanced household nutrition and income. Meat consumption frequency improved markedly (d=2.38), while meat quantity showed a moderate effect (d=0.88). Egg consumption recorded the strongest nutritional gains, with annual intake nearly doubling (d=12.33) and frequency rising substantially (d=3.94). Household income rose by ₹ 16,634 per annum (d=0.70). Backyard poultry also created employment, particularly for women, though, constraints like poor broodiness, predator pressure, and low market acceptance.

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