



Empowering Women Farmers through Backyard Poultry: Socio-Economic and Nutritional Impacts in Bihar

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ABSTRACT

Backyard poultry production is a low-input, high-impact intervention for assuring livelihood security, nutrition, and women's empowerment in rural areas. The present study, conducted under the Scheduled Caste Sub-Plan (SCSP) in Bhojpur district of Bihar, evaluated the socio-economic, nutritional, and management aspects of backyard poultry among farm women using improved dual-purpose breeds under semi-scavenging conditions. The findings indicated that improved breeds, particularly Vanaraja, showed superior growth performance under village conditions. Backyard poultry required minimal time investment, making it compatible with the existing workload of rural women. The enterprise contributed to enhanced household income and improved nutritional status, including better dietary intake and health indicators among beneficiary women. From a gender perspective, women play a central role in management, contributing to household nutrition and income with minimal time investment. Importantly, the study demonstrated a significant positive impact on nutritional security. Women engaged in backyard poultry showed higher consumption of eggs and meat, improved protein and micronutrient intake, better haemoglobin levels, and enhanced dietary diversity compared to non-beneficiaries. These improvements indicate a direct contribution of backyard poultry towards reducing malnutrition and anemia among rural women. Overall, the study establishes backyard poultry as a sustainable, economically viable and nutritionally impactful intervention with strong potential for promoting women's empowerment and inclusive rural development.

Keywords: Bhojpur, Kadaknath, Vanaraja, Rural women, Time utilization.

INTRODUCTION

Backyard poultry production is increasingly recognized as a low-input, high-impact approach for assuring livelihood security, nutrition, and gender equity in smallholder systems. Poultry meat and eggs provide affordable, high-quality protein and essential nutrients, helping address malnutrition among vulnerable groups. Studies show that improved backyard poultry significantly enhances household income and stability (Kumar et al, 2021). Adoption of Vanaraja birds achieved a benefit–cost ratio of 2.13 and increased rural women's income by 27–61%, indicating strong economic viability (Singh *et al*, 2025). Backyard poultry is also closely linked with women's empowerment, improving economic, social, and nutritional status. Chaturvedani *et al* (2015) reported the role of women in backyard poultry farming has significant importance. It might be due to the reason that most of the management practices viz., housing, feeding, breeding, health care and marketing

practices were carried out by the women. Acharya and Behera (2019) concluded that backyard poultry farming is an effective tool to strengthen the livelihood of resource poor farmers and landless labourers in rural area with low-cost initial investment. It provides eggs and meat for family consumption and additional income to the rural households. Improved variety and crosses of local birds with superior germ plasm are well adapted to local agro-climatic condition and should be incorporated in the farming system.

However, traditional systems face constraints such as low productivity, high chick mortality, disease incidence, and poor management. These challenges highlight the need for improved germ plasm and scientific practices. Dual-purpose breeds like Kadaknath and Vanaraja have been promising under village conditions. Thakur *et al* (2016) concluded that capacity building of farmers was an effective tool to augment poultry production and such trainings should be organized at regular interval to sustain the enterprise. Accordingly, the present study has been

Table 1. Comparative mean body weight of Kadaknath and Vanaraja birds under village conditions.

Age (Months)	Kadaknath Body Weight (g)	Vanaraja Body Weight (g)
1	122.52 ± 5.2 ^b (N=1500)	178.38 ± 6.1 ^a (N=1500)
2	250.12 ± 8.5 ^b (N=1380)	420.47 ± 10.2 ^a (N=1362)
3	427.16 ± 10.6 ^b (N=1378)	725.52 ± 15.4 ^a (N=1351)
4	602.72 ± 12.8 ^b (N=1378)	1053.22 ± 18.6 ^a (N=1346)
5	783.92 ± 14.3 ^b (N=1375)	1455.62 ± 22.5 ^a (N=1343)
6	987.16 ± 16.5 ^b (N=1374)	1693.84 ± 25.3 ^a (N=1343)

Note: Means with different superscripts (a, b) within the same row differ significantly at $P \leq 0.01$.

Table 2. Daily time utilization pattern of farm women involved in backyard poultry.

Sr. No.	Activity	Daily time spent (hrs.)
1	Household (Cooking, Cleaning, Child care)	9 – 10
2	Farm / Agriculture activity	6 - 7
3	Livestock / Poultry	2.05 (Cattle), 1 (Poultry)
4	Others (Social activity, Rest)	0.5 - 1
5.	Sleeping	5 – 7.5

conducted to evaluate the impact of backyard poultry's farming on women's empowerment, to compare growth performance of these breeds and to analyse time use pattern of rural women and to access nutritional improvement among farm women.

MATERIALS AND METHODS

The study was conducted by Krishi Vigyan Kendra (KVK), Bhojpur, Bihar, under Bihar Agricultural University, Sabour, as part of the Scheduled Caste Sub-Plan (SCSP) programme during 2022–2025. Three SCSP-adopted villages of Bhojpur district, namely Dogra Tola (Bihiya block), Chandi (Koilwar block), and Dhamar (Ara block), were purposively selected due to the predominance of Scheduled Caste households and their suitability for backyard poultry promotion. A total of 75 Scheduled Caste farm women (25 from each village) were selected through random sampling. Each beneficiary received 40 three-week-old chicks of improved dual-purpose breeds (Kadaknath and Vanaraja), resulting in the distribution of 3,000 chicks. Before chick distribution, all beneficiaries attended a 6-day capacity-building programme conducted by KVK scientists covering scientific backyard poultry management, including brooding, feeding, housing, health care, vaccination, sanitation, predator control, record keeping and marketing. Continuous technical support was provided through training programmes, village demonstrations, field visits, and advisory services throughout the study.

Birds were reared under a semi-scavenging production system with free-range scavenging during the day and supplementary feeding using locally available grains, kitchen waste, and crop by-products. Low-cost night shelters constructed from locally available materials were promoted to protect birds from predators and adverse weather. Vaccination, deworming, biosecurity measures, and routine health monitoring were carried out under the supervision of KVK scientists. Mortality was recorded throughout the study, with predator attack and infectious coryza being the major causes.

The data were collected through structured interview schedules, direct observations, beneficiary-maintained farm records, and regular field monitoring. Growth performance was assessed by recording individual body weight at monthly intervals from one to six months of age using a calibrated digital weighing balance. Daily time utilization of beneficiary women was recorded through personal interviews, covering household work, agriculture, livestock management, backyard poultry, social activities, and rest. Time spent on specific poultry management activities, including feeding, watering, cleaning, supervision, egg collection, and chick care, was also documented. The economic impact was evaluated by estimating annual net income generated from the sale of eggs and live birds, and households were categorized according to net returns obtained from one production cycle of approximately forty birds. For nutritional assessment, 30 beneficiary women (10 from each village) were

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Table 3. Time spent by farm women in backyard poultry (Activity wise) . (n=75)

Sr. No.	Activity	Time Spent (in minutes)	Respondents (%)	Justification
1	Feeding	5-10	52	3-4 times a day using Kitchen waste and cut grains
		11-15	48	
2	Watering	1-5	72	Simple container filling (as scavenging don't need much)
		6-10	28	
3	Cleaning	1-15	68	Either Cleaning of utensils or cleaning the backyard area
		16-30	32	
4	Supervision & Monitoring	1-5	100	Predator Scan, Daily Health check up
5	Egg Collection	1-5	82.67	Optional Activity, done only when chicken is on produce
		6-10	17.33	
6	Chick Care	1-5	38.67	Optional Activity, done only when chicks are small.

Table 4. Increase in household income due to Backyard Poultry. (n=75)

Sr. No.	Annual Net Profit (Rs.)	Category	Household (%)
1	9001-12000	High	18.67
2	7001-9000	Medium	57.33
3	5000-7000	Low	24.00

selected through stratified random sampling from the total beneficiaries, while 30 non-beneficiary women from the same villages served as the control group.

Nutritional status was assessed through dietary survey, anthropometric measurements, haemoglobin estimation, and dietary diversity assessment. Dietary intake was assessed using the 24-hour dietary recall method, and portion sizes were estimated using standard household utensils. Daily intake of protein, energy, iron, and calcium was calculated using the Indian Food Composition Tables (Longvah *et al*, 2017). Weekly consumption of eggs and chicken meat was recorded using a structured food-frequency questionnaire. Anthropometric measurements were recorded following standard procedures. Body weight was measured using a calibrated digital weighing scale, while height was measured with a stadiometer. Body Mass Index (BMI) was calculated as weight (kg) divided by height squared (m²) according to the World Health Organization (WHO) recommendations and was used as an indicator of nutritional status. Haemoglobin concentration was estimated using a portable HemoCue® Hb 201+ analyser. Capillary blood samples were collected by trained personnel using sterile disposable lancets under aseptic conditions, and haemoglobin concentration was expressed as g/dL. Dietary diversity was assessed using the Minimum

Dietary Diversity for Women (MDD-W) approach recommended by the Food and Agriculture Organization (FAO). Food items consumed during the previous 24 hrs were grouped into standard food categories, and the Dietary Diversity Score (DDS) was calculated as the number of food groups consumed, with higher scores indicating better dietary quality. Data were compiled and analysed using Microsoft Excel. Descriptive statistics, including mean, percentage, and standard error (SE), were calculated for all variables. Growth performance and nutritional parameters were compared using Analysis of Variance (ANOVA), and differences among means were considered statistically significant at $P \leq 0.01$.

RESULTS AND DISCUSSION

The present study clearly demonstrated that backyard poultry significantly contributed to improving productivity, income, nutritional security, and women's empowerment among rural households. The body weight of both Kadaknath and Vanaraja birds increased progressively with age; however, Vanaraja consistently recorded significantly higher weights at all stages. At 6 months, Vanaraja (1693.84 g) was about 78% heavier than Kadaknath (987.16 g). Statistical analysis with regard to growth performance also showed highly significant differences ($P \leq 0.01$) between breeds at each age (Table 1). The superior

Table 5. Nutritional Parameters of farm women under Backyard Poultry (Mean $\pm$ S.E.)

Nutritional Parameter	Backyard Poultry Women (n=30)	Control Group (n=30)
Egg consumption (eggs/person/week)	2.05 $\pm$ 0.17 ^a	0.62 $\pm$ 0.09 ^b
Chicken meat consumption (g/week)	54.50 $\pm$ 2.59 ^a	21.40 $\pm$ 1.85 ^b
Protein intake (g/day)	41.90 $\pm$ 0.70 ^a	35.20 $\pm$ 0.65 ^b
Energy intake (kcal/day)	1859 $\pm$ 15.4 ^a	1768 $\pm$ 13.8 ^b
Iron intake (mg/day)	11.54 $\pm$ 0.18 ^a	9.82 $\pm$ 0.16 ^b
Calcium intake (mg/day)	522.75 $\pm$ 6.8 ^a	468.30 $\pm$ 5.9 ^b
BMI (kg/m ²)	20.07 $\pm$ 0.17 ^a	19.21 $\pm$ 0.15 ^b
Hemoglobin (g/dL)	10.28 $\pm$ 0.09 ^a	9.41 $\pm$ 0.08 ^b
Dietary Diversity Score (DDS)	4.15 $\pm$ 0.12 ^a	3.25 $\pm$ 0.10 ^b

Note: Means with different superscripts (a, b) within the same row differ significantly at $P \leq 0.01$.

growth of Vanaraja aligns with (Rajkumar *et al*, 2020), who reported higher body weights due to genetic selection for growth traits. Developed by ICAR, Vanaraja is a dual-purpose breed suited for backyard systems, combining faster growth and adaptability (Perween *et al*, 2016). Dubey *et al* (2025) also reported enhanced nutritional efficiency contributing to higher weight gain. In contrast, Kadaknath, an indigenous breed, shows slower growth but better adaptability and meat quality (Rajesh *et al*, 2024), consistent with present findings. The significant age effect reflects normal growth patterns, as also reported by Niranjana *et al*, 2008. The increasing weight gap with age is attributed to the genotypic make up of improved breeds.

The data (Table 2) highlighted the daily time utilization pattern of farm women which indicated that the largest share of their time (9-10hr/d) was devoted to household activities, followed by farm and agricultural work (6-7hr/d) while the time spent on livestock management was comparatively much lesser with 2.05 hrs spent on cattle and only about 1 hr on backyard poultry, reflecting that backyard poultry can be managed effectively by women just by sparing only one hour out of their total available time. Time spent on other activities such as social interaction and rest was minimal (0.5-1 hr/day), while sleeping time ranged from 5 to 7.5 hrs. Overall, the result highlighted the heavy workload and busy schedule of farm women and demonstrated that backyard poultry is a low-time, supportive enterprise within existing livelihood activities. These findings are in agreement with FAO (2012) and Kumaresan *et al* (2008), who reported that backyard poultry enhances women's participation in economic activities but may not always translate into complete financial autonomy.

The activity-wise analysis of time utilization (Table 3) of women involved in backyard poultry

indicates that backyard poultry is a low-input, time-efficient enterprise well suited to rural women's workloads. The various sub-activities carried out by women in backyard poultry included feeding, watering, cleaning, supervision and monitoring, egg collection and chick care. It is evident from the table that 52% respondents spent 5-10 minutes on feeding activity, while 48% spent 11-15 minutes due to multiple daily feeding using kitchen waste and local grains, reflecting flexibility and reduced labour under scavenging systems (Alders and Pym, 2009; Wong *et al*, 2017). Further the activity of watering to birds required minimal time, with 72% respondents spending 1-5 minutes on it and cleaning was also low-effort, as 68% completed it within 1-15 minutes. It was further noticed that supervision and monitoring was universally practiced, with all respondents spending 1-5 minutes daily, highlighting its importance in flock safety and health monitoring. The time spent on egg collection was only 1-5 minutes for 82.67% of respondents, while chick care was performed by 38.67% of respondents and remained minimal and seasonal. Overall, total time spent on poultry activities was less than one hour per day, confirming its low labour requirement time compared to household and farm work. These findings support earlier studies (Dolberg, 2001; FAO, 2012) emphasizing backyard poultry as a flexible, low-labour activity.

The values (Table 4) showed the impact of backyard poultry on household income which clearly indicated that the majority of households (57.33%) earned a net profit of medium level i.e. ₹7001-9000 per production cycle (40 birds), while 18.67% achieved higher income levels of ₹9001-12000. About 24% of households had net profit of low level i.e. ₹5000-7000, possibly due to variations in management practices, mortality, or market access. These results indicate that even with small flock sizes and minimal mortality (up

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to 5%), backyard poultry as an enterprise can generate meaningful income for rural families. The observed income enhancement is consistent with earlier studies by Ahuja and Sen (2007) and Pica-Ciamarra and Dhawan (2010), who identified backyard poultry as a viable livelihood option for smallholder farmers due to its low input cost and quick returns. The additional income generated through poultry contributed to improved cash flow, small asset creation, and livelihood diversification, particularly among Scheduled Caste women.

The values (Table 5) revealed that women engaged in backyard poultry had significantly higher nutritional intake and health indicators than the control group. It was evident that egg consumption (2.05 ± 0.17 eggs/week) was over three times higher than the control (0.62 ± 0.09), while meat intake (54.50 ± 2.59 g/week) was about 2.5 times higher, reflecting improved availability of animal protein. Similar observations were reported by Food and Agriculture Organization (2023). Protein intake increased to 41.90 ± 0.70 g/day compared to 35.20 ± 0.65 g/day, aligning with findings of International Food Policy Research Institute (2022). Furthermore, mineral like Iron (11.54 ± 0.18 mg/day) and calcium (522.75 ± 6.8 mg/day) intake were also higher than the control group (9.82 ± 0.16 mg/day and 468.30 ± 5.9 mg/day), contributing to improved haemoglobin levels (10.28 ± 0.09 g/dL vs. 9.41 ± 0.08 g/dL) and reduced anemia risk, as supported by Gowri *et al* (2023). With regard to Body Mass Index (BMI), it was higher and closer to normal (20.07 ± 0.17 kg/m² vs. 19.21 ± 0.15 kg/m²), indicating better nutritional status, consistent with Kumar *et al.* (2022). Dietary Diversity Score was also significantly higher (4.15 ± 0.12 vs. 3.25 ± 0.10), confirming improved diet quality, in line with Smith *et al.* (2021). Thus, overall, backyard poultry significantly enhanced nutrition, health, and dietary diversity among women.

CONCLUSION

The present study conclusively demonstrated that backyard poultry farming was an effective, low-input intervention for enhancing livelihood security, income generation, nutritional status, and women's empowerment among rural households. The superior growth performance of Vanaraja birds over Kadaknath highlights the advantage of improved germplasm under village conditions, while the minimal time requirement confirms its compatibility with the existing workload of farm women. The enterprise generated substantial supplementary income and significantly improved dietary intake, health

indicators, and dietary diversity among beneficiary women. Overall, backyard poultry emerged as a sustainable, economically viable, and nutritionally impactful model that can be effectively scaled to promote inclusive rural development, particularly among resource-poor and marginalized communities.

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Received on 4/5/2026 Accepted on 10/6/2026