Improved Backyard Chicken Varieties for Enhanced Poultry Production

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ABSTRACT

In the Indian rural economy, poultry farming plays a vital role in the socio-economic development of the downtrodden by generating valuable employment and income and providing protein rich diet relatively at a lower cost. This study was conducted during the period from 2017 to 2022. On-Farm Trials (OFTs) and Front-Line demonstrations (FLDs) were conducted in Dharmapuri, Salem and Vellore districts to assess the productive and reproductive traits of improved chicken varieties (Srinidhi, Gramapriya, Nandanam Broiler-3, TANVAS Aseel, and Vanashree) under backyard conditions. Data were gathered on the mean body weights at different age groups, feed consumption, mortality, livability, age at first egg production, annual egg production, hatchability, fertility and monthly income. Body weight, egg production, and hatchability were lower in local chicken, compared to Srinidhi, Gramapriya, Nandanam Broiler-3, TANUVAS Aseel, and Vanashree strains. However, no differences were observed between these improved chicken varieties. Srinidhi chicken and TANUVAS Aseel chicken for egg production and meat production, respectively, were identified as suitable strains in the study areas of Vellore district. The annual egg production was 168.23 ± 1.98 in Srinidhi chicken, and the meat production in TANUVAS Aseel chicken was 2156.12 ± 1.89 kg.

Keywords: Improved chicken varieties, Egg and meat production

INTRODUCTION

Backyard poultry farming is widely practised in Indian rural areas. It is a low-input avocation, characterized by rearing poultry birds in small numbers in backyards under a free-range system whereby poultry birds scavenge for food. Rural backyard poultry farming plays an important role in the socio-economic development of the weaker sections of rural society, generating employment and income, besides supplementing a protein-rich diet at a lower cost. While the high-yielding layers and broilers demand costly inputs, they cannot also survive under sub-optimal nutritional and managerial conditions n stressful environment. However, the native breeds of fowl in rural and tribal areas are considered best suited for their ability to survive even in adverse and harsh climatic conditions, though they are low producers of eggs and meat. Therefore, to enhance the production of backyard poultry, the improved varieties of indigenous fowls have now been introduced into the rural farming system. Many research institutions have developed improved chicken varieties (Lurthu *et al.*, 2023). The productivity of the backyard poultry production system can be improved by introducing improved germplasm or adopting improved management practices (Chaiban *et al.*, 2020). Also, the improved varieties resemble the indigenous birds with multicoloured plumage, longer shanks, higher productivity, adaptability to varied agroclimatic conditions, and better immunity against many diseases (Rajkumar *et al.*, 2021). Improved varieties of birds are now available for higher meat and/or egg production, with a few reared for both egg and meat (dual-purpose) (Giri, 2023). The improved varieties include Srinidhi, Gramapriya, Nandanam Broiler-3, TANVAS Aseel, and Vanashree, which were introduced to the farmers of Dharmapuri, Salem and

Vellore districts of Tamil Nadu for enhancing rural backyard poultry production (Vinothraj *et al.*, 2020), to uplift and sustain rural farmers' livelihood. A brief description of each of these improved varieties is given below:

Srinidhi: (ICAR-DPR, Hyderabad, 2014): It is a dual-purpose chicken, having an attractive multi-colored plumage, longer shanks to run away from predators, and greater disease resistance, requiring a low plane of nutrition and producing more eggs, which are brown in colour. These birds have the ability to recycle the natural food and waste feed into high-quality protein eggs.

Gramapriya (ICAR-DPR, Hyderabad, 2017): It is also a dual-purpose chicken, having an attractive feather pattern, moderate body weight, and longer shanks, besides producing more brown-coloured eggs.

Nandanam Broiler-3 (TANUVAS, Tamil Nadu, 2017): It was developed by crossing two strains - Ven Cobb male with Nandanam Broiler 2 female, through artificial insemination for developing a synthetic strain through sustained selection and breeding for seven generations. It is well-suited for backyard poultry farming with a better feed conversion ratio and tenderness of the meat. This strain is complemented with the positive characteristics of both strains, such as multi-coloured feather pattern, brown shelled eggs, meat primed with all sensory attributes, better body weight and improved feed conversion efficiency, and good survivability under the backyard system. This strain is well-suited for the micro-economic, small and medium scale farming and the resource-poor rural women.

TANUVAS Aseel (TANUVAS, Tamil Nadu, 2018): This is a superior variety of native chicken, with a long and slender face, compact eyes, bright red wattles and ear lobes, a hard beak, a long and uniformly thick neck, predominantly reddish-brown plumage, and a pea or rose comb.

Vanashree (ICAR, DPR, 2019): This improved chicken was evolved from Aseel-Peela (PD-4) breed through selective breeding for improvement of body weight and egg production. It has a majestic look with attractive yellow coloured plumage, yellow shanks and red pea combs. These hens produce eggs with brown to light brown coloured shells.

However, only scanty information is available on production and reproduction performance of these improved backyard chicken varieties. Hence, this study was carried out to assess the production and reproduction performance of improved backyard chicken varieties in Dharmapuri district of Tamil Nadu during the period from 2017 to 2022.

MATERIALS AND METHODS

The study was undertaken at the Krishi Vigyan Kendra of Dharmapuri, Salem and Vellore of Tamil Nadu Agricultural University, Coimbatore, through OFT and FLD to evaluate the production efficiency of improved backyard chicken varieties *viz.*, Srinidhi, Gramapriya, Nandanam Broiler-3, TANUVAS Aseel, Vanashree and local birds in these districts. Every year, 300 numbers of unsexed day-old chicks were obtained from the Research Institute and brooded at the Poultry unit, Krishi Vigyan Kendra. They were brooded at a temperature of 35^0C with adequate water and feed. Lighting was provided for 24 hours a day during brooding to avoid piling and death. Standard management and health care practices were followed throughout the experiment period up to 21 days of age. After that, they were allowed under the backyard system of rearing. Performance data of all the varieties was collected.

The identified backyard poultry farmers (75 farmers @15 farmers/year and 20 chicks/farmer) were trained on the scientific practices in backyard poultry farming and were

supported for up to 21 days. The demonstration fields were regularly monitored and observed. The production parameters like body weight, feed conversion ratio, livability, age at first egg laying, egg production (20-40 weeks), egg weight and hatchability percentage were recorded at regular intervals to study the impact of FLD. Data from OFT, FLD, IFS and farmers' practices were recorded. Feeding with a balanced ration fortified with required minerals, vitamins, antimicrobial and anticoccidian was practiced during the brooding period. There were a lot of similarities in the feeding habits of all birds like foraging and search of feed from a vast backyard with green leafy vegetables, insects and grass grains. Sometimes the birds were offered chopped kitchen waste and vegetable waste. Observations on age at first egg production, total egg production, and shank length (mm) of adult male and female birds were recorded at periodic intervals. The birds were dewormed at 3 months interval, and vaccinated against Ranikhet (Newcastle-R2B, 0.5 ml S/C) disease and pox disease (fowl pox, 0.2 ml S/C) at 9th and 12th week of age, respectively. The mean and SE of various triats was calculated according to standard statistical procedures (Snedecor and Coehran, 1994).

RESULTS AND DISCUSSION

Production performances of improved backyard chicken varieties are presented in Table I. The results indicated that the average day-old weight of 42.56±2.16 was the highest in Srinidhi, while Thomas *et al.* (2023) reported that the average day-old weight was the highest in TANUVAS Aseel. Body weights at 6th week of age and 28th week of age were 420.35±5.35 g and 3100±0.95 g, respectively, in Srinidhi variety. The significantly (P≤0.05) higher mean body weight might be due to superior germplasm utilized in the development of Vanaraja and Srinidhi. Srinidhi consumed more feed of 120.26±1.32 g per day and obtained a significantly higher weight gain than other varieties. Lalremruata *et al.* (2022) reported the body weight gains of 1.61±0.12 kg and 1.2±0.1 kg in Srinidhi male and female birds. Sharma *et al.* (2017) reported that there was no significant difference in the mean body weights of Vanaraj and Srinidhi birds at similar ages. TANUVAS Aseel consumed 101.26 ±2.56 g of feed per day during the growing period, as reported by Lurthu *et al.* (2023). A higher percentage of livability of 97.35±1.26 was recorded TANUVAS Aseel in this study. However, Ezhil Valavan *et al.* (2016) observed that the livability of Aseel was 94%. The farmers of Dharmapuri, Salem and Vellore districts preferred to keep brown shelled egg producing as they fetched them higher prices (Rs.15/egg) and they could generate higher income. Singh *et al*. (2021) and Mahak Singh *et al*. (2019) reported that Srinidhi chicken was preferred for higher income generation in Nagaland due to higher egg production.

Table I: Growth Performance of Improved Backyard Chicken Varieties

Parameters			Backyard Chicken Variety					
			Local	Srinidhi	Gramapriya	Nandanam Broiler-3	TANUVAS Aseel	Vanashree
Growth rate (g)	0 day (Hatch weight)		29.12±1.25 ^{f}	42.56±2.16^{a}	39.26±2.36^{c}	41.46±3.16^{c}	38.12±0.56^{d}	37.72±1.36e
	6th week		200.12±2.32^{f}	420.35±5.35^{a}	370.35±4.95^{b}	320.12±3.15^{b}	220.62±4.85c	212.32±5.85b
	28th week	Cock	1500±08.23^{f}	3100±0.95^{a}	1900±0.52^{d}	2635.13± 1.42^{b}	2156.12±1.89^{c}	2436±0.45^{b}
		Hen	1340±04.58^{f}	2800±04.52^{a}	1800±0.26^{d}	2456.23±2.26^{b}	1975.72±0.26^{d}	1746.84±1.26^{e}
Average feed consumption			80.19±0.78^{f}	120.26±1.32^{a}	118.26±0.12^{b}	112.26±1.73^{c}	102.18±3.59^{f}	95.17±2.95^{e}
Feed conversion ratio			1.31±2.12^{b}	1.27±2.17^{c}	1.38±2.31^{c}	1.48±2.85^{d}	2.87±3.75f	2.48±2.12^{e}
House Mortality (%)			07.26±1.85^{f}	5.16±1.85^{d}	4.25±2.95^{b}	6.32±2.16^{e}	2.72±1.26^{a}	4.85±2.35^{c}

Adult Livability (%)	92.74±0.78[e]	94.84±0.45[c]	95.75±1.16[b]	93.68±0.46[d]	97.13±1.26a	95.8±0.94[b]
Monthly income (Rs.)(10+1)	1650[f]	1850[c]	1740[e]	1760[d]	1990[a]	1880[b]

Means between columns differ significantly (P≤0.05); Means bearing different superscripts within a row differ significantly.

Reproduction performance of improved backyard chicken varieties is shown in Table II. The average age of sexual maturity was 145 days in Nandanam Broiler 3, which was relatively lower than that of local birds. The average age at first egg production was 153 days in Nandanam Broiler 3, which was lower compared to other improved varieties, possibly due to genetic differences between the five groups of birds. However, Karuna Sree *et al*. (2017) recorded a higher age at first egg production in TANUVAS Aseel, Zuyie *et al*. (2009) recorded a higher age in the case of Vanaraja chicken and Islam *et al*. (2014) also recorded a higher age in indigenous chicken. The mean egg production of improved backyard chickens was significantly (P≤ 0.5) higher than that of local chickens, which might be due to the difference in the genetic makeup of birds. Among all the improved varieties, Srinidhi chicken showed an annual egg production of 168.23±1.98, relatively higher than the other improved varieties. Similar findings were also observed by Sharma *et al*. (2017).

Table II: Reproduction Performance of Improved Backyard Chicken Varieties

Parameters	Backyard Chicken Variety					
	Local	**Srinidhi**	**Gramapriya**	**Nandanam Broiler-3**	**TANUVAS Aseel**	**Vanashree**
Age at sexual maturity (days)	181±7.37[d]	155±4.12[c]	152±3.78b	145±4.56a	154±4.23[c]	183±5.23[e]
Age at first egg laying	186±5.72[d]	166±3.25c	160±4.62b	153±3.26[d]	164±3.12[c]	192±2.15[e]
Annual Egg production	52.36±1.96[f]	168.23±1.9a	158±2.86b	138±1.45[d]	148±4.96[c]	136±1.78[e]
Egg weight (g at 42 weeks)	37.45±0.97[f]	53.28±0.35b	52.12±0.23c	56.35±1.21[a]	48.16±0.82[d]	45.25±0.56[e]
Hatchability (%)	73.12±0.25[d]	92.56±0.79[a]	85.12±0.25[b]	71.25±0.65[e]	83.45±6.15[c]	84.56±2.38[b]
Brooding Nature	Present	Absent	Absent	Absent	Present	Present

Means between columns differ significantly (P≤0.05); Means bearing different superscripts within a row differ significantly.

Thangadurai *et al.* (2018) reported that all the farmers were aware of the importance of improved Srinidhi backyard poultry, but only 36.66% of them had raised them, 25% discontinued, and 38.33% had not at all raised them. The farmers preferred Srinidhi for the higher egg price, and the new varieties increased their income, paving the way for sustainable farming in their areas. The higher hatchability percentage found in this study was 92.56±0.79 in Srinidhi chicken. From the results, it could be observed that the reproduction performance of improved chicken varieties was higher, which could be due to higher production traits.

CONCLUSION

The eggs and meat of improved birds reared in backyard farming fetched higher income due to wider acceptability by the consumers of even urban areas. It could be concluded that all the improved varieties performed well under the backyard conditions of Dharmapuri, Salem and

Vellore districts. Farmers preferred Srinidhi chicken for egg production and TANUVAS Aseel chicken for meat production, compared to other improved and local varieties.

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