



Status of Backyard Turkey (*Meleagris gallopavo*) Production System in South 24 Parganas District of West Bengal, India

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Turkey farming is comparatively a new enterprise in West Bengal. A survey of 55 turkey farmers selected from six blocks of South 24 Parganas, a coastal district of West Bengal was conducted during 2021-2022 to study the socio-economic conditions of turkey growers, to evaluate the perceptions of the farmers towards scientific turkey farming and to characterize turkey production system in this district. A pre-tested and semi-structured questionnaire was used to evaluate the status of backyard turkey farming in the district. The outcome of the results revealed that the majority (71%) of the turkey growers were middle-aged with an educational background of secondary education. The results further showed that the farmers were mostly (54.5%) with limited land resources. Due to the scarcity of land, the farmers require an alternative livelihood for subsistence. A majority (72.7%) of the farmers had prior experience in turkey farming. The results showed that 81.8% of farmers had good extension contacts with various institutes. The perception scoring method revealed that 72.7% of farmers have a good perception of scientific turkey farming. It was further observed that a significant ($P < 0.05$) association was present between perception score and extension contact. The turkey production system was studied in detail and it was found that the farmers had scientifically maintained the key factors including litter management, vaccination and biosecurity arrangements of the farm. Most (67.3%) of the farmers had developed marketing linkages with West Bengal Livestock Development Corporation (WBLDC) for better profitability. The economic analysis of turkey farming indicated a benefit-cost ratio of 1.74. The study revealed that experienced and progressive farmers with a good perception of scientific farming are involved in this new enterprise. Overall, backyard turkey farming is a profitable enterprise and should be propagated among farmers of South 24 Parganas through various extension support systems.

(**Key words:** Backyard turkey farming, Coastal West Bengal, Perception, Production system, South 24 Parganas)

South 24 Parganas is a coastal district of West Bengal and is characterized by high population density with poor to mediocre socio-economic infrastructure (Bagchi, 2017). In this district, 89% of people depend upon agriculture, but the Human Development Report (Govt. of West Bengal, 2009) indicated that agriculture is slowly becoming unrewarding. The agricultural sustainability of this region is worsening day by day due to a myriad of factors like climatic variability, declining agricultural labour forces, frequent cyclonic storms, floods, erosion of embankments and soil salinity (Ghosh and Mistri, 2020). Among the livestock enterprises, backyard poultry farming (BYPF) using local poultry breeds was instrumental for alternative livelihoods

among small and marginal farmers in this district. However, BYPF is also now passing through difficult phases due to the high incidence of poultry diseases, lack of quality germplasm and lack of marketing linkages (Dumrya *et al.*, 2015).

In this backdrop, Sasya Shymala Krishi Vigyan Kendra (Farm Science Center, South 24 Parganas) initiated the promotion of backyard farming of turkey (*Meleagris gallopavo*) birds among existing poultry farmers of South 24 Parganas district as an alternative livelihood option since the year 2016, to achieve better income for the farm families. Turkey rearing was a comparatively new type of farming in this district. Thus, at the beginning leading poultry farmers of the district

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were given training for this enterprise by the Krishi Vigyan Kendra (KVK). Front-line demonstrations on scientific turkey farming were also conducted in different blocks of the district from time to time for gaining confidence and to promote horizontal diffusion of the package of practices among fellow farmers. The large-scale adoption program of turkey farming has been gradually taking momentum since 2019 and a model of this program (Fig. 1) was envisaged that was tightly integrated with financial institutions for credit linkages, various line departments of the Govt. of West Bengal for technology collaboration and West Bengal Livestock Development Corporation (WBLDC) under the aegis of the Department of Animal Resource Development, Govt. of West Bengal for development of market linkage (Ghosh *et al.*, 2019).

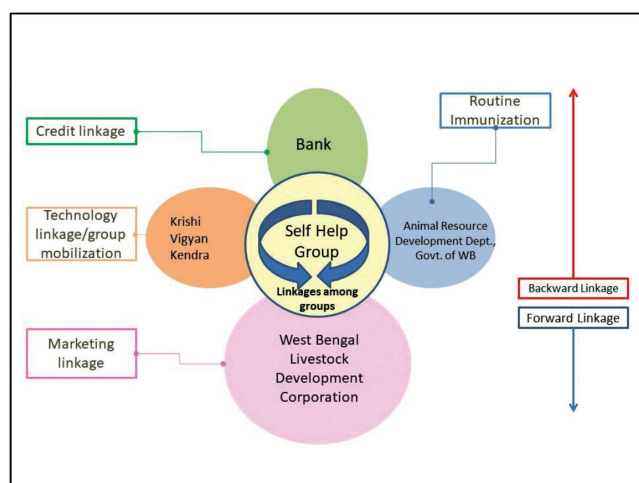


Fig. 1. Backward-forward linkage model for turkey farming

The present study was aimed at exploring the socio-economic attributes of farmers engaged in backyard turkey farming, examining the perception of farmers on the turkey production system and understanding present turkey management practices including all major husbandry parameters.

MATERIALS AND METHODS

Study area and duration

The present study was conducted in six community development blocks comprising Sonarpur, Basanti, Budge-Budge - II, Barupur, Canning - I and Mathurapur - I in South 24 Parganas district of West Bengal, India.

The blocks were chosen purposively. A total of 55 respondents, who are predominantly engaged in turkey farming, were chosen randomly from the selected blocks for a face-to-face questionnaire survey and focus group discussion. The present study was undertaken in the target area over a span of seven months from July 2021 to January 2022.

Data collection and analysis

A semi-structured and pre-tested interview schedule on socio-economic parameters (10 questions) and prevalent turkey production system (14 questions) was developed for the present survey. At the beginning of the interview, a brief introduction about the purpose of the study was communicated to the respondents and then they were asked to reply. The perception score of the farmers on turkey farming was recorded as per the method described by Elnadi *et al.* (2020). Briefly, 5 questions were set to understand the perception of the respondents. These questions were answered on a yes/no based response. Each correct answer was scored as '1' and incorrect as '0'. Based on a cutoff point (the mean score), the total perception score was categorized as a binary variable - 'Poor perception' or 'Good perception'. Data were compiled and coded in SPSS computer program v.20 (IBM SPSS Inc., Chicago, USA) for univariate descriptive statistics. The chi-square test was used to test for association between the demographic variables and categorized perception scores. All analyses were carried out at $P < 0.05$.

Economic analysis was carried out by collecting the data on gross cost (Cost for chick + Feed cost + Vaccine/Medicine cost) for rearing and gross returns (Sale proceeds of live turkey birds to WBLDC). The net returns were calculated by deducting the gross cost for rearing from the gross return. The benefit-cost ratio was then calculated by dividing the gross return by the cost of rearing (Ray *et al.*, 2019).

RESULTS AND DISCUSSION

Socio-economic status of turkey farmers

The data on the different socio-economic categories are presented in Table 1. From the table, it is evident that most of the turkey farmers (71%) were in the middle-aged group (30-45 years). Age is an important factor that influences the attitude of human beings. A

similar finding was observed by Mandal *et al.*, (2006) in backyard poultry systems. This indicates that the turkey farming business is being operated by young, energetic and physically capable farmers. The results also revealed that females (45.5%) are actively involved in backyard turkey farming. Females in Sundarban areas of South 24 Parganas district are gradually adopting this new type of farming. A majority (65.5%) of the respondents were from joint families with 5-8 family members. This helps them to carry out better management practices in turkey farming. Education also plays an important role in the overall progress of human life. It motivates farmers to adopt newer technologies and implement the program more successfully. The present study revealed that most of the respondents (54.5%) had studied till the secondary level of school education. This might be a driving force for the farmers to select a newer farming system in the villages. Turkey farming requires limited land resources for optimum operation and this attracted many farmers and rural youths who have marginal land holdings to adopt turkey farming. Our present study confirms that most of the turkey growers (54.5%) were marginal farmers having less than 3 acres of land. It was further observed that the majority of the farmers (91%) belonged to the poor and the middle-class category with income of less than ₹20,000 per month. This indicated that unlike broiler farming, small-scale turkey farming can be accomplished with limited resources. Backyard turkey farming promises new opportunities to the existing poultry farmers amidst the severe volatility of the broiler market. Turkey farming remains a modest source of assured income and food security for the turkey growers who were basically from the lower-income strata. Successful backyard turkey farming depends on the experience of poultry farming and the data (Table 1) revealed that 72.7% of the turkey growers had an average turkey farming experience of 1-3 years. Dumrya *et al.* (2015) had reported that the 90% of the farm owners had more than 3 years of experience in backyard poultry farming enterprises in the Sundarban area. Turkey farming is a new type of farming in South 24 Parganas district and moderately experienced poultry growers are engaged in this farming. Extension agencies like state departments, KVKs and NGOs play a pivotal role in agricultural technology adoption for better livelihood. In the present study it was found that 81.8%

of the respondents had linkages with different extension functionaries who helped them to adopt backyard turkey farming as an enterprise.

Perception of farmers about scientific turkey farming

A solid perception of key technologies in farming is critical for profitability and sustainability. A total of 5 questions were solicited to check the perception of the subjects on scientific turkey bird farming. Table 2 displays the perception of respondents on this aspect. Most respondents (54.5%) were familiar with the correct brooding temperature needed during the first week. All respondents (100%) were aware of the space requirement of turkey poult. Vaccination is a key management technique for profitable turkey farming. Among the respondents, 60% had the correct perception of vaccination against the deadly Ranikhet disease of turkey. Supplementary feeding is common in backyard poultry farming (Banerjee and Ghosh, 2021) and most turkey farmers (74.5%) in the district knew that supplementary feeding with greens could enhance the profitability of turkey farming as well.

Poultry birds including turkeys are subjected to physiological stress when they get parasitic infections that might lead to reduced weight gain. In the present study, it was found that most of the turkey growers (61.9%) did not have a proper perception of commonly used dewormers. De-worming strategies might be a neglected area in the training programmes conducted and this indicated that more extension contacts with a focus on deworming shall be needed to improve their perception on scientific management of turkey birds. A lack of perception on this issue might affect in future the sustainability of the blooming turkey farming in the district.

The perception scores across the socio-economic variables are given in Table 3. Perception scores were categorized further into two variables - Good perception (those having score of more than 2.5) and Poor perception (those having score of less than 2.5). The association of perception with socio-economic variables is also presented in Table 3. Among the respondents, the highest perception score was observed in those hailing from Canning I block followed by the Sonarpur block. However, it was observed that perception was not significantly ($P < 0.05$) associated with place of farming

Table 1. Socio-economic characteristics of the respondents (*n* = 55)

Variables	Characteristics	No of respondents (n)	Frequency (%)
Blocks			
Sonarpur		20	36.4
Basanti		5	9.1
Budge-Budge II		10	18.2
Baruipur		10	18.2
Canning I		5	9.1
Mathurapur I		5	9.1
Gender	Male	30	54.5
	Female	25	45.5
Age	<30 years	16	29
	30-45 years	41	71
	>45 years	0	0
Family size	<5 members	19	34.5
	5-8 members	36	65.5
	>8 members	0	0
Education level	Illiterate	0	0
	Primary	15	27.3
	Secondary	30	54.5
	Graduate	10	18.2
Primary occupation	Farmer	30	54.5
	Housewife	15	27.3
	Agri-labour	10	18.2
	Other	0	0
Land holding	<3 acres	30	54.5
	3-7 acres	25	45.5
	>7 acres	0	0
Farm-family income	<₹ 10000 / month	25	45.5
	₹ 10000 - 20000 / month	25	45.5
	>₹ 20000 / month	5	9.1
Turkey farming experience	<1 year	5	9.1
	1-3 years	40	72.7
	>3 years	10	18.2
Extension contacts	Yes	45	81.8
	No	10	18.2

(i.e., blocks), gender, age, family size, education level, occupation, land holding, family income and farming experience. Interestingly, a significant ($P < 0.05$) association between perception and extension contact was observed in the present study. Extension support in terms of capacity-building, trainings, demonstrations and frequent exposure visits is, thus, needed for the rapid propagation of turkey farming.

Characteristics of turkey production system

Major farming components in the backyard turkey production system operated in South 24 Parganas district are presented in Table 4. In this study, it was found that Beltsville Small White is the only turkey breed that is maintained by farmers in this district.

Anandh and Jagatheesan (2015) opined that this breed is best suited to the hot and humid climatic conditions of India. The production type is a typical 'All-In, All-Out' system like broiler farming, where all grow-out birds are sold at a time. This type of production, unlike multi-age farming, is the best for disease prevention (Gocsik *et al.*, 2014). The majority of the farmers (69.1%) were found to rear turkey flocks of more than 30 birds. Turkey poults are generally kept in sheds but also allowed to graze on the land for some time. The floors of the sheds are predominantly (63.6%) cemented. The cemented floor can easily be washed after each lot and is the most suitable for turkey farming. The majority (54.5%) of the roof structure is made up of asbestos followed by tiles (27.3%) and straw (18.2%).

Litter materials used are mostly sawdust (72.7%) followed by a mixture of straw and sawdust (27.3%). Most of the farmers (76.4%) manage the litter efficiently by following a combination of various techniques like removal of wet litter, addition of fresh litter and tilling. Feed cost is an important factor in the poultry sector (Thirumalaisamy *et al.*, 2016). It is evident from the present study that among the farmers, a majority (81.8%) use azolla or green succulents to reduce the feed cost of the flock. Azolla and other green succulents provide important trace minerals and phytochemicals needed for body growth and immunity. Vaccination is an important factor that can successfully decrease disease incidence in backyard poultry flocks (Dey *et al.*, 2017). It was observed that most of the farmers (56.4%) administer vaccines to their turkey flocks as advised by veterinarians. The results of the present study also revealed that the biosecurity arrangements of the farms are adequate. Most (60%) of the farmers reported that they have restricted entry at the farm gates. Besides, 63.4% of farmers use disinfectant sprays in empty sheds at regular intervals. This practice can effectively eradicate most germs inside the sheds. Vaccination and biosecurity are two main pillars of successful backyard turkey farming. The present study indicated that the farmers in the district of South 24 Parganas are adopting both these scientific practices with the help of robust extension support networks in this district.

Table 2. Perception about scientific turkey bird farming ($n = 55$)

Perception	Response	No of respondents (n)	Frequency (%)
Turkey chicks require 95°F temperature during first week of brooding	Yes	31	54.5
	No	24	45.5
Turkey poults require 4 sq ft per bird floor space for healthy living	Yes	55	100
	No	0	0
F1 and R2B vaccine is used against Ranikhet disease in turkey farming	Yes	33	60
	No	22	40
Supplementary feeding with azolla/vegetable wastes enhances profitability in turkey farming	Yes	41	74.5
	No	14	25.5
Piperazine is a dewormer used in turkey farming	Yes	21	38.1
	No	34	61.9

Table 3. Association of perception score with the socio-economic variables (n =55)

Variables	Characteristics	Perception score (Mean)	No. of respondents (n)		χ^2 (df)	P value
			Good Perception (<2.5)	Poor Perception (<2.5)		
Blocks						
Sonarpur		4.2	18	2	8.479 (5)	0.132
Basanti		2.3	1	4		
Budge-Budge II		3.1	8	2		
Baruipur		3	7	3		
Canning I		5.2	4	1		
Mathurapur I		2.2	2	3		
Gender	Male	3	16	14	3.438 (1)	0.182
	Female	4	24	1		
Age	<30 years	4.6	15	0	1.547 (1)	0.491
	30-45 years	3.3	25	15		
	>45 years	-	0	0		
Family size	<5 members	4	12	6	0.016 (1)	0.721
	5-8 members	3.1	28	9		
	>8 members	-	0	0		
Education level	Illiterate	-	0	0	0.917 (2)	0.632
	Primary	3.6	11	4		
	Secondary	3.6	24	6		
	Graduate	2.5	5	5		
Primary Occupation	Farmer	3.5	21	10	1.757 (2)	0.415
	Housewife	3.6	13	2		
	Agri-labour	3.1	6	3		
	Other	-	0	0		
Land holding	<3 acres	3.8	25	5	0.749 (1)	0.545
	3-7 acres	3	15	10		
	>7 acres	-	0	0		
Farm-family income	<₹ 10000/month	3.6	13	12	0.917 (2)	0.632
	₹ 10000 - 20000/month	3.4	20	5		
	>₹ 20000/month	3	5	0		
Turkey farming experience	<1 year	2.1	1	5	3.438 (2)	0.179
	1-3 years	3.3	30	10		
	>3 years	4.5	10	0		
Extension contact of the farmer	Yes	3.7	39	6	6.519 (1)	0.04*
	No	2.1	1	9		
Overall	-	3.45	40 (72.7%)	15 (27.3%)	-	-

*Significant ($P < 0.05$)

The major (67.3%) marketing channel in turkey farming, as evidenced by this study, is through West Bengal Livestock Development Corporation (WBLDC), a state government undertaking under the Department of Animal

Resource Development, Govt. of West Bengal for the development of market linkage. The honest price without any middleman, direct money transfer to the beneficiary account and quick payment time have attracted farmers to

Table 4. Characteristics of turkey production system in South 24 Parganas district (n = 55)

Variables	Characteristics	Number of respondents (n)	Frequency (%)
Turkey Breeds	Beltsville Small White	55	100
	Broad Breasted Bronze	-	-
Type of production	All in All out system	55	100
	Chain (Multi-age) system	-	-
Flock Size	<10 numbers of birds	0	0
	10-30 numbers of birds	17	30.9
	>30 numbers of birds	38	69.1
Floor types	Earthen floor	19	36.4
	Cemented floor	36	63.6
Roof types	Straw thatched	10	18.2
	Asbestos	30	54.5
	Tile	15	27.3
Litter materials	Saw dust	40	72.7
	Chopped straws	0	0
	Combined	15	27.3
Litter management	Removal of wet litter and adding of dry litter	9	16.3
	Tilling of litter	4	7.3
	Combination of all	42	76.4
Feeding management	Only mash feeding	10	18.2
	Mash feeding with greens	45	81.8
Vaccination of flock	Never	0	0
	Occasional	24	43.6
	Regular (As directed by vet)	31	56.4
Restricted entry at farm gate	Yes	33	60
	No	22	40
Use of water sanitizer in drinking water	Yes	3	5.5
	No	52	94.5
Use of disinfectants in empty shed	Yes	34	63.4
	No	21	36.6
Use of antibiotics	Yes	43	78.2
	No	12	21.8
Marketing channel	Local market	0	0
	WBLDC	37	67.3
	Combined	18	37.7
Avg age of marketing	<5 months	16	29
	5-6 months	30	54.5
	>6 months	9	16.5

establish a marketing linkage with WBLDC. Most of the farmers (54.5%) sell their live turkeys at an average age of 5 to 6 months directly to WBLDC.

Economics of turkey farming

A farming system that provides significant net returns is considered economically viable. Table 5 depicts that the net return per kg (live weight basis) is ₹117.40 from an average live weight of 4.66 kg turkey birds at the time of marketing. The benefit-cost ratio (B:C ratio) of this farming was 1.74. This implies that turkey farming is a profitable business and farmers may gradually adopt turkey farming as an alternative livelihood to broiler farming.

From our investigation, it could be concluded that experienced farmers with good extension contacts are involved in the backyard turkey farming business in South 24 Parganas district. The farmers are well aware of the scientific interventions needed for feed supplementations and disease prevention. The marketing linkage with WBLDC among farmers has ensured profitability and sustainability in this venture. Besides, thrust should be given to conduct more outreach programmes among the farmers on this profitable enterprise to enhance their livelihoods and to engage farmers' organizations like self-help groups, farmers' clubs and FPOs in the turkey farming business.

Table 5. Average live weight (Kg) of turkey birds at marketing and financial parameters from farming (Mean $\pm$ SD)

Average live weight (kg) at marketing	Gross income per live bird (₹ kg ⁻¹)	Gross expenditure per live bird (₹ kg ⁻¹)	Net return per live bird (₹ kg ⁻¹)	Benefit-cost ratio
4.66 $\pm$ 1.5	271.22 $\pm$ 26.47	153 $\pm$ 17.4	117.4 $\pm$ 20.23	1.74 $\pm$ 0.18

CONFLICTS OF INTEREST

The authors declare that there are no competing interests.

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