RESEARCH ARTICLE

An Assessment of Livelihood Status, Profitability, and Obstacles Faced in Native Chicken Farming in Some Selected Areas of Bangladesh

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ABSTRACT

The present research aimed to assess the livelihood status of native chicken farmers in Bangladesh, their rate of profitability, constraints, and their suggestions for addressing these issues. Primary data were collected from a random sample of 260 native chicken-rearing farmers across six divisions in Bangladesh. The majority of farms (36.9%) fell into the small category (1–10 chickens), followed by medium (11–15 chickens) and large (>15 chickens) farms (31.9%). Common deshi hens were present in nearly 95% of the farms. In 2023, the market prices for different categories of chicken were as follows: roasters at 329.68 ± 7.20 BDT, hens at 302.22 ± 2.66 BDT, and chicks at 68.23 ± 2.28 BDT. The market prices for duck eggs, native chicken eggs, brown-shelled eggs, and white-shelled eggs ranged from 63.91 ± 0.52 to 61.07±0.58 BDT per hali. The Patuakhali district had the highest benefit-cost ratio of 2.61, while Rangpur had the lowest at 1.57. Native chicken farming contributed 7.79% to household income. A multiple regression analysis revealed that almost all variables were influenced by income from native chicken farming, except for rearing costs. The major constraints reported were disease outbreaks and predatory animal attacks, mentioned by 80.4% of the farmers. In conclusion, native chicken farming in Bangladesh is profitable despite some challenges that need to be addressed.

Abbreviations

GR: Gross return
GC: Gross cost
BCR: Benefit Cost Ratio
SE: Standard Error of Mean

SSC: Secondary School Certificate
HSC: Higher Secondary Certificate
NC: Native chicken
BDT: Bangladeshi Taka

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Introduction

*B*angladesh, a densely populated nation, has a strong agricultural foundation, with rural areas accounting for 68.49% of the total population [1]. The average per capita income is only $2824, and the majority of individuals are engaged in crop cultivation, fisheries, and livestock rearing. Both domestic and commercial poultry farming are becoming increasingly common. Poultry plays a crucial role in the agricultural sector of Bangladesh, offering economic benefits and allowing birds to reproduce freely. In rural areas, backyard poultry farming is a traditional method of raising chickens that supports family economies and provides food for subsistence [2]. Poultry is also raised for commercial purposes, assisting farmers in creating jobs, earn income, and contribute to building a poverty-free and healthy society. In Bangladesh, the poultry sector is crucial in creating employment, contributing to national income, improving human nutrition, and generating revenue. Increasingly, people are recognizing the value of poultry farming as a source of income for marginal and landless farmers, especially women [3]. In developing countries, poultry meat and eggs contribute approximately 20% of dietary protein [4]. In Bangladesh, native chickens are raised by rural farmers. However, some obstacles impact domestic chicken production. One major obstacle is disease prevalence, which is influenced by climate change, farm management, vaccination and deworming routines, and societal awareness. Despite these challenges, native chicken farming remains a profitable industry in Bangladesh, particularly for rural women, providing them with a source of income. The purpose of this study is to learn more about the financial conditions, profitability, and challenges faced by local chicken farmers. We also aimed to identify the support needed by farmers to expand local poultry farming. The current study provides data on the production costs and returns associated with raising chickens. The findings of this study might be useful to the authorities and rural poultry producers in making informed decisions and other districts

had no significant difference. The specific objectives of the study were:

1. To evaluate the profitability of native chicken farming and the farmers' standard of living

2. To understand the limitations against farmers' perspectives on chicken farming.

3. To offer a potential way out of guidelines to enhance indigenous chicken farming.

Results

1.1 Socioeconomic Status of Farmers

The socioeconomic status of farmers in the selected regions is shown in Table 1. The mean age of the farmers in the surveyed region ranged from 38.30±0.98 to 46.86 ± 2.29 years. The average family sizes in the Rangpur, Sherpur, Feni, Pirojpur, Patuakhali, Sunamgonj, Pabna, and Joypurhat areas were 4.03, 4.36, 4.30, 4.50, 4.44, 5.36, 4.23, and 4.06

1.2. Level of Education

Approximately 13% of the farmers lacked the basic education needed for everyday tasks, while 37% were completely illiterate. The level of education farmers in the chosen region up to Class 5, up to Class 8, and had passed their SSC, HSC, and degree were 23.1%, 15.8%, 9.2%, 3.5%, and 2.7% respectively (Table 2).

1.3 Farmer Occupations

In agriculture, 34.6% of household heads were engaged, making it the major occupation among the se-

Table 1.

Socio-economic status of the native chicken rearing farmers

District	Age (Mean±SE)	Family size (Mean ± SE)	Earning member (Mean±SE)	Dependency ratio	Farming Experience in year (Mean±SE)
Pabna	40.40 ± 1.15	4.23 ± 0.29	1.26 ± 0.12	3.35	5.65 ± 0.33
Rangpur	38.30 ± 0.98	4.03 ± 0.14	1.00 ± 0.00	4.03	6.44 ± 0.29
Joypurhat	39.23 ± 1.11	4.06 ± 0.20	1.20 ± 0.08	3.38	9.70 ± 0.68
Sherpur	46.86 ± 2.29	4.36 ± 0.26	1.33 ± 0.13	3.27	15.46 ± 1.50
Pirojpur	42.36 ± 1.98	4.50 ± 0.17	1.23 ± 0.07	3.65	16.92 ± 1.16
Feni	42.60 ± 2.05	4.30 ± 0.17	1.16 ± 0.06	3.70	13.18 ± 1.42
Sunamgonj	44.33 ± 1.60	5.36 ± 0.20	1.30 ± 0.08	4.12	10.32 ± 1.36
Patuakhali	39.62 ± 0.99	4.44 ± 0.14	1.18 ± 0.05	3.76	18.38 ± 0.70
Overall	41.55 ± 0.56	4.41 ± 0.07	1.20 ± 0.03	3.67	12.50 ± 0.45

Standard Errors (SE)

Table 2.
Educational level of selected farmers

Education level	Percentage (N)	Education level	Percentage (N)
Illiterate	13.1 (34)	SSC	9.2 (24)
Slightly educated	32.7 (85)	HSC	3.5 (9)
Up to class 5	23.1 (60)	Degree	2.7 (7)
Up to class 8	15.8 (41)	-	-

SSC: Secondary School Certificate, HSC: Higher Secondary Certificate

lected farmers. According to this survey, the primary occupation of household heads was 21.5% day laborers, 18.1% business, 10% service jobs, and 15.8% were engaged in other occupations (Table 3).

1.4 Farm Size and Native Chicken Raising Type

Three categories were used to classify the native chicken farms: small (<10), medium (>10), and large (>15). According to the survey, 36.9% of farmers

Table 3.
Occupations of native chicken farmers in the chosen regions

Occupation % (N)	Agriculture	Day laborer	Service	Business	Others
Primary	34.6 (90)	21.5 (56)	10.0 (26)	18.1 (47)	15.8 (41)
Secondary	33.8 (88)	10.8 (28)	-	1.5 (4)	35.4 (92)

%: Percentage, N: Number

raised less than ten chickens per family, 31.9% raised 10-15 chickens per household, and 31.2% raised more than 15 chickens per household (Table 4).

2. Households' Role in Native Chicken Production

All rural women in the research area reared native chickens with additional support by

Table 4.
Farm size and Native Chicken type

Farm Size	Percent (n)	Native Chicken type farm	Percent (n)
Small range (1-10)	36.9 (96)	Common deshi	95.0 (247)
Medium (11-15)	31.9 (83)	Hilly	2.3 (6)
Large (>15)	31.2 (81)	Naked neck and Common deshi	1.5 (4)
Total	100.0	Naked neck	1.2 (3)

N: Number

21.9% of girls, 8.8% of men, and 7.7% of boys (Table 5). Regarding food purchasing, the majority were men (52%), followed by women (20%) and both genders in 13.5% of cases. About egg sales, 40.4% was handled by women and 23.5% by men. Chicken sellers were 36.2% women. The majority of women (approximately 91.2%) saved money from selling eggs and chickens, while 4.6% of both genders jointly managed savings and 4.2% of men saved money from native chicken farming. In terms of household spending, 41.5% of both genders participated in spending. The average weekly egg consumption per family was found to be 4.59 ± 0.17 eggs.

a. Purpose of Native Chicken Rearing

Approximately 76.5% of farmers raised native chickens for both personal use and additional revenue, while 19.2% of farmers raised chickens for their own needs and 4.2% for income (Table 6).

3. Analysis of the demand and market value for native chicken

The highest average market value recorded in the current year in the Patuakhali district was 424.76 ± 12.65 BDT for roasters and 95.80 ± 3.19 BDT for chickens (Table 7). The Patuakhali district

Table 5.
Household's role in native chicken production

Contribution in NC Rearing	% (N)	Category	Man % (N)	Women % (N)	Both % (N)
Woman	100 (260)	Feed buyer	52 (173)	20 (52)	13.5 (35)
Man	8.80 (23)	Egg and NC seller	23.5 (61)	36.2 (94)	40.4 (105)
Boy	7.70 (20)	Keep money	4.20 (11)	91.2 (237)	4.60 (12)
Girl	21.9 (57)	Spent money	32.7 (85)	25.8 (67)	41.5 (108)

SE: Standard Errors, %: Percentage, N: Number, NC: Native Chicken.

likewise had the highest average market value of roasters the previous year which was 390.18 ± 12.72 BDT for chicken and 80.50 ± 3.27 BDT for roasters. However, the Rangpur district had the highest average market value of hens, 346.50±3.93 BDT in the current year and 313.63 ± 4.19 BDT in the previous year. Conversely, Su-

namgonj had the lowest average market value for roasted chicken 266.83 ± 22.49 BDT, while the market value of hens was 264.33 ±3.66 BDT in Sherpur and chickens was 47.33 ± 3.79 BDT in the Joypurhat district in the current year. The lowest market values for roasters (210.50 ± 27.74 BDT), hens (193.83±25.7 BDT), and chickens (31.33 ± 4.25) were recorded in the Pirojpur district the year before. In 2023, the market prices for chickens were as fol-

Table 6.
Purpose of native chicken rearing and data recorded by farmers

Purpose of rearing Native chicken	Percent (N)
Own need	19.2 (50)
Extra income	4.2 (11)
Both (family need + extra income)	76.5 (199)
Data record on DOC weight, weight gain, and egg production (%)	1.5 (4)

DOC: Day Old Chick, N: Number

Table 7.
Average market value of native chicken in the chosen regions

Location	Average market value of native chicken (Mean±SE) (BDT)					
	Previous year			Present year		
	Roaster	Hen	Chicken	Roaster	Hen	Chicken
Pabna	306.89 ± 7.03	282.16 ± 5.97	46.66 ± 1.99	341.00 ± 7.82	325.50 ± 5.01	58.00 ± 3.90
Rangpur	317.16 ± 4.43	313.63 ± 4.19	68.90 ± 1.21	339.50 ± 12.44	346.50 ± 3.93	76.00 ± 2.77
Joypurhat	327.33 ± 12.34	263.33 ± 9.87	43.33 ± 2.85	333.33 ± 25.07	303.63 ± 3.73	47.33 ± 3.79
Sherpur	235.83 ± 20.10	239.66 ± 3.10	41.33 ± 4.71	293.16 ± 18.70	264.33 ± 3.66	53.00 ± 4.77
Pirojpur	210.50 ± 27.74	193.83 ± 25.7	31.33 ± 4.25	283.83 ± 23.69	312.83 ± 5.85	74.33 ± 14.89
Feni	301.16 ± 11.68	267.66 ± 5.56	52.33 ± 2.28	291.66 ± 21.82	291.00 ± 6.07	63.33 ± 2.59
Sunamgonj	276.96 ± 14.34	243.13 ± 1.62	45.33 ± 3.06	266.83 ± 22.49	271.83 ± 11.48	59.66 ± 3.26
Patuakhali	390.18 ± 12.72	282.40 ± 6.00	80.50 ± 3.27	424.76 ± 12.65	302.18 ± 5.99	95.80 ± 3.19
Overall	**303.01 ± 6.36**	**262.39 ± 4.35**	**53.46 ± 1.51**	**329.68 ± 7.20**	**302.22 ± 2.66**	**68.23 ± 2.28**

SE: Standard Errors, BDT: Bangladeshi Taka

lows: roaster 329.68 ± 7.20 BDT, hen 302.22 ± 2.66, and chicken 68.23 ± 2.28 BDT.

a. Demand Analysis of Native Chicken

The primary source of native chicken purchases is from farms or the home of a native chicken rearing farmer (58.8%), followed by neighbors (26.7%) and wholesalers (14.2%) shown in Table 8. Due to the fair market price, 40% of farmers favoured broiler chicken, while 30.8% preferred native chicken. In the studied locations, 1.9% of farmers favoured Layer chicken and 27.3% desired Sonali. We found that 64.4% of farmers chose native hens with an average marketable weight of about 1 kg or more. Of them, 18.8% wanted 900 g and 16.2% chose 750 g. The value chain of native chicken is influenced by different stakeholders related to the direct decision of this business. According to the value chain, 36.5% of farmers eat native chicken largely for its flavour, with 21.9% and 41.5% prefer-

ring it for roasting and health reasons, respectively (Table 8).

b. Demand Analysis of Eggs in the Market

In the study areas, most of the consumers (46.9%) preferred brown-shelled eggs, followed by native chicken eggs (28.1%), white-shelled eggs (18.1%), and duck eggs (6.9%) as presented in Table 9. The exorbitant cost of native breeds and their eggs was the cause. For duck eggs, the highest market price was recorded at 63.91 ± 0.52 BDT/hali, while it was 61.07 ±0.58 BDT/hali for native chicken eggs. However, the market price for brown-shelled eggs was 46.82 ± 0.31 BDT/hali, whereas the price for white-shelled eggs was 41.12 ± 0.26 BDT/hali. Most subjects (53.8%) who favoured eating native chicken eggs were pregnant women (22.3%) and children (20%). In addition, 3.8% of elderly individuals favoured native chicken eggs. We observed that 53.8% of patients said they would rather eat native chicken eggs, compared to 22.3% of

Livelihood and Challenges in Native Chicken Farming

Table 8.
Sources of Native chicken and their demand in the selected areas

Source of buying	Percent (N)	Demanded chicken type	Percent (N)	Avg. marketable weight	Percent (N)	Value chain	Percent (N)
Farm	58.8 (150)	Native chicken	30.8 (80)	750 g	16.2 (42)	Roast	21.9 (57)
Neighbor	26.9 (70)	Broiler	40.0 (104)	900 g	18.8 (49)	Healthy	41.5 (108)
Wholesaler	14.2 (37)	Sonali	27.3 (71)	1 kg/Above	64.6 (168)	Tasty	36.5 (95)
-	-	Layer	1.90 (5)	-	-	-	-

N: Number

pregnant women and 20% of toddlers. Furthermore, 3.8% of elderly individuals said that they desired native chicken eggs because they were organic, high in nutrients, and could be considered a healthful diet.

4.Cost of managing and rearing native chickens

Rangpur district had the greatest total costs for raising and managing native chickens at 9742.67 BDT/year, while Joypurhat district recorded the lowest total expenses at 5018.47 BDT/year. The district of Pirojpur had the most cost participation (1620.47 BDT/year) for purchasing chicks, while in the Joypurhat district was 842.5 BDT. Patuakhali had the lowest cost involvement of 138 BDT/year for vaccination and medication, while farmers in Rangpur spent the most for vaccine and medication (1206.66 BDT/year).

In the Pirojpur district, individual farmers spent

Table 9.
Market demand and consumer preferences for egg in the selected areas

Demanded egg type	Percent (N)	Demanded egg price	BDT/hali Mean ± SE	Consumer type of NC egg	Percent (N)
White Egg	18.1 (47)	White Egg	41.12±0.26	Patient	53.8 (140)
Duck Egg	6.9 (18)	Duck Egg	63.91±0.52	Pregnant	22.3 (58)
NC egg	28.1 (73)	NC egg	61.07±0.58	Children	20.0 (52)
Brown Egg	46.9 (122)	Brown Egg	46.82±0.31	Old	3.8 (10)

N: Number, SE: Standard Errors, NC: Native Chicken

Table 10.
Principal costs associated with raising and managing native chickens in the chosen regions

Average income generation (BDT/year) of farmers from native chicken rearing and production (mean)								
Parameters	Pabna	Rangpur	Joypurhat	Sherpur	Pirojpur	Feni	Sunamgonj	Patuakhali	Overall
Chick price	916.4	1102	842.5	1007	1620.47	1121	1097.87	1586.24	1194.34
Vaccine and Medicine cost	1107.33	1206.67	706.67	190.00	515.00	395.00	373.33	138.00	545.08
Veterinary Service Fee	40.00	0.00	23.33	6.67	160.00	116.67	16.67	0.00	41.92
Disinfectant cost	0.00	0.00	19.33	0.00	16.67	13.33	10.00	94.40	25.00
Feed cost	4018.00	5106.67	3183.33	5746.67	4886.67	4766.67	3980.00	4523.60	4526.23
Litter cost	15.00	0.00	0.00	0.00	0.00	0.00	33.33	6.00	6.73
Labor cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Housing cost with 10% Depreciation	405.93	430.67	226.67	362.07	323.07	287.67	303.83	277.79	323.41
Miscellaneous cost	1875.00	1896.67	16.67	33.33	0.00	0.00	0.00	0.00	440.96
Gross Cost	8377.67	9742.67	5018.47	7345.73	7521.79	6700.27	5814.91	6625.94	7103.62

BDT: Bangladeshi Taka

a maximum of 160 BDT for veterinary services per year, while farmers in the Feni and Pabna districts paid 116.67 BDT and 40.00 BDT, respectively, for the same services. One of the main challenges was the high feed cost. For example, in the Sherpur district, annual feed cost reached 5746.67 BDT, whereas in the Joypurhat district comparatively lower feed cost of 3183.33 BDT/year was found.

Furthermore, there were no expenses associated with labor, transportation, or electricity for rearing and managing native chickens in the research areas. The Rangpur district recorded the highest housing cost of 430.67BDT/year with 10% depreciation, while the Joypuhat district recorded the lowest cost of 226.67BDT/year for a native chicken house. Additional expenses associated with raising native chickens were discovered to be 1896.67 BDT per year in the Rangpur and 1875.00 BDT per year in the Pabna district. The principal costs associated with rearing and managing native chickens in the chosen regions are shown in Table 10. Expenses related to veterinary service, veterinarian fees, litter, and disinfectant costs were minimal because only a small number of farmers invested on these items.

5. Income Generation via the Production and Raising of Native Chickens

The main sources of revenue from native chicken production are presented in Table 11. The Patuakhali district recorded the highest overall income at 17,308.20 BDT per year, while the Joypurhat district reported the lowest at 9,200.67 BDT per year. In terms of income from the sale of native chickens

specifically, farmers in Patuakhali earned a maximum of 6,492.20 BDT annually, whereas the lowest income from chicken sales was recorded in Pabna, at 3,583.33 BDT per year.

Farmers in Pirojpur earned the highest income from selling native chicken eggs, with an annual average of 3,378.67 BDT, while farmers in Joypurhat earned the least, at only 216.67 BDT per year. In Patuakhali, individual farmers earned the highest income from selling chicks, at 40.00 BDT annually. The highest household consumption of native chickens was valued at 4,184.00 BDT per year in Patuakhali, which also recorded the lowest values for gifts (58.00 BDT) and closing stock (1,466.00 BDT). In contrast, Joypurhat had the lowest household chicken consumption, valued at 1,760.00 BDT annually.

Regarding egg consumption, the highest annual household value was observed in Feni (2,070.00 BDT), while the lowest was recorded in Sherpur (640.00 BDT). Pabna reported the highest value for gifted native chickens at 2,052.67 BDT per year, whereas Sherpur had the highest value from closing stock at 2,686.67 BDT per year. Across all the surveyed regions, there was no significant revenue generated from the sale of native chicken litter

6. Net Benefit and Benefit-Cost Ratio (BCR)

The Patuakhali district recorded the highest net income at 10,682.30 BDT and the highest Benefit-Cost Ratio (BCR) of 2.61. In contrast, the Rangpur district had the lowest BCR, at 1.56. Across all selected locations, the average net benefit was 7,586.70 BDT, with an overall BCR of 2.07. Two key indicators used

Table 11.
Income generation via the production and selling of poultry and their products

Category	Average income generation (BDT/year) of farmers from Native chicken rearing and production (Mean)								
	Pabna	Rangpur	Joypurhat	Sherpur	Pirojpur	Feni	Sunamgonj	Patuakhali	Overall
Chicken sell	3583.33	4580.00	4733.33	4666.67	5680.67	5863.33	5920.00	6492.20	5290.12
Egg sells	1882.00	1966.67	216.67	423.33	3378.67	3233.33	2246.67	3324.40	2179.38
Chick sell	0.00	0.00	0.00	0.00	10.00	23.33	10.33	40.00	12.73
Family consumed Chicken value	2273.33	2790.00	1760.00	3740.00	3416.67	3470.00	3040.00	4184.00	3168.85
Family consumed Egg value	1647.60	1406.67	640.00	743.33	1943.33	2070.00	1651.67	1743.60	1500.99
Gift value	2052.67	2020.00	0.00	226.67	133.33	480.00	475.00	58.00	632.81
Selling Liter	0.00	0.00	33.33	0.00	66.67	0.00	0.00	0.00	11.54
Closing stock value	2119.33	2503.33	1850.67	2686.67	1596.67	1644.00	1670.00	1466.00	1905.46
Gross Income	13558.27	15266.67	9200.67	12486.67	16159.33	16784.00	15013.67	17308.20	14690.34

Bangladeshi Taka (BDT)

to assess the profitability of native chicken production are gross revenue (benefit, B) and total expenditure (cost, C). Among all regions, the Joypurhat district had the lowest net income, at 4,182.20 BDT. Detailed figures on net benefits and Benefit-Cost Ratios for native chicken farmers in the study areas are presented in Table 12.

7. Contribution of Native Chicken Farming to Family Income

As shown in Table 13, the highest contribution of native chicken farming to annual household income was observed in Pabna, at 13.83%, followed by Patuakhali (10.87%) and Rangpur (10.32%). The lowest contribution was recorded in the Feni district, at 4.84%. On average, the total annual family income across all regions was 188,623.07 BDT, of which 14,690.34 BDT came from native chicken farming.

8. Production function analysis

A multiple regression model was employed to estimate the factors influencing income or profit generated from rearing native chickens in selected areas. A total of ten (10) independent variables were considered in the analysis. Among them, seven (7) variables were identified as key contributors significantly affecting the production process, while three (3) variables were statistically non-significant based on t-statistics. The results of the multiple regression analysis on native chicken rearing are presented in Table 14.

(A) Interpretation of the estimated model

From the production function analysis, it was found that the family size, chick price, vaccine and medicine expenses, veterinary service fees, disinfectants, feed expenses, and litter significantly affected the gross returns and profit of the native chicken production.

Family size (X1): The estimated value for the coefficient of family size was 0.112 for native chicken-rearing farmers which was significant at a 5% level probability level. There was a positive relationship between family size and the gross return and indicating a 5% increase in family size on average led to 11.2%

Table 12.
Net benefits and benefit-cost ratio of native chicken growers in the chosen areas

parameters/ Variables	Pabna	Rangpur	Joypurhat	Sherpur	Pirojpur	Feni	Sunamgonj	Patuakhali	Overall
Gross Income (GI) BDT/year	13558.27	15266.67	9200.67	12486.67	16159.33	16784.00	15013.67	17308.20	14690.34
Gross Cost (GC) BDT/year	8377.67	9742.67	5018.47	7345.73	7521.79	6700.27	5814.91	6625.94	7103.62
Net Income BDT/year	5180.60	5524.00	4182.20	5140.90	8637.50	10083.73	9198.80	10682.30	7586.70
BCR	1.62	1.57	1.83	1.70	2.15	2.50	2.58	2.61	2.07

Bangladeshi Taka (BDT), Benefit Cost Ratio (BCR

Table 13.
Contribution of Native chicken farming in Family income

Parameters	Income/year from NC	Total Family Income (BDT/year)	Income (%) from NC in total family income
Pabna	(BDT)	98000	13.83
Rangpur	13558.27	147900.00	10.32
Joypurhat	15266.67	157566.67	5.84
Sherpur	9200.67	196633.33	6.35
Pirojpur	12486.67	222866.67	7.25
Feni	16159.33	346766.67	4.84
Sunamgonj	16784	199600	7.52
Patuakhali	15013.67	159240	10.87

Bangladeshi Taka (BDT), Native Chicken (NC), Percentage (%)

rise in the gross return and profit of native chicken farmers.

Chick price (X2): It is evident from Table 14 that the regression coefficient of the chick price was estimated as 0.25 for native chicken which was significant at 1% probability level. Therefore, there was a positive relationship between the chick price and gross return. With other variables being constant, 1% increase in the chick price on average led to a rise of 25% in gross return for native chicken rearing farmers,.

Vaccine and medicine expenses (X3): In the case of vaccine and medicine expenses, the coefficient was 0.149 for the sampled farmers which was significant at 5% probability level. Consequently, vaccine and medicine expenses had a positive relationship with gross return.

That showed a 5% increase in vaccine and medicine expenses on average led to 14.9% rise in gross return from native chicken farming with other variables being constant. This specified that the farmers who used vaccination and medicine for their native chicken got 16.4% more profit than the farmers who did not use vaccine and medicine.

Veterinary service fee (X4): The estimated value of the coefficient of veterinary service fee was 0.220 for native chicken-rearing farmers, which was significant at 1% probability level. This value implied that the respondents who received veterinary services got 22% more profit than the respondents who did not receive any veterinary services.

Feed cost (X6): It is evident from Table 13 that the coefficient of the feed cost was estimated as 0.443 for native chicken rearing farmers which was significant at a 1% probability level. Therefore, there was a positive relationship between feed cost and gross return, showing that 1% increase in the feed cost of the farmers, on average, led to 44.3% rise in gross return, remaining other variables constant.

Litter cost (X7): In the case of litter cost, the coefficient was 0.067 for the sampled farmers, which was significant at a 10% probability level. Therefore, litter cost and gross return had a positive relationship, indicating that 10% increase in litter cost, on average, led to 6.7% rise in gross return for native chicken rearing farmers, holding other variables unchanged.

Value of R2: The estimated value of the coefficient of multiple determinations, the R2 value of the adjusted model was 0.462, which indicated that about 46.2% of the total variation in gross return under native chicken rearing farmers could be explained by the variables included in the model. In other words, 53.8% of the total variation in the gross return was unexplained due to the variables that were not included in the model.

Value of adjusted R2: The estimated value of the adjusted R2 of the model was 0.441 for native chicken rearing farmers (Table 14). Here, adjustment is for the degrees of freedom (Gujarati, 2003). This value indicated that about 44.1% of the total variation in the gross return under native chicken farming was explained by the variables included in the model considering the degrees of freedom.

F-count: The F-statistic was estimated for the overall significance of the estimated model. The F-count of the derived model was 21.407. This value was highly significant at 1% probability level implying that all the explanatory variables included in the model were important for explaining the variation in gross return and profit for native chicken rearing.

(B) Multi-Collinearity Analysis

The multi-collinearity test aimed to test whether the regression model found a correlation between the independent variables or not. For this test, the value of the correlation coefficient (r) between the independent variables was considered. According to Gujarati (1999), multi-collinearity occurs if the value of the correlation coefficient between independent variables is greater than 0.85. The value of the correlation coefficient between the independent variables is presented in Table 15. The analysis results of the multi-collinearity in Table 15 showed that the value of the correlation coefficient between the independent variables was less than 0.85. Conequetly, the data did not show multi-collinearly

Table 14.
Multiple regression analysis

Independent Variables	Regression Coefficients	t-count	Sig.
(Constant)	4379.239	2.624	0.009***
Farmer's age	-0.049	-1.018	0.310
Family size	0.112	2.335	0.020**
Chick price	0.250	5.053	0.000***
Vaccine and Medicine cost	0.149	2.131	0.034**
Veterinary Service Fee	0.220	4.570	0.000***
Disinfectant cost	0.118	2.315	0.021**
Feed cost	0.443	8.316	0.000***
Litter cost	0.067	1.421	0.156*
Housing cost with 10% Depreciation	-0.014	-0.275	0.784
Miscellaneous cost	-0.019	-0.258	0.796
F-count	21.407		0.000***
Adjusted R Square	0.441		
R-Square	0.462		
Y=Profit			

Figures in the parentheses indicate the significance level; ***, p<0.01; **, p<0.05; *, p<0.1.

Table 15.
Multi-Collinearity Analysis

Multi-Collinearity Analysis									
	X1Logs	X2logs	X3Logs	X4Logs	X5Logs	X7Logs	X8Logs	X9Logs	X10Logs
X1Logs	0.00	0.00	0.00	0.02	0.00	0.25	0.00	0.11	0.00
X2Logs	0.00	0.00	0.00	0.01	0.40	0.02	0.00	0.27	0.00
X3Logs	0.00	0.00	0.00	0.00	0.28	0.12	0.00	0.57	0.00
X4logs	0.00	0.00	0.01	0.03	0.26	0.46	0.00	0.00	0.00
X5Logs	0.00	0.00	0.00	0.35	0.02	0.06	0.09	0.01	0.26
X6Logs	0.00	0.01	0.30	0.00	0.03	0.00	0.33	0.01	0.32
X7Logs	0.00	0.05	0.10	0.38	0.00	0.07	0.51	0.00	0.08
X8Logs	0.07	0.16	0.43	0.18	0.00	0.01	0.01	0.02	0.28
X9Logs	0.39	0.60	0.01	0.01	0.00	0.01	0.05	0.00	0.00
X10Logs	0.54	0.17	0.15	0.02	0.01	0.00	0.01	0.00	0.05

or there was no relationship between the independent variables. Hence, the classical assumptions were satisfied.

9. Restrictions on the production and rearing of native chickens

Farmers face several obstacles when rearing and producing native chickens. According to field survey data, the majority of farmers (80.4%) had to deal with

Table 16.
Principal constraints regarding native chicken rearing

Category	Income/year from NC
Lack of good quality chicks	28.5 (74)
Outbreak of diseases	80.4 (209)
Chicks' death rates are high	51.2 (133)
High price of one-day chicks	6.2 (16)
Unavailability of native chick	3.50 (9)
Unavailability of Govt. Vaccines	39.6 (103)
Higher price of poultry feed	48.8 (127)
predatory animals attack	80.4 (209)
Lack of vaccine	60.8 (158)
Profit not guaranteed	3.10 (8)
Problem of thief	22.3 (58)

Number (N)

Table 17.
Perspectives of farmers on how to address issues and limitations about the management and rearing of native chickens

Category	Percent (N)
Needs to make a trap to save chicken from predator animals	32.7 (85)
The authorities should arrange training programs for poultry farmer	52.7 (137)
Govt. / Bank officials should provide loans for small farmers/entrepreneurs.	37.3 (97)
Govt. vaccine supply should be available and free of cost	53.5 (139)
The authorities should encourage farmers in poultry farming	55.8 (145)
Good quality chick supply should be available to the farmers	71.5 (186)
Need sufficient knowledge about poultry disease and poultry rearing method	22.7 (59)

Number (N)

disease outbreaks and predator attacks, and 60.8% experienced a shortage of vaccines in the research areas. Among the surveyed producers, 51.2% reported high chick mortality, while 48.8% mentioned the very high cost of feed as constraints. Furthermore, 39.6% reported that government-provided vaccines were unavailable for native chicken. According to the results, 28.5% of farmers cited the lack of access to high-quality chicks for raising, 22.3% theft, and 6.2% the high price of DOC. A smaller proportion of farmers (3.5%) stated that DOCs were unavailable, and 3.1% reported that native chicken farming often did not ensure profit.

10. Perspectives of farmers on resolving issues and limitations

To address the limitations and difficulties, about 71.5% of farmers requested a supply of high-quality chicks, 55.8% suggested that the authorities should encourage farmers to engage in poultry farming,

52.7% demanded a training program on native chicken rearing and management, 53.5% vaccines provision by government, 37.3% nedded loans or other incentives for native chicken rearing, and 32.7% opined to protect their chickens from predator animals. From survey findings, 22.7% of farmers stated that they did not know about managing chicken diseases and rearing chicks.

Discussion

These findings are quite comparable to those of [5], who reported that the mean age of chicken farmers was 37.95±0.77 years. The largest household size is 5.36 in Sunamgonj, which was in line with the [6] report. The lowest household size is 4.03 in Rangpur, which differs slightly from the findings of BBS as the lowest household size is 4.00 in the Rajshahi division. This discrepancy may be attributed to the limited number of survey locations and variations in sample size. In the surveyed regions, the average number of earning members per household was 1.20 ± 0.03, with a dependency ratio of 3.67.

In the case of education, the findings are consistent with those of [7], who reported that 31.25% of individuals have an education that helps them manage their farms, 16.35% have completed SSC or above, 6.25% have completed higher education, and 33.75% are illiterate. These results were marginally lower than that of the BBS 2022 report, which indicated that nationally, 74% of people were literate and 26% were illiterate. According to [5], 9% of farmers did not go to school. This was due to the limited sample size and the random data collection from local households engaged in native chicken farming.

In agriculture, the head of the household works 34.6%, which is comparable to the 36.50% reported in the study [5]. This figure differed from the report of [5] who stated that the predominant occupation was day labor (19.50%) and others for 4.50%. According to their findings, the majority of family poultry farmers (43%) worked primarily in the agriculture sector, with the remainder in business (20%), services (10%), and other occupations (27%).

The research conducted by [8] stated that 58.33% of farmers in Sylhet raised 0-15 checkens per family, while 41.67% of farmers raised more than 15 chickens. Meanwhile, [9] reported that 98.75% of rural women reared small flocks (5-13 chickens) and 1.25% raised large flocks (21-29 chickens) because mothers had little children. About 95% of farmers reared common deshi chicken and the rest reared hilly (2.3%), naked neck (1.2%), and both naked neck and common deshi chicken (1.5%). [10] stated that the mean monthly intake of chicken for a family was 1.15±0.03, which was more than 6.02±1.61 chickens where a household consumes annually.

These data on women's contribution was very similar to that of [9], who reported that the majority of rural women (88.75%) raised backyard chickens as a source of income, followed by both (11.25%) a source of income and own consumption. A report by [11] stated that households kept poultry primarily for income generation (55%) and home consumption (22%). Halima *et al.* reported that the objectives of rearing village chicken in Ethiopia is income generation and household consumption [12]. In contrast to the current study, [13] said that the primary purpose of hens for farmers is to provide meat and eggs for domestic use.

Furthermore, the research areas found higher market value for roaster, hen, and chick than in the previous year. This scenario was comparable to that of [14] who found that the price of an adult chicken ranged from BDT 320 to BDT 370. This study was comparable to [10] who discovered that selling eggs and chicks was directly from households in 72.4% cases and via the village market in 27.6%. According to [15], approximately 48.96% of participants sold their chicken goods in the village market, 5.21% at nearby retailers, 22.92% at their doorstep, 3.13% as entire sellers, and 19.79% at home. According to [16], 50% of farmers incubate chicken eggs for newborn chicks. In addition, 18% and 32% of farmers travel to the market and neighbours. According to [17], bird sources possess 77.65%, sell 55.88%, and have a neighbouring in 1.18%. These results contrasted with those of [15], who found that consumers preferred exotic (17.71%), local (55.21%), and equal breeds of meat and eggs (27.08%). [18] stated that the producer-level egg price was found to be BDT 8.13 for local hens, BDT 9.65 for ducks, and BDT 7.69 for layers, which was in line with the findings of the current investigation.

Results of Rajsahi relate by [19], who indicated a net income of 3207; [14] reported an annual net return of BDT 3705.95, which was less than the current study. The BCR values were 1.25 relevant to [19], which was 1.24. The family poultry produced 1.90 BCR according to [14]. The BCR illustrates the financial viability of farm. A high BCR shows that rearing chickens as a family is a lucrative endeavor. According to [20], BCR was 5.57, which was greater than the present study. The difference in income results from the time frame because the paper was published ten years ago by [21]. The contribution of native chicken farming to family income was 7.79%. Native chickens play a great role for family income in different areas of Bangladesh.

This result was connected to the findings of [15],

who found that 34.38% of the respondents indicated the prevalence of illness, 18.75% reported predator assaults, and 17.71% claimed the lack of instruction regarding poultry management techniques. The remaining respondents brought up the following issues: theft (3.13%), lack of marketing, lack of money for beginning (9.38%), and the unavailability of veterinary services (12.50%). In 2023, Chowdhury *et al.* discovered that 22.5% of farms had lower egg prices, 10% had lower meat prices, 15% lacked training facilities, 25% had technical issues, 10% had housing issues, 32.5% had marketing issues, and 65% had economic issues [7]. According to [22], the majority of families (88.79% in Chapai Nawabganj and 83.80% in the Sylhet region) identified several significant challenges, such as the death of baby chicks by predators, the lack of vaccination, and the damage caused by chickens to cultivated crops. [17] reported that the death rate from predator attacks was 8.82%, the death rate from disease was 54.12%, and the death rate was 37.06%. In this regard, [16] reported the main issues with backyard chicken keeping the use of backdated techniques, the lack of feed, improper housing facilities, a high frequency of illness, a shortage of vaccines and medications, and predator attacks. The main obstacles to backyard poultry production, according to [23], were disease (38.1%) and predators (23.1%). Moreover, [24] reported 33.1% disease incidence and 12% predators in East Shewa, Ethiopia. A report by [25] showed 100% higher disease incidence and 89.17% predator attack in the Bhandara district of Maharashtra, India. [26] showed that poor housing (44.86%), unreliable and disorganized marketing system (12.78%), the lack of capital (41.86%), institutional credit facilities (47.89%), disease outbreak (16.02%), feed scarcity (8.86%), the lack of training and extension services (6.07%), and the lack of sufficient vaccines and medications (5.56%) were the main causes of chicken rearing in the native environment.

These results were also in line with [16], who suggested that high-yielding deshi bird varieties needed to be available, village women should participate in training programs on managing and rearing poultry, farmers should be able to afford feed, medicine, and vaccinations, and extension and motivational work should be practiced. According to [26], the development of poultry enterprises depended on the improvement of breeds through appropriate breeding methods (33.4%), proper vaccination programs (25.03%), proper management and veterinary training for farmers (16.05%), organized markets for buying and selling (7.50%), assurance of an easy bank loan system (7.90%), and low-cost processed feed (8.50%).

Materials & Methods

Study areas and duration

Pabna, Rangpur, Feni, Sherpur, Pirojpur, Patuakhali, Joypurhat, and Sunamgonj were eight districts from six divisions of Bangladesh, which were chosen for data collection from June 2023 to December 2023.

Data collection

A baseline survey was conducted to learn more about the issues faced by local chicken producers in the chosen regions of Bangladesh, as well as their gross production cost and revenue using a pre-designed questionnaire. Interviewers personally questioned the chosen farmers to collect primary data. Thirty different types of questions regarding poultry farming in the households of 260 farmers, 50 from Patuakhali and the remaining from other districts, were gathered through a field study that involved the first-hand observation and interviews of farmers. Secondary data might be found in several places, such as books, theses, papers, journals, government documents, and Bangladesh's statistics yearbooks. Details included the BCR, issues, native chicken marketing status, production and consumption of poultry meat and eggs, and farmer demographics.

Statistical analysis

Collected data were entered, sorted, compiled, tabulated, and organized into a Microsoft Excel sheet. Next, data were statistically analyzed by Statistical Package for the Social Sciences (SPSS) version 25. All data were then tabulated using descriptive statistics, such as frequency distribution, percentage, mean, and standard error value for further interpretation.

For calculating net return, we used the following formula:

Net return=GR-GC (Where, GR is gross return and GC is gross cost)

To calculate the BCR, we used the following formula:

$$\text{Benefit-Cost Ratio} = \frac{\text{Gross return (GR)}}{\text{Gross cost (GC)}} \quad \text{......................... (1)}$$

The gross return includes the average return from the main product and by-products of native chicken. Gross cost entails the total cost of native chicken rearing. The BCR was a relative measure used to compare benefit per cost. It helped to analyze the financial efficiency of the farms. The multiple regression model was used to determine the effects of key variables. The completion of the relationship between Y and X was by regression, such as the variation of Y that was affected by the variation of X with an estimation model using the simple multiple regression method, which can be written as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_i \quad \text{............... (2)}$$

Where, Y=Profit of native chicken farmers (BDT/year)

a=Constant

b=Regression coefficient

X_1=Age of Farmer

X_2=Family Size

X_3=Cost of chicken purchasing

X_4=Cost of Vaccine and Medicine

X_5=Cost of Veterinary Service

X_6=Cost of Disinfectant

X_7=Cost of Feed

X_8=Cost of Litter

X_9=Cost of Housing

X_{10}=Miscellaneous Cost

e_y=Disturbance factors

The equation is converted into a multiple linear form by the logarithm of the equation to make it easier to estimate the equation above. The logarithmic form of the equation is:

$$\text{Log } Y = \text{Log } a + b_1 \log X_1 + b_2 \log X_2 + ... b_6 \log X_6 + u \quad \text{............... (3)}$$

The multi-collinearity test was applied to analyze multiple regression consisting of two or more independent variables (X1, X2, X3, X4,…, Xn), in which the degree of association of the relationship or influence between the independent variables would be measured through the magnitude of the correlation coefficient (r). Multi-collinearity occurred if the coefficients between the independent variables (X1 and X2, X2 and X3, X3, and X4) were greater than 0.60 (other opinions were 0.50 and 0.90). Multi-collinearity did not occur if the correlation coefficient between independent variables was less than or equal to 0.60 (R2 depicted that there were no symptoms of multi-linearity, but if r2 < R2, it showed the model contained multi-clinical issues [27].

Authors' Contributions

This research was carried out with the collaboration of all authors. Syidul Islam designed the study, wrote the protocol, collected the data, and wrote the manuscript. Sharmin Sultana and Md. Ashraful Islam helped with data collection and manuscript writing. Dr. Shamim Ahmed helped in writing the manuscript. Dr. Razia Khatun provided support and guidelines for writing this article. All authors read and approved the final manuscript.

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Conflict of interest

The authors have no competing interests to declare.

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