Research Article

Title: An assessment of livelihood status, profitability and obstacles faced in native chicken farming in some selected areas of Bangladesh

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Keywords

Native chicken, market demand, Benefit Cost Ratio, Constraints, Profitability

Abstract

The research aimed to understand the livelihood status of native chicken farmers in Bangladesh, their rate of profitability, constraints, and their opinions on addressing these issues. Primary data were collected by a random sample of 260 native chicken-rearing farmers across 6 divisions in Bangladesh. The majority of farms (36.9%) were in the small (1–10) category followed by medium (11–15) and large (>15) farms (31.9%). Common deshi hens were observed at almost 95.0% of the farmer's level. Market prices in different categories of chicken in 2023 were for roaster cases 329.68±7.20 BDT, hen 302.22±2.66 BDT, and chick 68.23±2.28 BDT. The market prices for duck eggs, native chicken, brown-shelled and white-shelled eggs ranged from 63.91±0.52 to 61.07±0.58 BDT / hali respectively. The Patuakhali district had a significantly higher benefit-cost ratio (BCR) of 2.61, while Rangpur had the lowest at 1.57. The contribution of native chicken farming to family income was 7.79% Multiple Regression model revealed that almost all variables were influenced by income from native chicken farming except rearing cost. The major constraints were an outbreak of disease and predatory animal attacks mentioned by 80.4% of farmers. In conclusion, native chicken farming is profitable.

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Abbreviations

GR=Gross return	GC=Gross cost
BCR= Benefit Cost Ratio	n= Number
%= Percentage	SE= Standard Error of Mean
SSC= Secondary School Certificate	HSC= Higher Secondary Certificate
NC= Native chicken	BDT= Bangladeshi Taka

Introduction

Bangladesh, a heavily populated nation, has a strong agricultural foundation, with rural regions accounting for 68.49% of the total population [1]. The average per capita income is only $2824, and most individuals work in crops, fish, and livestock, with domestic and foreign poultry becoming more common. Poultry is a crucial agricultural sector in Bangladesh, providing economic services to humans and allowing birds to reproduce freely. In Bangladesh's rural areas, backyard poultry farming is a traditional method of raising chickens that supports family economies and provides food for subsistence [2].It is raised for commercial purposes, assisting farmers in creating jobs, earning money, and contributing to a poverty-free and healthy society. In Bangladesh, the poultry sector is crucial to create employment, national income, human

nutrition, and revenue earning. Most people are realizing the value of chicken as a source of income for marginal and landless farmers, especially women [3]. In developing countries, poultry meat and eggs contribute approximately 20% of the dietary protein [4]. The native chicken was raised by rural farmers. Some obstacles have an impact on domestic chicken production. One of the obstacles is Disease prevalence that varies on climate change, management, vaccination and deworming, societal awareness, etc. in a given location. Although several obstacles are preventing native chicken farming from growing in Bangladesh, it is a lucrative industry that gives rural women in the community a source of income. The purpose of this study is to learn more about the financial situation, profitability rate, and challenges faced by local chicken growers. We also made an effort to identify the answer that the farmer required to grow his local poultry farming enterprise. The purpose of this study is to offer data about 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 the rest of the 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 Farmer's socioeconomic situation

The socioeconomic status of farmers in the selected regions is shown in Table 1 shows. The average age of the farmers in the surveyed region ranged from 38.30±0.98 to 46.86±2.29 years. The average family size in the Rangpur Sherpur, Feni, Pirojpur, Patuakhali, Sunamgonj, Pabna, and Joypurhat areas is 4.03, 4.36, 4.30, 4.50, 4.44, 5.36, 4.23, and 4.06 respectively. These numbers are very similar to the average family size in the Barishal, Sylhet, Rajshahi, Rangpur, and Mymensingh divisions which was 4.38, 5.25, 4.00, 4.10, and 4.39 respectively.

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Table 1: Socio-economic status of the Native Chicken (NC) rearing farmer

Upazila	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)

1.2 Level of Education

The necessary education for everyday tasks about 13% of farmers lacked and 37% were entirely 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).

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Table 2: Educational level of selected farmers

Education level	Percentage (%)	Education level	Percentage (%)
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)	-	-

Secondary School Certificate (SSC), Higher Secondary Certificate (HSC)

1.3 Farmer Occupations

In agriculture, the head of the household works 34.6%, which was major occupation among the selected farmer. According to this survey, the major occupation of the head of the household was 21.5% day labor, 10.0% service, 18.1% business, and 15.8% other showed in Table 3.

Table 3: Native chicken farmers' occupations in the chosen regions

Occupation % (n)	Agriculture	Day labor	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 (%), Number (n)

1.4 Farm Size and Native Chicken Raising Type

Three categories were used to classify the native chicken farms: short (<10), medium (>10), and large (>15). According to this survey, 36.9% of farmers raised less than ten chickens per family, 31.9% raised native chickens between 10 and 15 chickens per household, and 31.2% raised more than 15 chickens per household (Table 4).

Table 4: Farm size and Type of Native chicken rearing farmers' status

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 & Common deshi	1.5 (4)
Total	100.0	Naked neck	1.2 (3)

Number (n)

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2. Households' Role in Native Chicken Production

All rural women (100%) reared native chickens with the supporting help of 21.9% girl, 8.80% man and 7.70% boys in the research area (Table 5). The majority percent of males buy feed around 52%; women 20% and both genders cases around 13.5% found respectively. However, the maximum 40.4% of eggs were 23.5% males and chicken sellers were 36.2% women. The highest percentage of women around 91.2% kept money savings by selling eggs and chicken, 4.60% for both genders, while 4.20% of men kept money from raising native chickens, whereas 41.5% of both categories participated in spending. The average weekly intake of eggs per family was found 4.59±0.17.

Table 5: Families raising Native chickens in the designated locations

Contribution in NC Rearing	**% (n)**	**Category**	**Man% (n)**	**Women% (n)**	**Both% (n)**
Women	100 (260)	Feed buyer	52 (173)	20 (52)	13.5 (35)
Man	8.80 (23)	Egg & 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)
Average family egg consumption per week (Mean±SE)			4.59±0.17		
Average family chicken consumption per month (Mean±SE)			1.15±0.03		

Standard Errors (SE), Percentage (%), Number (n), Native Chicken (NC)

a. Purpose of Native Chicken Rearing

Around 76.5% of farmers raised Native chickens for both personal use and additional revenue 19.2% of farmers raised the birds for their own needs and 4.2% for money creation (Table 6).

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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)

Day Old Chick (DOC), Number (n)

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 around 424.76±12.65 BDT for roasters and 95.80±3.19 BDT for chicks respectively (Table 7). The Patuakhali district likewise had the highest average market value of roasters the previous year which was 390.18±12.72 BDT for the chick and 80.50±3.27 BDT. 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, Sunamgonj had the lowest average market value for roasted chicken 266.83±22.49 BDT while the market value of hens 264.33±3.66 BDT in Sherpur and chicks 47.33±3.79 BDT in the Joypurhat district in current year. The lowest market values for roasters 210.50±27.74 BDT, hens 193.83±25.7 BDT, (and chicks (31.33±4.25) were recorded in the Pirojpur district the year before. In 2023, the market prices for chicken were as follows: roaster cases 329.68±7.20 BDT, hen 302.22±2.66, and chick 68.23±2.28 taka.

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Table 7: Native chicken's average market value in the chosen regions

Location	The average Market value of Native chicken (Mean±SE) (BDT)					
	Previous year			Present year		
	Roaster	Hen	Chick	Roaster	Hen	Chick
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**

Standard Errors (SE), Bangladeshi Taka (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, 40.0% of farmers favoured broiler chicken, while 30.8% preferred native chicken. In the studied locations, 1.90% of farmers favoured Layer chicken and 27.3% desired Sonali. 64.4% of farmers chose Native hens with an average marketable weight near about 1 kilogram or more. Of them, 18.8% wanted 900 grams, and 16.2% chose 750 grams. The value chain of native chicken is influenced by different stakeholders related to this business's direct decision. According to value chain, 36.5% of farmer eat native chicken

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largely for its flavour, with 21.9% preferring it for roasting and 41.5% preferring it for health reasons (Table 8).

Table 8: Demand and market value of Native chicken 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)	750gm	16.2 (42)	Roast	21.9 (57)
Neighbor	26.9 (70)	Broiler	40.0 (104)	900gm	18.8 (49)	Healthy	41.5 (108)
Wholesaler	14.2 (37)	Sonali	27.3 (71)	1kg/ Above	64.6 (168)	Tasty	36.5 (95)
-	-	Layer	1.90 (5)	-	-	-	-

Number (n)

b. Demand Analysis of Eggs in the Market

In the study areas, the highest percentage of consumers (46.9%) preferred brown-shelled eggs, followed by Native chicken eggs (28.1%), white-shelled eggs (18.1%), and duck eggs (6.9%) which were described 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 for native chicken eggs, it was 61.07±0.58 BDT/hali. 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. The greatest percentage of patients (53.8%) who favored eating Native chicken eggs were pregnant women (22.3%) and children (20.0%). Additionally, 3.8% of elderly individuals favored Native chicken eggs. At most 53.8% of patients said they would rather eat Native chicken eggs, compared to 22.3% of pregnant women and 20.0% of toddlers. Furthermore, 3.8% of elderly individuals said that they liked Native chicken eggs because they were organic, high in nutrients, and healthful diet.

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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)

Number (n), Standard Errors (SE), Native Chicken (NC)

4. The 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 the district of Joypurhat was 842.50 BDT. Patuakhali had the lowest cost involvement 138.00 BDT/year for vaccination and medication while Farmers in Rangpur spent the most for vaccine and medication1206.66 BDT/year for these purposes.

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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	916.40	1102.00	842.50	1007.00	1620.47	1121.00	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**

Bangladeshi Taka (BDT)

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In Pirojpur district, individual farmers paid a maximum of 160 BDT for veterinary services per year, while in Feni and Pabna districts; they paid 116.67 BDT and 40.00 BDT, respectively, for the same services. One of the main problems was the high feed cost; in the Sherpur district, the feed cost was 5746.67 BDT /year, while in the Joypurhat district comparatively lower feed cost was seen and was 3183.33 BDT /year. Furthermore, there were no expenses associated with labor, transportation, or power to grow and manage Native chickens in the research regions. The Rangpur district recorded a maximum housing cost of 430.67BDT/year with 10% depreciation, while the Joypuhat district recorded a minimum cost of 226.67BDT/year for a Native chicken house. Additional expenses associated with raising Native chickens were discovered to be 1896.67 BDT /year in Rangpur and 1875.00 BDT /year in the Pabna district. The principal costs associated with raising and managing Native chickens in the chosen regions are shown in Table 10. The cost of veterinary service, Vet Doctor fee, litter prices, and disinfectant costs was too little due to the small number of farmers who spent their money on it.

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

The main sources of revenue from Native chicken production and raising are given in Table 11. The Patuakhali district generated the most overall income (17308.20BDT/year), while the Joypurhat district generated the least (9200.67 BDT/year). In the Patuakhali district, farmers made a maximum of 6492.20 BDT annually from the sale of native chicken, while in the Pabna district, the minimal revenue was recorded at 3583.33BDT.

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Table 11: Native chicken production and raising is the farmers' main source of revenue.

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)

Farmers in Pirojpur had the chance to make the most money of 3378.67 BDT by selling Native chicken eggs, while those in the Joypuhat district made the least of 216.67 BDT per year. Individual farmers in Patuakhali district made the most money from selling chicks (40.00 BDT.

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The household that devoured the most native chicken annually was 4184.00 BDT, while the lowest value was 58.00 BDT for gifts and 1466.00 BDT from closing stock which was noted in the Patuakhali area. The Joypurhat district had the lowest household consumption of chicken, valued at 1760.00 BDT annually. In Feni, the highest family egg consumption value per year was 2070.00 BDT, while the lowest was 640.00 BDT in the Sherpur area. Furthermore, Pabna recorded the greatest gift value of Native chicken at 2052.67BDT/year, while Sherpur district recorded the highest value from closing stock at 2686.67BDT /year. In the chosen localities, there was no remarkable evidence of revenue production from the sale of Native chicken litter.

6. Net Benefit and Benefit-cost ratio (BCR)

The Patuakhali district had the greatest net income 10682.30 BDT and benefit-cost ratio (BCR) which was 2.61, while the Rangpur district had the lowest BCR at 1.56. In the selected location, Net Benefits were 7586.70 BDT, and the Benefit-Cost Ratio (BCR) was 2.07. Two crucial factors are Gross revenue generation/benefit (B) and Total expense/cost (C) to assess the Net benefit of Native chicken producers. Net income/benefit in Joypurhat district had the lowest at 4182.20 BDT The Net Benefits and Benefit-Cost Ratios of Native chicken growers in the chosen areas are shown in Table 12.

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Table 12: Native chicken growers in the chosen areas' net benefits and benefit-cost ratio (BCR)

Points	**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)

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7. Contribution of Native chicken farming to Family income

From Table 13, we found that the highest contribution of native chicken farming in the annual family income was from Pabna at 13.83% followed by Patuakhali at 10.87%, Rangpur at 10.32% and the lowest at 4.84% from the Feni district. The overall family income was at 188623.07 BDT whereas from native chicken farming, it was 14690.34 BDT.

Table 13: Contribution of Native chicken farming in Family income

Parameters	Income/year from NC (BDT)	Total Family Income (BDT /year)	Income (%) from NC in total family income
Pabna	13558.27	98000	13.83
Rangpur	15266.67	147900.00	10.32
Joypurhat	9200.67	157566.67	5.84
Sherpur	12486.67	196633.33	6.35
Pirojpur	16159.33	222866.67	7.25
Feni	16784	346766.67	4.84
Sunamgonj	15013.67	199600	7.52
Patuakhali	17308.2	159240	10.87
Overall	14690.34	188623.07	7.79

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

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8. Production function analysis

Multiple Regression model was used to estimate the coefficient of income or profit generated from rearing of Native chicken in some chosen areas. A total of ten (10) independent variables were considered for this analysis, among them seven (07) variables were identified as the key contributors that affected the production process because two (03) variables showed statistically non-significant results in t-statistics. The results of the model estimation for 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 cost, veterinary service fee, disinfectant cost, feed cost and litter cost significantly affected the gross returns and profit of the Native chicken production.

Family size (X_1): The estimated value for the coefficient of family size was 0.112 for Native chicken-rearing farmers which was significant at a 5 percent level probability level. There was a positive relationship between the family size and the gross return and indicating a 5 percent increase in family size on average led to an 11.20 percent increase in the gross return and profit of Native chicken farmers.

Chick price (X_2): It is evident from Table 14 that the regression coefficient of the chick price was estimated as 0.250 for Native chicken which was significant at a 1 percent probability level. Thus, there was a positive relationship between the chick price and the gross return. That indicated the 1 percent increase in the chick price on average led to a 25.0 percent increase in gross return for Native chicken-rearing farmers, holding other variables constant.

Vaccine and medicine cost (X_3): In the case of Vaccine and medicine cost, the coefficient was 0.149 for the sampled farmers which was significant at a 5 percent probability level. Thus, there was a positive relationship between vaccine and medicine cost and gross return. That showed a 5 percent increase in vaccine and medicine costs on average, leading to a 14.9 percent increase in gross return from Native chicken farming, remaining other variables unchanged. This specified that the farmers who used vaccination and medicine for their Native chicken got 16.4 percent more profit than the farmers who did not use vaccine and medicine.

Veterinary service fee (X_4): The estimated value of the coefficient of veterinary service fee was 0.220 for Native chicken-rearing farmers, which was significant at a 1 percent probability level. This value implied that the respondents who received veterinary services got 22.0 percent more profit than the respondents who did not receive any veterinary service.

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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.

Feed cost (X_6): 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 percent probability level. Thus, there was a positive relationship between feed cost and gross return. That showed 1 percent increase in the feed cost of the farmers, on average, led to a 44.3 percent increase in gross return, remaining other variables constant.

Litter cost (X_7): In the case of litter cost, the coefficient was 0.067 for the sampled farmers, which was significant at a 10 percent probability level. Thus, there was a positive relationship between litter cost and gross return. That showed, 10 percent increase in litter cost, on average led to a 6.7 percent increase in gross return for Native chicken rearing farmers, holding other variables unchanged.

Value of R^2: The estimated value of the coefficient of multiple determinations, R^2 Value of adjusted of the model was 0.462, which indicated that about 46.2 percent of the total variation

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in gross return under Native chicken rearing farmers had been explained by the variables included in the model. In other words, 53.8 percent of the total variation in the gross return was unexplained due to the variables that were not included in the model.

Value of adjusted R^2: The estimated value of the adjusted R^2 of the model was 0.441 for Native chicken-rearing farmers (Table 14). Here, the term adjusted means adjusted for the degrees of freedom (Gujarati, 2003). This value indicated that about 44.1 percent of the total variation in the gross return under Native chicken farming had been 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 model derived was 21.407. This value was highly significant at a 1 percent 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. This test was conducted by looking at the value of the correlation coefficient (r) between the independent variables. 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 had a value of (r) less than 0.85 so the data did not show multi-collinearly or there was no relationship between the independent variables. Hence, the classical assumptions were satisfied.

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Table 15: Multi-Collinearity Analysis

Multi-Collinearity Analysis									
	X_1Logs	**X_2logs**	**X_3Logs**	**X_4Logs**	**X_5Logs**	**X_7Logs**	**X_8Logs**	**X_9Logs**	**X_{10}Logs**
X_1Logs	0.00	0.00	0.00	0.02	0.00	0.25	0.00	0.11	0.00
X_2Logs	0.00	0.00	0.00	0.01	0.40	0.02	0.00	0.27	0.00
X_3Logs	0.00	0.00	0.00	0.00	0.28	0.12	0.00	0.57	0.00
X_4logs	0.00	0.00	0.01	0.03	0.26	0.46	0.00	0.00	0.00
X_5Logs	0.00	0.00	0.00	0.35	0.02	0.06	0.09	0.01	0.26
X_6Logs	0.00	0.01	0.30	0.00	0.03	0.00	0.33	0.01	0.32
X_7Logs	0.00	0.05	0.10	0.38	0.00	0.07	0.51	0.00	0.08
X_8Logs	0.07	0.16	0.43	0.18	0.00	0.01	0.01	0.02	0.28
X_9Logs	0.39	0.60	0.01	0.01	0.00	0.01	0.05	0.00	0.00
X_{10}Logs	0.54	0.17	0.15	0.02	0.01	0.00	0.01	0.00	0.05

7. Restrictions on the production and rearing of native chickens

Farmers have to contend with several obstacles when raising and producing Native chickens. Farmers had to deal with some obstacles when it came to raising and producing Native chickens. According to field survey data, the majority of farmers—80.4%—had to deal with disease outbreaks and predator attacks on Native chicken, while 60.8% of farmers had to deal with a shortage of vaccination in the research regions. Of the producers surveyed, 51.2% reported greater chick mortality, 48.8% reported extremely expensive feed prices, and 39.6% reported that government immunizations were unavailable for Native chicken. Farmers said 28.5% of them did not receive high-quality chicks for raising, 22.3% of them had difficulties with theft, and 6.2% of them mentioned the high price of DOC in the designated locations. Additionally, 3.5% of farmers said that day-old chicks were unavailable, and 3.10% reported that they had difficulties since native chicken husbandry never ensured profit.

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Table 13: Principal constraints regarding Native chicken management and raising

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

Number (n)

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8. Farmers' perspectives on resolving issues and limitations

To address the limitations and difficulties, about 71.5% of farmers requested that a supply of high-quality chicks need to be made available. Of these, 55.8% suggested that the authorities should have encouraged farmers to engage in poultry farming, 52.7% demanded a training program on native chicken rearing and management, and 53.5% of farmers wanted to supply vaccines free from Government sites.; while 37.3% wanted loans or other incentives from the government or banks for native chicken-rearing farmers/entrepreneurs, 32.7% opined to protect their chickens from predator animals. From survey findings, 22.7% of farmers said they don't know about managing their chicken diseases and raising chicks.

Table 14: Farmers' perspectives 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)

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Discussion

These findings are quite comparable to those of [5], who reported that the average 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 BBS report's finding that the lowest household size is 4.00 in the Rajshahi division. This discrepancy is from the fact that the data was collected from a limited number of locations and was subject to size variation. In the surveyed regions, the family's overall earning member was 1.20±0.03, and their dependence ratio was 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. This statistic was marginally lower than that of the BBS 2022 report, which indicates that nationally, 74.0% of people were literate and around 26.0% were illiterate. According to [5] 9.0% of farmers did not go to school. The reason for this was the limited sample size and random data collection from local farmers' homes who raised chickens.

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 somewhat from the report of [5] stated that the predominant occupation was day labor (19.50%) and 4.50% others. According to his 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 findings conducted by [8], stated that 58.33% of farmers in Sylhet raised chickens for 0 to 15 birds per family, while 41.67% of farmers raised chickens for more than 15 birds. Meanwhile, [9] reported that 98.75 percent of rural women reared poultry small flocks (5–13) and 1.25% raised large flocks (21-29) because of having mothers have little children. About 95% of farmers reared common deshi chicken and the rest of the farmers reared hilly (2.3%), naked neck (1.2%), and both naked neck and common deshi chicken (1.5%).
[10] stated based on their findings that the average monthly intake of chicken for a family was 1.15±0.03, which was more than 6.02±1.61 birds where a household consumes annually.

This 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%) as 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 primary production raising 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 high 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 72.4% directly from households, and 27.6% via the village market; According to [15], around 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 new born 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 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%), respectively.
According to [18] The average 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 from the 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], were 1.24. The family poultry produced a 1.90 benefit-cost ratio,

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according to [14]. The benefit-cost ratio illustrates the farm's viability financially. A high BCR said that raising chickens as a family is a lucrative endeavor. According to [20], BCR were 5.57, which was greater than the present study.

The difference in income was due to the time frame because regarding the research theme connection a paper 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 around 34.38% of the majority of respondents indicated the prevalence of illness, 18.75% reported predator assaults, and 17.71% claimed a lack of instruction regarding poultry management techniques. The remaining respondents brought up the following issues: theft of chicken (3.13%), lack of marketing, lack of beginning money (9.38%), and availability of veterinary services (12.50%); In 2023,Chowdhury and associates discovered that 22.5% of farms had lower egg prices, 10% have lower meat prices, 15% lack training facilities, 25% have technical issues, 10% have housing issues, 32.5 percent have marketing issues, and 65 percent have economic issues[7]; where [22] found that 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 workers, 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 connection according to [16], the main issues with backyard chicken keeping include the use of backdated techniques, a 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] findings in native chicken 38.1% disease and 23.1% predators; [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%), an unreliable and disorganized marketing system (12.78%), a lack of capital (41.86%), institutional credit facilities (47.89%), an outbreak of disease (16.02%), a scarcity of feed (8.86%), a lack of training and extension services (6.07%), and a 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 suggest that high-yielding deshi bird varieties need to be made available, that village women should participate in training programs on managing and rearing their poultry, farmers should be able to afford feed, medicine, and

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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 and Methods

Study areas and duration

Pabna, Rangpur, Feni, Sherpur, Pirojpur, Patuakhali, Joypurhat, and Sunamgonj; eight districts from six divisions of Bangladesh were chosen for research 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 gather primary data. 30 different types of questions regarding poultry farming in the households of 260 farmers, 50 from Patuakhali and the remaining from each district, were gathered through a field study that involved the farmers' first-hand observation and interviews. Secondary data might be found in several places, such as books, theses, papers, journals, government documents, and Bangladesh's statistics yearbooks. Details on the benefits-cost ratio, 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. Then data were statistically analyzed by Statistical Package for the Social Sciences (SPSS), Version-25. All data was 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=Gross return, GC=Gross cost)

To calculate the benefit-cost ratio we used the following formula

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

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The gross return includes the average return from the main product and by-products of native chicken. Gross cost includes the total cost of native chicken rearing. The benefit-cost ratio was a relative measure that was 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 a means of 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:

$$Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + b6X6 + ei \quad (2)$$

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

a = Constant b = Regression coefficient

X1 = Age of Farmer

X2=Family Size

X3 = Cost of chicken purchasing

X4= Cost of Vaccine and Medicine

X5= Cost of Veterinary Service

X6= Cost of Disinfectant

X7=Cost of Feed

X8=Cost of Litter

X9= Cost of Housing

X10= Miscellaneous Cost

Hey = Disturbance factors

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

$$\text{Log } Y = \text{Log } a + b1 \log X1 + b2 \log X2 + \ldots b6 \log X6 + u \quad (3)$$

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, etc) 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 (r R2 depicted that

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there were no symptoms of multi-linearity, but if r2 < R^2, it showed the model containing multi-clinical issues [27].

Authors' Contributions:

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

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Competing Interests:

The authors declare that there is no conflict of interest.

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