Profitability and Problems of Farmers in Duck Farming: A Study On Haor Areas in Bangladesh

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Abstract

The present study was endeavored to focus useful information on profitability and problems of farmers in duck farming. A structured interview schedule was used to collected data from 100 randomly selected duck farmers (10% of total population) during January to May 2020 from Haor areas i.e., Tarail and Itna upazila (sub-district) under Kishoreganj district in Bangladesh. Data were analyzed by utilizing both descriptive and inferential statistics. According to the analysis, the total cost of 550 ducks was assessed to be Tk. 72889.8 per lot. Average gross return, average gross margin and average net returns for 550 ducks were assessed to be Tk. 121720, Tk. 57,725.7 and Tk. 48830.2 per lot, respectively. The benefit cost ratio for duck raising was calculated to be 1.67. The findings indicated that majority of the duck farmers (74%) faced high problems, while 21% and 5% of them faced medium problem and low problem in duck farming, respectively. Among difficulties of the duck growers, outbreak of disease was the most common problem followed by high price of feed in the study area. Correlation analysis indicated that out of nine selected characteristics of the duck farmers level of education, family size, annual income, and social mobility showed negative significant relationship with the problem confrontation while the mortality of ducks and number of ducks reared by the farmers showed positive significant relationship for the same. The study revealed some prospects for the policymakers to address the above significant characteristics for profitable duck farming through lessening problems.

1. Introduction

Ducks are raised all over the world, but Asia accounts for more than 75% of the total (Ahmed et al., 2021). Bangladesh is a South Asian riverine country with 16488 Km2 of Haors, canals, ponds and low-lying water freshwater bodies that can be used for duck farming (Rashid et al., 2009; Rahman et al., 2009; Islam et al., 2023). Duck rearing is an essential part of poultry farming system in Bangladesh (Jha et al., 2015; Parvez et al., 2020). Duck comprises of about 16% (47.25 million) of the total poultry population (270.71 million), occupying 2nd place next to chicken in the production of table eggs in the country (BER, 2013) and contributes a major source of animal protein (DLS, 2019; Alam et al., 2012). Among the Asian countries, according to Food and Agricultural Organization (FAO), the position of Bangladesh with respect to duck meat and egg production is 11th and 4th, respectively (Pingle, 2011) due to favourable climate and environment.

Duck farming plays an important role in the Haor districts of Bangladesh, providing meat and egg and generates income (Parvez et al., 2020). Despite the economic importance of the Haor, people in the region are poorer than any other parts of the country. More than 28% of the total population here lives below the lower poverty line (BHWDB, 2011). Duck farming in Haor region of Bangladesh provides self-employment for landless and small producers. Farmers favor indigenous ducks in traditional scavenging systems owing to their great adaptation to farming settings, superior foraging abilities, long productive life, and resistance to illnesses (Pervin et al., 2013; Morduzzaman et al.,

2015). Traditionally, farmers used to maintain a small duck flock along with their chickens throughout the country. However, great-scale duck farming, ranging from 100 to 1000 ducks, is prevalent in the country's north-eastern and coastal areas, where land ecology, agro-climatic conditions, and natural feed supplies have a large impact on duck community (Churchil and Jalaludeen, 2022; Khanum et al., 2005).

Ducks are effective consumers of agricultural byproducts such as kitchen trash, seeds, grains, garden waste, insects, green grasses, and helpful to control weeds, pests, and plant diseases; improve soil properties and aeration to increase crop yield (Huo et al., 2021; Hasan et al., 2017). However, nowadays there are significantly fewer duck farms in Bangladesh as a result of a number of factors, including shrinking water bodies, pollution of grazing fields, difficulty in obtaining inputs like birds, feed, and medications, difficulties with marketing, and disease outbreaks like avian influenza epizootics (Churchil and Jalaludeen, 2022; Ajieh and Oyibojoba, 2018). According to Sankaralingam and Mahanta (2022), the duck farmers of Bangladesh have been facing a lot of problems like outbreak of diseases like duck plague, duck cholera, and avian influenza, lack of inheritance by new generation people, shrinking of scavenging areas and natural feed resources, drying up of natural water bodies, excessive use of pesticides on paddy fields, shift from paddy cultivation to cash crop cultivation, industrialization, and urbanization. As a result, there is an ample opportunity of enhancing the profitability of duck farming in Haor regions of Bangladesh through investigating the problems and identifying how to overcome them (Jha et al., 2015; Islam et al., 2016).

Unfortunately, very few research works has been done on the problems and profitability of duck rearing in Bangladesh. Therefore, an attempt was carried out to identify the major problems faced by duck farmers in Haor areas along with their profit in duck farming. The specific objectives of the study are to analyze the profitability in duck farming; to identify the socioeconomic characteristics of duck farmers; to find out the major problems faced by the duck farmers; and to determine the relationship exists between socioeconomic characteristics and problems of duck farmers in the study zone.

2. Materials and Methods
2.1 Location and respondents of the study
To achieve the objectives of the present study, a survey was conducted in two upazila (sub-districts) i.e., Tarail and Itna of Kishoreganj district, Bangladesh (Figure 1). The location was chosen specifically for its ease of access, as well as the availability and willingness of the duck farmers to take part in the study. A survey method was utilized to select the duck farmers for collecting data from them. There was a total of 1000 duck farmers in the two studied upazilas; however, 100 randomly selected duck farmers took part in the survey finally.
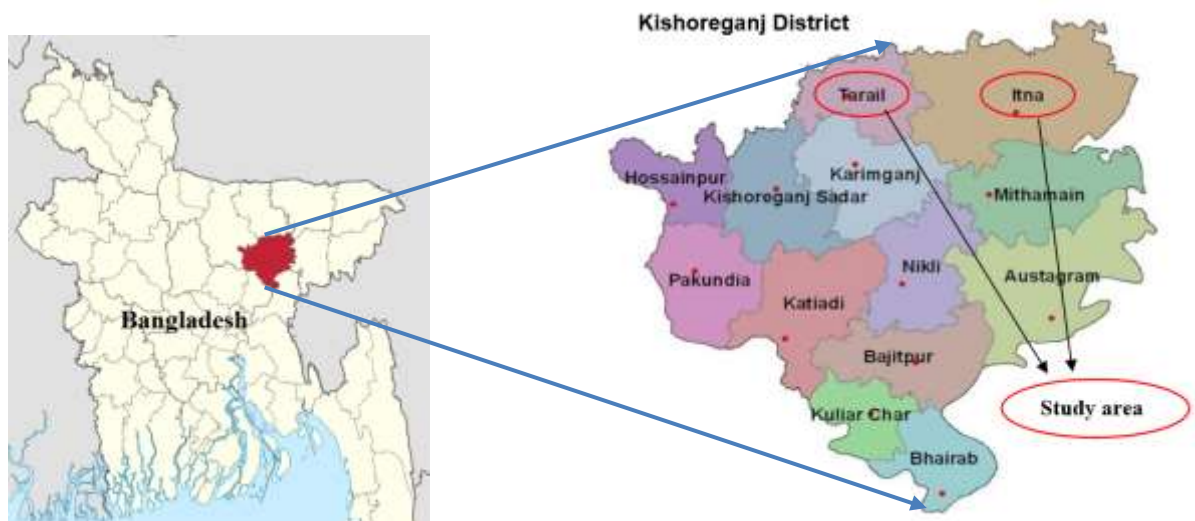

Figure 1. Map showing the study area

2.2 Instrument and data collection
A structured interview schedule was prepared to collect data from the duck farmers during January to May 2020. The interview schedule was consisted of two parts, the first part measured profitability in duck farming, and the second part sought for the problems of farmers in duck farming.

2.3 Data analysis
2.3.1 Profitability analysis
Duck farming profitability was assessed by gross return, gross margin, net return, and benefit cost ratio (Afrin et al., 2016; Matemba, 2023; Shibu et al., 2019). The following formulas were used for 550 ducks to calculate gross profit in duck farming.

Gross return = Sale price of duck (Tk.) × Quantity of duck (Tk.)

Gross margin = Total Return - Variable Cost

Net return = Gross return - Gross cost

Gross cost = Total fixed cost + Total variable cost

Benefit cost ratio, BCR = Gross benefit/Gross cost

2.3.2 Problems identification
Extent of problems of duck farmers was the focus variable and nine socioeconomic characteristics of them were selected as explanatory variables namely age, education, family size, number of ducks, mortality of duck, annual income, extension media contact, training exposure, and social mobility.

The socioeconomic features of the duck farmers were measured with descriptive statistics viz. mean, and percent. A four-point rating scale was used to explore the extent of problems (Mithun et al., 2020) of farmers in duck farming. A total of ten (10) problems in duck farming were identified from the focus group discussions (FGD) and available literature. Each problem was scored with four possible responses: high, medium, low and not at all, with corresponding scores of 3, 2, 1 and 0, respectively (Mithun et al., 2018; Sheheli, 2012). Hence, the scale score ranged from 0 to 30, where 30 indicates severe problem, and 0 indicates no problem. A problem facing index (PFI) was calculated to measure the extent of severity of the problems faced by the duck farmers in the study area (Equation 1) (Hoque et al., 2021; Das et al., 2020).

$$PFI = \frac{P_h \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0}{N} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where,

PFI = problem facing index, P_h = number of responses with high problems, P_m = number of responses with medium problems, P_l = number of responses with low problems, P_n = number of responses with no problem, and N = total number of responses.

For the analysis, the data were cleaned, coded, and analysed with the statistical package for social sciences (SPSS) var. 20. To explore the relationship between the explanatory variables and focus variable, Pearson's product-moment correlation coefficient (r) (Pearson, 1895) was computed (Equation 2).

$$r_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where,

r_{xy} = Pearson's product-moment correlation coefficient

$\bar{x}$ and $\bar{y}$ = Means of the variables x and y, respectively

3. Results and Discussion
3.1 Profitability analysis of duck farming
3.1.1 Total cost estimation
Table 1 represents the estimation of total cost in duck rearing for 550 ducks in the study area. Total cost of duck rearing for 550 ducklings was estimated at Tk. 72889.8 and based on it, total variable and fixed cost was estimated at Tk. 63994.3 and Tk. 8895.5, respectively. Variable cost included duckling cost, feed cost, labor cost, veterinary cost, electricity cost, and transportation cost regarding duck rearing (Table 1). The duck growers of the research site mainly collected day-old-ducklings from hatcheries and familiar local agents and average cost of day-old-chick for 550 birds was Tk. 24705 (33.89% of total cost). The average feed cost for 550 birds was Tk. 30744 (42.17% of the total cost). Labor cost for 550 ducks was Tk. 1647 (2.26% of total cost). Average veterinary and medicine cost for 550 ducks was Tk. 3843.7 (5.28% of total cost). Average cost of electricity charges was Tk. 3843.7 (1.18% of total costs). Average transportation cost for 500 ducks was Tk. 2196 (3.01% of total cost).

Fixed cost included depreciation on housing cost, depreciation on tools and equipment cost, family labor cost and interest on operating capital (Table 1). Average housing cost for 550 ducks was Tk. 2745.36 (3.7% of total cost). Average tools and equipment cost for 550 ducks was Tk. 1647.45 (2.26% of total cost). Average family labor cost for 550 ducks was Tk. 3294.89 (4.5% of total cost). Interest on operating capital for 550 ducks was Tk. 1207.8 (1.66% of the total cost).

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Table 1. Estimation of total cost in duck rearing for 550 ducks

Particulars	Costs (Tk.)	Percentage (%)
Variable cost		
i. Duckling cost	24705	33.89
ii. Feed cost	30744	42.17
iii. Labor cost	1647	2.26
iv. Veterinary cost	3843.7	5.28
v. Electricity cost	858.6	1.18
vi. Transportation cost	2196	3.01
A. Total variable cost	63994.3	87.79
Fixed cost		
vii. Depreciation of housing cost	2745.36	3.7
viii. Depreciation of tools and equipment cost	1647.45	2.26
ix. Family labor cost	3294.89	4.5
x. Interest on operating capital	1207.8	1.66
B. Total fixed cost	8895.5	12.21
Total cost (A+B)	72889.8	100.0

3.1.2 Estimation of return

Table 2 represents the gross return and gross margin of duck farming for 550 ducks. Gross return was calculated by combining money from duck sales with other sources of income. Average gross returns for 550 ducks were Tk. 121720 (Table 2). Average gross margins for 550 ducks were at Tk. 57,725.7. Average net returns were estimated at Tk. 48830.2 which indicates that duck farming is profitable business for the farmers. Benefit-cost ratio of duck farming was 1.67 which implies that Tk. 1.67 would be earned by investing every Tk. 1.00 for duck farming (Table 2). So, duck farming was profitable for the farmers in the study area. Afrin et al. (2016) observed similar findings in her study.

Table 2. Gross return and gross margin of duck farming for 550 ducks

Particulars	A. Gross return	B. Total variable cost	C. Total fixed cost	D. Total cost (B+C)	Gross margin (A-B)	Net return (A-D)	BCR (A/D)
Value (Tk.)	121720	63994.3	8895.5	72889.8	57,725.7	48830.2	1.67

3.2 Socioeconomic characteristics of the duck farmers

The socioeconomic characteristics of the duck farmers have been presented and discussed here. Among 100 respondents of the present study, 55% were young aged followed by middle aged (38%). The highest proportion (65%) of the farmers were educated up to primary level, 29% above primary level and rest of them were illiterate (6%). The majority (49%) of the duck growers belonged to large families compared to medium families (43%). Among the respondents, 25% farmers reared up to 200 ducks, 24% reared 201-499 and 51% of them reared above 500 ducks in the selected two upazilas in Kishoreganj district. An overwhelming majority (51%) of the farmers reported that their duck mortality was medium followed by high mortality (32%). More than half of the respondents (54%) had high annual income in the investigation site compared to medium annual income (38%). Majority of the duck farmers (90%) had medium to low extension media contact. Most the of respondents (87%) had short training exposure in the locality regarding duck rearing. Training is important for enhancing farmers' knowledge and abilities, which leads to more profitable duck rearing through better duck growth and production (Mithun et al., 2020). Almost four-fifth of the duck farmers (80%) had medium social mobility which meant that the farmers in the study area were eager enough to interact and cooperate with other farmers for ensuring profitable duck farming.

3.3 Extent of problems faced by duck farmers in Haor areas

The data presented in Table 3 revealed that the highest proportion of the duck farmers (74%) faced high problems, while 21% and 5% of them faced medium problem and low problem in duck farming, respectively. The findings of Hoque et al. (2021) supported our findings.

Table 3. Categorization of duck farmers based on their problems in duck farming (n=100)

Categories	Respondents (%)	Mean
Low problem (1-10)	5.0	
Medium problem (11-20)	21.0	20.65
High problem (21-30)	74.0	

For determining the extent or severity of individual problem, rank order was made computing Problem Facing Index (PFI). According to the rank order of the 10 selected problems shown in Table 4, the major problems with highest score have been described here.

Table 4. Rank order of problems faced by duck farmers in Haor areas (n=100)

Problems	Level of problems				PFI	Rank order
	High	Medium	Low	Not at all		
Price fluctuation of duck egg	55	17	21	7	2.20	6
Problem of theft	25	10	35	30	1.30	9
High price of feed	65	30	5	0	2.60	2
Pollution of environment	11	23	31	35	1.10	10
Outbreak of disease	73	24	3	0	2.70	1
Lack of training	50	20	7	23	1.97	7
Irregular supply of duckling	59	22	11	8	2.32	4
Low price of duck egg and meat	62	27	11	0	2.51	3
Inadequate veterinary services	48	30	22	0	2.26	5
Lack of sufficient capital	41	29	9	21	1.90	8

Data presented in the Table 4 show that 'outbreak of disease' got the highest score (PFI = 2.70) and hence was considered as the 1st ranked problem. Many diseases caused a very high mortality rate which hinders the production of duck and affects the profitability of the farm very badly in the study area. That is why it has become the most faced problem and ranked at the first place in the problems list. Disease outbreaks like duck plague, duck cholera, and avian influenza cause huge loss of the duck farmers (Churchil and Jalaludeen, 2022; Sankaralingam and Mahanta, 2022; Ajieh and Oyibojoba, 2018).

The problem 'high price of feed' got the 2nd highest scores (PFI = 2.60) and hence considered as the 2nd ranked problem. Most of the farmers complained about the high price of feed which costs a lot of money from their capital regularly. Begum et al. (2020) and Zannat et al. (2018) found high price of feed as a major problem in their research.

The problem 'low price of duck egg and meat' in the market got the 3rd highest scores (PFI = 2.51) and ranked as 3rd most important problem in the research site. A collapse in egg and meat market results into a great loss for the duck farmers. Low price of duck egg and meat was stated as the second crucial constraint by Begum et al., 2020.

Irregular supply of duckling (PFI = 2.32) was also a noticeable problem in duck farming. It also affects the production and eventually turns into a loss in the business. Inadequate veterinary service (PFI = 2.26) was another problem in duck farming. Sometimes, it immerges as an emergency problem during high mortality rate. Besides, price fluctuation of duck egg, lack of training, lack of sufficient capital, problem of theft, etc. were also ranked chronologically in the list of problems. It is important to note that, the pollution of environment was ranked as a last problem in the study area of present research.

3.4 Relationship between socioeconomic characteristics and problems of duck farmers

The relationship between problems faced by the duck farmers and their socioeconomic characteristics was calculated through Karl Pearson's Product Moment Correlation coefficient (r) analysis (Table 5). The negative significant correlation (r = -.221) of level of education with the problem faced by the duck farmers clearly pointed out that the duck farmers having more educational qualification can minimize the undesirable loss during duck farming. Smrity et al. (2020) and Sheheli et al. (2021) found similar findings in her study. Family size of the duck farmers showed a negative significant relationship (r = -.237) with their problems in duck farming (Table 5). So, it could be revealed that if the number of family member of the duck farmers increases, the problems in duck farming decreases which might be due to the reason that the duck farmers with large family had sufficient number of labourers to rear the ducks efficiently. Smrity et al. (2020) reported similar findings in their study.

Table 5. Result of correlation analysis between explanatory variables and focus variable (n=100)

Focus variable	Explanatory variables	Correlation coefficient (r) with 98 df
Problems faced by duck farmers	Age	-.102
	Education	-.221*
	Family size	-.237*
	Number of ducks reared	.213*
	Mortality of duck	.635*
	Annual income	-.428**
	Extension media contact	-.201
	Training exposure	-.173
	Social mobility	-.345*

** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level, df=Degrees of freedom

The positive significant correlation (r = .213) between number of ducks reared and problems of duck farmers designated that with the increase of number of ducks, the problems in duck farming increases because rearing a large number of ducks needs more knowledge, skills, experiences etc. to make duck farming profitable. Mortality of duck exposed a positive significant relationship (r = .635) with their problems in duck farming (Table 5) which specified that if mortality rate of ducks increases, it will cause unwanted loss for the duck farmers. Islam et al. (2016) found that mortality rate of ducks contributed significantly to the farmers' problems in Bangladesh. The negative significant correlation (r = -.428) of annual family income with the problems of duck farmers indicated that with the increase of annual family income of the duck farmers, the problems in duck farming decreases. Mithun et al. (2020) found similar relationship between the concerned variables. Social mobility had significant and negative relationship (r = -0.345) with the problems of duck farmers (Table 5), presented that the farmers having frequent contact with neighbors and other farmers in their society received necessary information on handling of different difficulties in duck rearing.

4. Conclusion and Recommendation

The present study was aimed to know the profit and problems of duck farming in Haor areas. The benefit cost ratio for duck farming was estimated to be 1.67 which reveals that duck rearing was profitable for the farmers. Duck farmers in the study area found a lot of problems, of which, outbreak of disease, high price of feed, and low price of duck egg and meat in the market were significant. Several factors such as level of education, family size, annual income, social mobility, mortality of ducks and number of ducks reared by the farmers were found more dominant to the problems in duck farming. This indicates an opportunity to work on those features to lessen the difficulties that will make duck rearing more gainful. In order to increase the profitability of duck production, it is highly recommended that the appropriate authority should provide better interventions to the farmers, such as training, readily available inputs, and extension services.

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