Original Research Article

Broiler Farming in Hathazari Region of Bangladesh: A Study of Management Practices.

Abstract

Broiler farming has greatly improved the socio-economic status of people in underdeveloped countries like Bangladesh. The productivity and profitability of broiler farming largely depend on good management practices. The present study was conducted on selected broiler farms to know about the socio-economic status of the farmers, the managemental practices adopted by them and the overall production performance of the broiler chicken in Hathazari region, Chittagong. The data for this study was collected using direct interviews with farmers, visual inspection of farms and farm records through a pre-formed questionnaire. In the study, it was found out that most of the farmers are young (60%), started the farm with their own money (60%), received no training (90%), had an experience of 6-10 years (50%) and has taken farming as a main occupation (70%). Considering management practices, 50% of the farmers collected day-old chick (DOC) from Kazi Farms Limited through local dealers. The housing system was intensive, open-sided with kacha (60%) and paka (40%) floors and tin shed roof. In all farms, sawdust was used as litter material due to the unavailability of rice husk. An electric brooding system was used in all the farms with a duration of 5-7 days in summer and 10-15 days in winter.About 50% of farmers reported that they did not monitor nor measure air temperature during brooding. The most common disease in this area is infectious bursal disease (66%). Most farmers maintained vaccination schedules but hygiene conditions were minimal, with no foot bath and unrestricted public access. All the farmers used different growth promoters, antibiotics, liver tonics, and vitamins in broilers. The average mortality rate of the studied farm was 3.36%, the average final body weight was 1.7 kg and the average feed conversion ratio (FCR) was 1.26. It is concluded that the information gathered through this study would be beneficial in developing enhanced poultry management strategies in the study area.

Keywords: Broiler, production performance, mortality rate, day old chick, feed conversion ratio.

1. Introduction

The poultry sector has developed as one of the most promising commercial sectors in Bangladesh in recent years. It contributes 14% to the overall economic value of livestock [30] and 37% of the total animal protein in Bangladesh [27]. The total poultry population is 3857.04 lakh in 2022-23 which is the highest among the previous years [23]. It is estimated that per year per capita consumption of broiler meat was 6.3 kg in 2018 which was assumed to reach 7 kg in 2020 [15]. So the demand for broiler chicken which is mainly produced for meat purposes is increasing day by day due to its shorter production cycle, tenderness, high palatability and digestibility and low price [21].

In recent years poultry industry has experienced a positive transformation evolving from backyard rearing to fast growing commercial sector. A study done on the effect of the Smallholder Livestock Department Project showed that the socio-economic condition of the people of rural areas especially the meat and egg consumption rate, employment rate improved due to the measures taken by SLDP (smallholder livestock department project) [3]. About more than 6 million job opportunities are created by the poultry industry [7]. Thus facilitating in reducing unemployment problems, improving socio-economic conditions also expanding women's empowerment in rural areas [28]. A great number of rural women are under the non-government organization and department of livestock service conducting poverty alleviation

programs which include poultry production and rearing [23]. The poultry sector also created great investment opportunities in Bangladesh [14]. So the poultry sector has become one of the great sources for earning, reducing poverty [10]. It has also a greater contribution to the GDP of the country, thus contributing 1% of the total GDP of Bangladesh [12]

Broilers are young chickens of either male or female reared for meat production. They are characterized by rapid growth gaining a weight of 1.5-2 kg from around 40 gm within 5 weeks. So achieving profits from the poultry industry [35]. One should have good knowledge and more concern on its technical aspects like housing, breeding, feeding and overall management [36]. Like layer birds, broiler also need similar housing with one square feet floor space per bird after they are brought from hatcheries as day old chicks. As they grow quickly, they require high protein, vitamins, minerals and other trace elements in their diet. According to [6], probiotics in the diet of broilers have a great effect on their body weight gain, mortality rate and feed conversion ratio. Again feed conversion ratio was greater for those birds kept under bio-secured conditions than those without bio-security [5]. .But most of the broiler farm owners suffer from different problems like lack of capital, price and low quality of the chicks, high feed cost which is also low in quality, improper transportation system, and inadequate veterinary services [22,37]. Studies found that the high price of broiler feed is one of the important factors affecting broiler farms [11,13]. Environmental factors like temperature also affect the growth of the broilers. Besides this broiler faces a lot of diseases like infectious Bursal disease (Gumboro), Newcastle disease (Ranikhet Disease), Avian Influenza, salmonellosis and many more which lead to high mortality [31]. Most of the diseases occur due to managemental problems on the farm as most of the farmers are illiterate and have no training or experience in broiler farming. Moreover, worldwide the broiler industry including Bangladesh adopting new strategies and technologies to improve managemental systems and production performance.

A good number of research have occurred in different regions in Bangladesh on broiler production and management. However, no research was found on the management and production aspect of broiler farms in the Hathazari region of Chittagong which has great geographical significance due to its rich agricultural land and abundant water resources from the Halda river. Therefore, the current study was undertaken in the Hathazari upazila of Chittagong to minimize this research gap by achieving the following objectives:

(i) to know the socio-economic status of the farmers of the Hathazari region,
(ii) to assess the different managemental systems adopted by farmers in the Hathazari region,
(iii) to assess the production performance of broilers in the Hathazari region

2. Materials and Methods

2.1 Study area

This study was conducted at some selected broiler farms of Hathazari upazila of Chattogram district, Bangladesh.

Figure 1: Location of study area

2.2 Study period

The information related to broiler farming was collected from February, 2024 to March, 2024 in the daily basis.

2.3 Study design

The study design is a retrospective descriptive study, meaning it examines past data to identify trends and insights without altering any variables. By analyzing existing records, the research aims to understand different aspects of broiler management, including housing, nutrition, health, and overall performance.

2.4 Study population

The study was carried out on broiler farms in Hathazari Upazila, with flock sizes varying from 500 to 3,000 birds. Farms were selected based on key criteria, including their size, location, and overall farm conditions. Ten farms were randomly chosen to provide a diverse and representative sample, capturing a range of distances and farming environments. This selection

process was designed to ensure that the farms included in the study would offer valuable insights and align with the research objectives.

2.5 Data collection

The data were collected through the direct interview of the broiler farmers and also by direct visit to the farm. A Questionnaire was designed for data collection which contained both open and close form of question. The data were collected from the owner, their family members and the workers by asking different question in simplest way. In addition, farm record book was used, when available, for validation of this information. All the data were collected according to the management system of the farms. The data were collected on different parameter like owner's information (Name, age, occupation, experience and received any training or not), management system (No. of birds, type of housing, floor and litter management, brooding, feeder and drinker, biosecurity and hygiene practices, common disease and drug used and vaccination schedule) and finally on production performance like feed conversion ratio (FCR), mortality rate and final body weight.

$$FCR = \frac{Total\ feed(kg) consumed\ up\ to\ the\ age\ of\ marketing}{Live\ weight\ (kg) of\ bird\ at\ the\ age\ of\ marketing}$$

$$Mortality\ rate = \frac{Total\ death\ till\ marketing}{Total\ DOC\ introduced\ in\ farm} \times 100$$

$$Final\ body\ weight\ gain = live\ weight\ of\ bird\ at\ marketing\ day - day\ old\ chick\ weight$$

2.6 Statistical analysis

The collected data was processed using Microsoft Excel 2016 for further analysis. Descriptive statistics including mean value, frequencies and percentages were calculated using Excel formula. For various qualitative variables, the Fisher's Exact test was performed using STATA- 18 software.

3: Results

3.1 Owner's information

Detailed information about the owners are presented in Table 1. Most of the farmers (60%) invested their own funds. The majority of them did not receive any training (90%; p = 0.001). No female broiler farm owner was observed in the study area. A great percentage (60%) of them are between the age of 24 to 30 years. About 50% of the owner had an experience of 6 to10 years and a considerable number of them have taken farming as their primary occupation.

Table 1: Information about the status of broiler farm owners (N=10).

Parameter	**Categories**	**No. of farmers**	**Percentage (%)**	**p-value (Fisher's Exact)**
Investment source	Own	6	60	0.656
	Bank loan	4	40	
	Yes	1	10	0.001

Received any training	No	9	90	
Age (year)	24-30	6	60	0.090
	31-35	2	20	
	36-40	2	20	
Sex	Male	10	100	-
	Female	0	0	
Experience (year)	1-5	3	30	0.118
	6-10	5	50	
	11-15	1	10	
	16-20	1	10	
Farming main occupation	Yes	7	70	0.178
	No	3	30	

3.2 Managemental practices in broiler farms

3.2.1 Collection of day old chick and no. of birds:

The farmers collected the day-old chicks (DOC) from different companies like Kazi farms, Paragon, CP, Nahar etc. in the Hathazari region. They collected the DOCs through the local dealers of particular hatcheries. The size of the observed farms and the source of DOCs are presented in Table 2. Among the ten (10) farms three small-scale (30%), five medium-scale (50%) and two large scales (20%) farms were seen. Most of the DOCs (50%) were obtained from the Kazi farm in that area.

Table 2: Size of farms and source of DOC.

Parameter		**No. of farmers**	**Percentage (%)**	**p-value**
Farm size	Small (500-1000 birds)	3	30	0.349
	Medium (1000-2000 birds)	5	50	
	Large (2000-3000 birds)	2	20	
Source of DOC	Kazi Farm	5	50	0.111
	Paragon	2	20	
	Aman	1	10	
	Nourish	1	10	

	Dhaka group	1	10	

3.2.2 Housing system

All ten broiler farms are of intensive type with tin shed roofs. Large and medium-scale farms had separate brooder and grower sheds. But in small-scale farms, there was a single shed used for both brooding and growing purposes. The housing system of the selected farms is shown in Table 3 which reveals that most farms had kacha floors (60%) and the majority of farmers used tarpaulin as curtain to protect their birds from adverse weather.

Table 3: Housing system of farms.

Parameter		**No. of farms**	**Percentage (%)**	**p-value**
Floor type	Kacha	6	60%	0.656
	Paka	4	40%	
Curtain type	Sack	4	40%	0.656
	Tarpaulin	6	60%	
Floor space/bird at grower stage	1-1.5 Sq. ft	5	50%	_
	1.5-2 Sq. ft	5	50%	

3.2.3 Feeder and drinker

In most farms, tray feeders are used during brooding (some farmers avoid it as it causes more wastage of feed) and round feeders after brooding. Feeders are wiped daily with a clean cloth and washed per batch. Drinker washed regularly. Water was supplied directly from deep wells in most farms. The number of feeders and drinkers is presented in Table 4 showing that during brooding 6 farms used 1 feeder and drinker per 100 birds. At growing stage, 6 farms ($p = 0.057$) kept 3-4 feeders for every 100 birds which indicating a significant difference in feeder distribution.

Table 4: No of feeder and drinker in farms.

Period of flock	**No. of feeders/100 bird**	**No. of farm**	**p-value**	**No. of drinkers/100 bird**	**No. of farm**	**p-value**
Brooder	1	6	0.656	1	6	0.656
	2	4		2	4	
Grower	1-2	3	0.057	1-2	4	0.142
	3-4	6		3-4	5	
	5-6	1		5-6	1	

3.2.4 Brooding management

The brooder house was prepared before the arrival of the chicks at the farm using rice husk as litter material and plastic board as chick guard. In most farms, 500 chicks were brooded together except some in which 300/400/750/1000 were brooded together. The duration of brooding was 5-7 days in summer and 15-18 days in winter.

No significant differences can be figured out on brooding temperature measurement and the number of bulbs used for brooding from Table 5. Half of the farms maintained the brooder temperature schedule by keeping the temperature scale in the brooding area whereas half of the farms did not maintain that.

Table 5: Temperature measurement and No. of bulb used during brooding.

Parameter		**No. of farms**	**p-value**
Brooding temperature	Measured	5	-
	Not measured	5	
No. of bulb used/ brooding	3-5 of 100 watt/500 bird	5	-
	6 of 100 watt/ 500 or 750 bird	5	

3.2.5 Litter management

Sawdust was used as litter material in all farms due to scarcity of the rice husks in the Hathazari region. The depth of the liter was thicker in cold season than summer.. In most farms during the summer season, the litter depth ranged from 1 to 1.5 inches, while in some farms, it was deeper, measuring between 2 to 2.5 inches.In cold season the depth is usually 3 inches in most farms

3.2.6 Feeding management

Effective feed and feeding management is a primary concern for successful commercial poultry farming. The feed should contain all of the nutrients like protein, fat, carbohydrate vitamins, and minerals for proper growth of broilers. All the farmers of the study area used feed from different companies like Kazi, ACI, Paragon etc.

Table 6: Feed, feed type and feeding schedule adapted by different farmers.

Feed Company	**Farm no. (%)**	**Feed type**	**Feed size**	**Time**
Kazi	3 (30%)	Broiler starter	Crumble	0-15 days
		Broiler grower	pellet	15-till marketing
ACI	2 (20%)	Broiler starter	Crumble	0-14 days
		Broiler grower	Pellet	14- till marketing
Paragon	2 (20%)	Broiler starter	Crumble	0-15 days
		Broiler grower	Pellet	15-till marketing

Suguna	1 (10%)	Broiler starter	Crumble	0-20 days
		Broiler finisher	Pellet	20-till marketing
Aman	1 (10%)	Broiler starter	Crumble	0-17 days
		Broiler grower	Pellet	17-till marketing
Nourish	1 (10%)	Broiler pre-starter	Crumble	0-8 days
		Broiler starter	Crumble	9-20 days
		Broiler finisher	Pellet	21- till marketing

3.2.7 Common disease and medication

The prevalence of different kinds of diseases was seen in all broiler farms. Outbreaks of infectious bursal disease (Gumboro) and Newcastle disease (Ranikhet) were seen in some of the farms which caused high mortality and great loss to the farmers. Besides these, brooder pneumonia, chronic ascites, and infectious coryza were also seen in different farms.

From Table 7, it can be observed that infectious bursal disease (66%) is the most prevalent disease in that region followed by Newcastle disease (44%). Various kinds of medicine were used by farmers in the brooding and growing stages of broilers. In the brooding stage, Cefa-1 Vet (Cephalexin), Lisovit (anti-stress drug), and different vitamins and minerals like Zinc, Calcium, selenium etc were given to the birds. Glucose and amino acid preparations were used. In the growing stage, different antibiotics like Sulpha drug, amoxicillin, Colistin, Enrofloxacin, Amprolium etc. were used. Toxin binder, liver tonic, and different vitamin-mineral preparations were also used to enhance the growth of broilers.Table 7: Disease prevalence in different farms.

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Name of Disease	**No of Farms**	**Prevalence (%)**
Infectious bursal disease (IBD)	6	66%
Newcastle Disease (ND)	4	44%
Chronic Respiratory disease	4	44%
Infectious Coryza	3	33%
Brooder Pneumonia	1	11%
Ascites	1	11%

3.2.8 Vaccination schedule

The table below presents the vaccination schedule for broiler chicks, including the specific diseases targeted, the vaccines administered, and the recommended dosage and route of administration. This schedule aims to ensure the health and protection of the flock against common poultry diseases, such as Newcastle Disease (ND) and Infectious Bursal Disease

(IBD, also known as Gumboro). Vaccines are given at various stages of the chicks' development, primarily through eye drops, as detailed in the table 8.Most of the farmers maintained the proper vaccination schedule whereas some of them had vaccinated their chicks for 2 to 3 times

Table 8: Proper vaccination Schedule maintained by farmers in study area.

Day	Disease	Vaccine	Dose and Route
3-4	ND	BCRDV	1 drop in 1 eye
7-12	IBD	Gumboro	1 drop in 1 eye
18-20	ND	BCRDV	1 drop in 1 eye
22-25	IBD	Gumboro	1 drop in 1 eye

3.2.9 Biosecurity and hygiene management

Most of the farmers maintained minimal biosecurity in their farms. Farmers and workers used separate shoes and dresses to enter the farms. There was no footbath in any farms. No strict restriction was available to the entry of common people in most of the farms. Vehicles carrying feed had their wheels sprayed before entering the farms. Proper ventilation was maintained in most of the farms. Most of the farms had proper drainage systems to wash out the wastage. Dead birds were either buried in the soil or fed to fish or thrown away into the push. On some farms, nets were used to keep rodents out, but others had rodent problems, including rats because they don't take any measure to prevent rodents. After the flock was sold, the litter material was thoroughly cleaned. Then some farmers washed the shed with bleaching powder and lime while some of them washed with potash and lime water. At last the sheds were sprayed with copper sulphate.

3.2 Production performance of the farms

The table 9 presents a detailed overview of broiler flock performance across different farms, highlighting key factors that influence their growth and overall productivity. It includes data on initial and final flock sizes, mortality rates, feed consumption per bird, final body weight, and the Feed Conversion Ratio (FCR). These metrics are crucial for assessing the health and efficiency of the flocks, as well as understanding the relationship between feed intake, survival rates, and growth.

This information reflects both the challenges and successes in broiler farming, providing insight into how different management practices affected the flocks. Mortality rates shed light on the overall health of the birds, while feed consumption per bird and final body weight give an indication of the effectiveness of the feeding strategies in place. The FCR, which represents the amount of feed required for each unit of weight gain, serves as a key measure of how efficiently the birds are converting feed into growth.

Table 9: Production performance of the 10 studied farms with mortality rate

Sl no.	Initial Population	Final Population	Mortality Rate (%)	Total feed consumption/Bird (Kg)	Final body weight/Bird (Kg)	FCR

1	3000	2830	5.6	1.6	1.5	1.06
2	2000	1960	2	2.5	1.5	1.6
3	1500	1470	2	2	1.8	1.1
4	1500	1430	4.6	3	1.6	1.8
5	1500	1470	2	2	1.8	1.1
6	1000	995	0.5	2	2	1
7	1000	970	3	2.5	1.7	1.5
8	600	570	5	2	1.6	1.25
9	500	480	4	1.8	2	0.9
10	500	485	3	2	1.5	1.3
Total	**13100**	**12660**	**3.36**	**21.4**	**1.7**	**1.26**

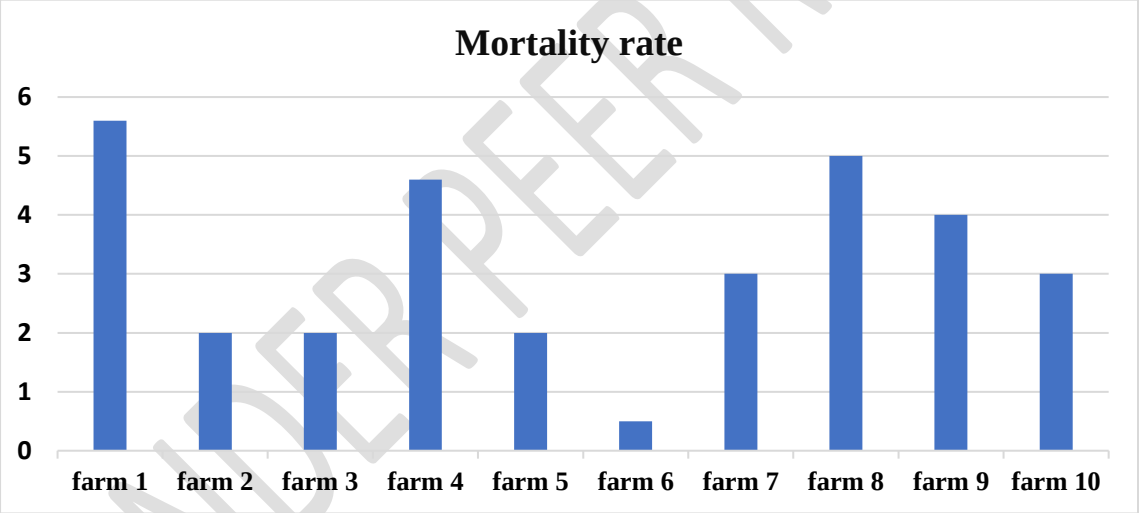

Figure *2*: Mortality rate of 10 farms

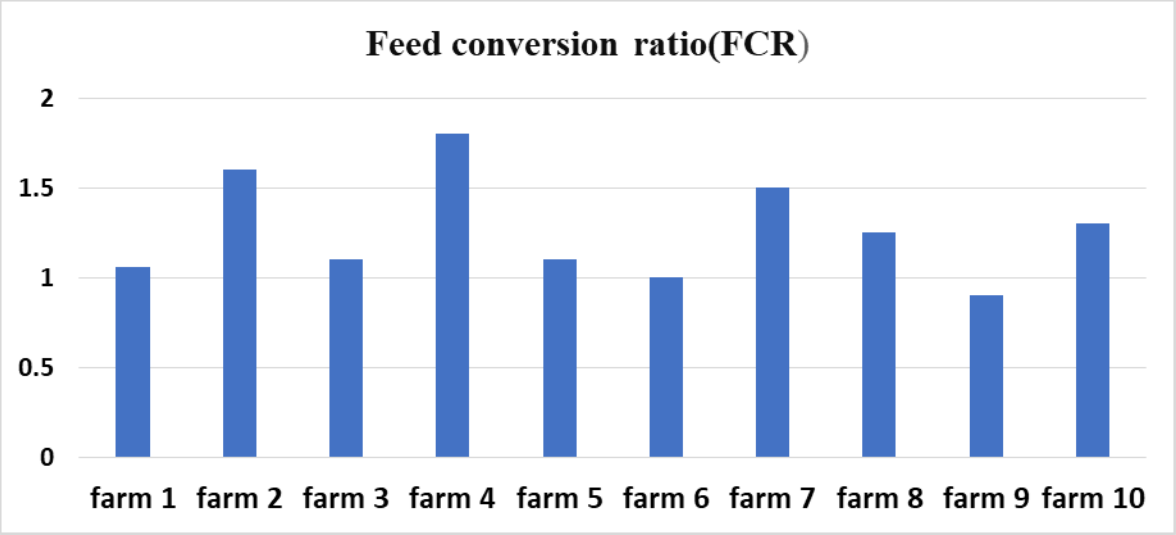

Figure 3: Feed conversion ratio (FCR) of 10 farms

Discussion

The present study revealed that the investment sources of 60% of the farmers were their own money while Hussain [17] found that farmers started their farms by taking loans from Bangladesh Krishi Bank. This difference may be attributed to variations in financial accessibility and economic conditions across different study areas. Regarding the age distribution of farmers, 60% of the farmers in the study area were young (24-30 years), whereas previous studies, such as that of [32], found that 60% of farmers were middle-aged (31-50 years). Similarly, Akter et al. [2] observed that 54.84% of farmers in Mymensingh were in the middle-age category. These variations might be influenced by regional differences in occupational preferences and generational involvement in farming.

Most of the farmers (50%) had an experience of 6-10 years while 30% of them had experience of 1-5 years.Islam et al [20]found that 75% of Mymensingh and 33.3% of farmers of Barguna had experience of more than 3 years. These findings highlight regional differences in farmer experience, potentially due to disparities in the establishment and expansion of poultry farming.

Only 10% of farmers in the study area had received training, while 90% had no formal training. Alam et al. [4] reported a slightly higher percentage (27.5%) of trained farmers, showing a general trend of insufficient training across regions. The lack of training could influence farm productivity and management efficiency.

Farming was the main occupation of 70% farmers while 30% of them took it as a secondary occupation or hobby.Mozumdar et al [26] showed that 35% of broiler farmer had taken farming as main occupation. Those suggests that economic dependence on poultry farming varies across regions.

In the study area, 50% of the farms were of medium scale while 30% were of small scale and only 20% of farms were of large scale. These findings align the findings of Islam et al [19]] who reported that most of the farms (50%) were of medium scale; 25% farmers had small and 25% farmers had large farms in mymensingh.. Maximum farmers purchased day-old chick from Kazi Farms Ltd and this has previously been reported in another study [14]. The flooring system of most of the farms was Kacha whereas some of them had Paka floors. The study of Uddin [33] reported that most broiler flooring systems are Kacha and brick in Bangladesh.

They suggested that using Kacha flooring because it resulted in higher growth rates and better feed conversion ratio (FCR) compared to other types of flooring [1]. All of the broiler sheds in the study region were intensive open-sided types which issimilar to the study of Islam et al [19]. The majority of farmers in Hathazari Upazila (30%) used feed from Kazi Farms Ltd., which is similar to the findings of Uddin [33] in Santhia Upazila, Pabna district.. Besides this, feed of Paragon, ACI, Aman, and Nourish were also used in the study region. All farmers of the study region used sawdust as litter material due to lacking of rice husk in that region. However, Afrin et al [1] reported that rice husks were mainly used by the farmers (60%) in the Sylhet region other than sawdust (28%). Brooding was done with an electric brooder in all of the farms for 5-7 days in the study area. Islam et al [19] also reported electric brooding for 7 days in Mymensingh and Barguna district.

In the study area, the prevalence of infectious bursal disease (66%) & Newcastle disease (44%) were the highest which has similarity with Afrin et al [1]. But Hassan et al[16] reported that salmonellosis was the most prevalent (28.57%) disease while infectious bursal disease & Newcastle disease were the next most prevalent diseases affecting 14.87% and 12.56% of poultry in the Gazipur district. In the study area, vaccines against infectious bursal disease and Newcastle disease were used and a maximum numbers of farmers maintained proper vaccination schedules. The study of Rahman et al [29] reported that 70% of farmers maintained regular vaccination schedules whereas 30% of them did not maintain it. Bhattu et al [9] reported that 16% of the farmers had done regular vaccination to control disease in the Mansa district of Punjab. In Hathazari region most farmers did not imposed strict restrictions on the entry of common people and did not keep any footbath at the entrance of farms which is similar to the findings of Ibrahim et al [18] that the biosecurity practices in Bangladesh by poultry farmers are quite insufficient like common people can easily enter the farms without properly disinfecting their hand, shoes and clothes.

The average feed conversion ratio (FCR) of the study area was 1.26 and Chand[35] found the FCR 1.93 to 1.94. The average mortality rate was 3.36% in the Hathazari region but Babiker et al [24] reported 6.2 % mortality in the Hariana region. The final body weight per bird was 1.7 kg which is similar to Afrin et al [1]. But Hauque [34] reported a 1.5 kg average market weight per bird in Sherpur Sadar Upazila.

Conclusion

Broiler sector has a great role in improvement of socio-economic condition of people of The broiler sector has a great role in the improvement of the socio-economic condition of the people of Bangladesh. It has created employment opportunities for the educated young generation and rural women. In the Hathazari region all of the broiler farm owners (100%) are male and most of them are youth of age 24-30 years old. Only 10% of the farmers got training on farming and large number of them (70%) has taken it as their main profession. Intensive rearing was practiced in all farms, with most the farms (60%) having kacha floors. The majority of DOCs (60%) and feed (30%) were supplied by Kazi farms. Electric brooding was done in all farms for 5-7 days in summer. Sawdust was used as litter material in that area. Birds were mostly affected by infectious bursal disease (66%) despite most farmers maintaining a proper vaccination schedule in that areaThe findings of this study will assist broiler farmers and researchers in identifying gaps in broiler management practices and developing strategies to overcome them, ultimately enhancing production performance. Besides this, the government should take the lead in advancing this sector.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Author's Contribution:

This study was a collaborative effort among all authors. **Author MNUN** led the conceptualization, supervised the research, and ensured the accuracy and integrity of the methodology. **Author NJM** conducted the field survey, collected resources, managed the investigation, performed primary data analysis, and drafted the initial manuscript. **Author SZ** was responsible for data curation, applying software tools, conducting statistical analyses, and generating visual representations of the results. Additionally, **Authors MNUN and SZ** contributed to manuscript review and refinement. All authors have thoroughly reviewed and approved the final version for publication

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