Chapter 1: INTRODUCTION

Pigeon is the common name for members of the family Columbidae characterized by stout bodies and necks, small heads and thick, heavy plumage Gifford, (1941). Pigeons are related to human since ancient time. They live side by side with human as a source of food, hobby and experimental purposes Sari *et al.,* (2008). Pigeons are incredibly complex and intelligent animals. Pigeons are ubiquitous birds and can be found in virtually every town and city around the globe Marques *et al.,* (2007). They are highly dependent on humans to provide them with food and sites for roosting, loafing and nesting. Although pigeons are one of the most intelligent of all the bird species man has found limited uses for the birds other than for the purposes of sport, food and as a message carrier.

Bangladesh has a long historical record of raising poultry under backyard system Bhowmik *et al.,* (2014). The weather and vast areas of crop field along with housing premises of Bangladesh are suitable for pigeon farming Asaduzzaman *et al.,* (2009). More than 80% of the rural households' rear poultry Haque, (1987). Mbap, (1985) suggested that before attempting any genetic improvement, animals must first be characterized FAO, (2010). The future utilization of genetic resource depends on breed characterization. Pigeons are mainly monogamous birds Essam, (1997). The contribution of pigeon has not yet been considered in relation to the contribution of Livestock sub-sector and whole poultry production though the pigeons provide alternative source of animal protein. Comparatively low investment, less feed and housing cost involved, easy and economic husbandry practices, short reproduction cycle and less disease occurrence are observed for pigeon farming. Pigeons are used in natural beautification and ornamental birds as source of recreation, source of palatable, delicious and easily digestible animal protein, source of bio-fertilizer especially for family gardening and used as the laboratory animal in case of genetic and hormonal studies Asaduzzaman *et al.,* (2009). Hence profitable pigeon farming may be an easy and

reliable source of employment opportunity, way of family labor utilization and cash income.

Sustainable and increasing rate of pigeon farming may enhance the rate of reducing the gap of animal protein deficiency; increase the rate of poverty reduction and it may improve the socio-economic status of the rural poor community Asaduzzaman *et al.*, (2009). In Bangladesh perspective some fancy pigeons especially Crowned pigeon, Jacobin, Fantail, Pouter, Swallow, Bokhara trumpeter and Frill back are reared as expensive items and it have aristocratic lifestyles Kabir MA, (2015). In these pigeons for ornamental feathers which are the barriers for its normal breeding. So, trimming of the head-feather, leg and tail region is must in some cases. For the huge ornamentation of feathers those pigeons can not fly properly. So, it is easily maintained in a balcony or narrow space of the residence Kabir MA, (2015). Giribaz is one of the oldest pigeons in Indo-Bangladesh subcontinent. Tumbler pigeons are come by lots of artificial selection. In Bangladesh perspectives the tumblers are very ancient Kabir MA, (2015).

Among the farmers 50% liked Gola, 37.5% Giribaz, 5% Siraji, 5% Serting and 5% Mayouri / Local breed of pigeon Islam, (2010). The pigeon is able to consume simple feeds consisting of grains and a little good grit; the pigeon also needed clear water Anggorodi, (1995). Drevjany, (2001) also reports that pigeon could be fed with feed that was made up of crumble ration or mixed of grins, minerals, grits and water. Among the feeds, pigeon liked grains such as corn, soya bean, peanut and wheat grain Alwazzan, (2000). The meat derived from the early age of pigeon is called squab meat. People of all religions like squab meat. Squab meat is very lean, easily digestible and rich in proteins, minerals and vitamins. It is also used as tasty, delicate and fancy meat (Richard, 2006; Morgan, 2006). Chinese people consider the meat of pigeons as having medicinal value and squab is a part of celebratory banquets for holiday such as Chinese New Year Hsiung *et al.,* (2005). Egyptians raised pigeon for food Levi, (1972). Pigeon were popular in Romans, France and England as a means of Livelihood to produce squab Goodwin, (1967).

In developing countries like Bangladesh, Pigeons are reared under semi scavenging system mainly for squab production. Balance ration is one of the fundamental requirements to successful pigeon farming. Optimum nutrition promotes proper growth, production and disease resistance Levi, (1977).

However, information on the pigeon rearing scenario in different areas of Bangladesh especially Hakimpur Upazila of Dinajpur District is limited. Therefore, the current study was conducted to study the present status, problems and prospects and to formulate some suggestions about pigeon farming in Hakimpur Upazila, Dinajpur, Bangladesh.

Objectives of the study:

1. To know the common management practices of pigeon farming
2. To determine feeding system and availability of feeds for raising of pigeon
3. To identify the diseases and vaccination status of pigeon
4. To evaluate production performance of pigeon
5. To calculate profitability of raising pigeon in different numbers

Chapter 2: Review of Literature

Pigeons are mainly monogamous birds, pigeons mated for life, they mate in pair and remained together for life unless they were forced to be separated by removal or death Essam, (1997) and Levi, (1974). Pigeons are reared as pairs. Therefore, male female ratio should be 1.00. Levi, (1957).

The interval between two consecutive egg laying (days) depends on the activity of parents to rear of their squabs Abdel- Azeem, (2005). The length of the egg cycle of adult pigeons significantly increased due to decreasing dietary Metabolizable Energy levels Abou Khashaba *et al.,* (2009). The length of the egg cycle values depending on the activity of parents to rear of their squabs and times of environmental conditions (light, warm, and nutrition) Abou Khashaba *et al.,* (2009).

The duration of incubation is 18 days from laying of the first egg in pigeons, but only 15 days in doves. Hatching takes about 24 hours from first pipping of the shell Silver, (1978). Incubation period lasted from 17 to 18 days and shared by both parents Bokhari, (1994). Allover mean of squabs/female/season was lower in summer and autumn seasons by almost 30% compared to that in winter and spring seasons El-Hanoun *et al.,* (2008). Squab's number was high during the spring season and low during the autumn season Fred *et al.,* (1953).

Seasons had a significant effect on the fertility and hatchability percentages, where spring and winter seasons had the highest values followed by autumn and summer seasons, whereas the pattern became vice versa for embryonic mortality and pipped eggs percentages. Embryonic mortality percentage was not significantly affected by seasons El-Hanoun *et al.,* (2008). Embryonic mortality and pipped eggs increased and hatchability decreased in summer than other seasons Drent and Woldendrop, (1989). Season had an effect on reproductive traits of pigeons, with a decrease in fertility and

hatchability percentages during summer season Ahmed and Mahmoud, (1992). Male and female parent pigeons incubate the eggs and the first hatched squab usually is male, while the second was female Abdel-Azeem, (2005).

Feeding one pair of pigeon requires about 74gm of feed which costs about TK 2.00 per day. Monthly cost of feeding for a pair of pigeon was TK 60.00 Asaduzzaman *et al.*, (2009). It is evident that the squab weight ranged from 200 to 300gm with an average of 258gm Asaduzzaman *et al*., (2009). The weights of pigeons with free access to food were found to fluctuate with season. All pigeons were at their heaviest weight in the winter and were lightest in summer Sargisson *et al.*, (2007). There found significant seasonal variation gaining weight in the spring, autumn and winter. The body weight reached at maximum in the winter Clark, (1979). The pigeons gain heaviest body weight in the winter and lightest in the summer Kangas and Branch, (2006) and Rebecca *et al.*, (2007).

Levi, (1957) reported marketing age varying from 25 to 35 days with an average of 30 days. Rahman, (1999) reported each loton pigeon was sold at 150-200 taka, whereas, Levi, (1957) observed the price of each commercial pigeon was 175 taka. A variety of diseases affect pigeons but viral diseases are predominate Liu *et al.*, (2003). Among viral diseases, Newcastle disease is most important disease Ballouh *et al.*, (1985).

Chapter 3: Materials and Methods

The study was conducted from August 2019 to March 2020. The selected area was Hakimpur Upazila of Dinajpur district. Ten selected pigeon farms have been visited randomly and the different information about pigeons were recorded. Keeping in view the objectives of the study, the upazila was also chosen on information that people of this upazila has been rearing pigeon since long time. The interview schedule was carefully designed keeping the objectives in view. The schedule contained both open and closed form questions. Most easy, simple and direct questions were asked to obtain information. The parameters recorded are farmers personal information (age and educational level) and about breed, housing, feeding, management and marketing of pigeon and squab, problems and prospects in pigeon farming by the farmers.

The collected data were complied, tabulated and analyzed as per objectives of the study. Qualitative data were converted into Quantitative forms by means of suitable score whenever needed simple tabular techniques were used to explain the data. Percentages were used mainly to illustrate the results. It is however to be noted that for analytical purpose, the cost and returns per bird and per family were estimated.

Chapter 4: Results

4.1. Educational level of pigeon owner

Educational level of pigeon owner is an important indicator for pigeon rearing. The farmers were classified into 3 categories on the basis of their educational level and represented in (Figure 4.1). Data presented that most of the farmers 30% were SSC and above, 30% farmers were class (1-10), 40% farmers were illiterate. Results revealed that pigeon farmers had lower educational level.

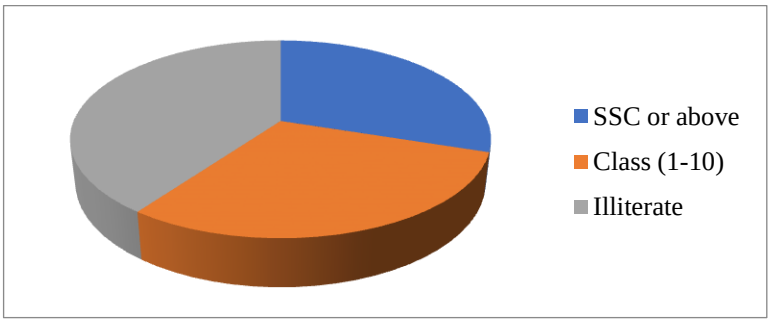

Figure (4.1): Literacy level of farm owner in the studied area

4.2. Different types of feed supplied to the pigeon:

The feeds supplied to the pigeons were Wheat, Mustard, Rice grain, Maize, Pea, Millet etc. (Table 1). The owners supplied feed two to three times daily. Feed ingredients were differing from availability of feed ingredients, seasons and areas.

Table 1: Feed items supplied to the pigeons

Feed items supplied
Wheat
Mustard
Rice grain
Maize
Pea and Millet

4.3. Disease incidence and Vaccination status:

Pigeons were affected different type of diseases (Figure 4.2). These diseases were occurred due to infection by different Bacteria, Virus, Parasite and Fungus. The pigeons were mostly affected by Newcastle disease, Fowl pox, Lice infestation, Salmonellosis, Staphylococcosis and mineral deficiency as per the sign and symptoms shown by the bird and explained by the farm owners. Treatments were given mainly on the basis of sign and symptoms by the owner himself or by registered Veterinarian. Only 30% of the pigeon farms were vaccinated by Newcastle disease vaccine and Pox vaccine.

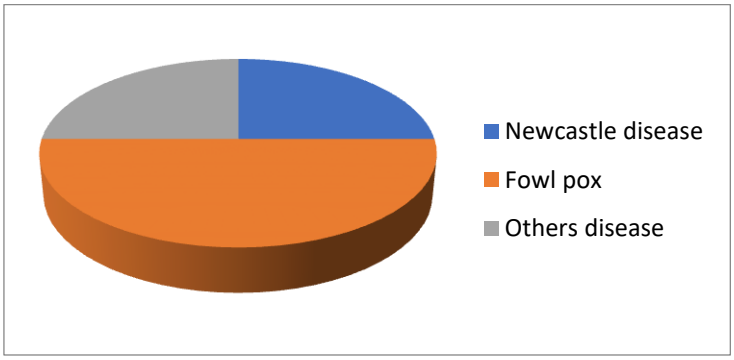

Figure (4.2): Disease incidence of the ten pigeon farms

4.4. Farm owners, pigeon breed, rearing time and number of pigeons

The pigeon owners times of rearing of pigeons were maximum 5 years and minimum 1 year, with an average 2.5 years (Table 2). The rearing of pigeon number ranged from 10 to 53 pairs, with an average 22 pair/year. The pigeon owners likely to prefer Deshi, Giribaz, Loton and King breeds of pigeon.

Table 2: Farm owners, Times of rearing, Number of pigeons and Breeds name

Farms No.	Name of the farm owner	Times of rearing year(s)	No. of pigeon reared (In pair)	Name of the pigeon breeds
1	Masud	5	28	Giribaz, King, Homer, Loton, Deshi
2	Afela	2	31	Fantail, Deshi, Giribaz
3	Tarek	1	14	Lakha, Loton
4	Marfudul	3	10	Homer, Giribaz, Deshi, Lakha
5	Labu	2	10	Deshi, Siraji, Loton, Giribaz
6	Dalim	1	13	Giribaz, Loton
7	Sirazul	1	18	Siraji, King, Fantail
8	Ilias	5	25	Lakha, Homer, Giribaz, Deshi
9	Ikbal	4	53	Chila, King, Jacobing, Deshi
10	Mamun	1	16	Giribaz, Cropper, Loton

4.5. Bird performance and mortality

The feed supply, feed cost, no. of squab production per year, marketing age, body weight of squab, price of squab and mortality are represented in (Table 3). The quantity of feed supplied to pigeon ranged from 31 gm/day to 46 gm/day, with an average 37.6 gm/day. Pigeon feed cost was an average 42 taka/kg. Therefore, spending on feed 37.6gm/day for each pigeon was about 1 taka per day. Maximum production of squab was 450 numbers/year and minimum production was 120 numbers/year, with an average 315 numbers/year. The range of marketing age was 25-35 days and the average marketing age was 30 days. Maximum body weight of squab was 350 gm and minimum body weight was 200 gm, with an average 282 gm. The price of squab ranged from 110 to 150 taka, with an average 130 taka. Maximum mortality was 18% and minimum mortality was 2%, with an average 8% in the pigeon farms.

Table 3: Collection of Data from 10 Pigeon farms

Parameter	Farm No.										Average
	1	2	3	4	5	6	7	8	9	10	
No. of pigeon reared (In pair)	28	31	14	10	10	13	18	25	53	16	22
Feed supply (gm/ day/pigeon)	35	38	43	37	31	38	32	46	36	40	37.6
Feed cost (TK/month/ pigeon)	42	44	45	42	35	40	38	49	40	45	42
No. of squab/year	450	430	210	160	120	180	230	300	830	240	315
Marketing age (days)	32	25	30	30	35	28	30	28	35	30	30
Body wt. of squab (gm)	300	200	280	280	350	230	300	230	350	300	282
Price of squab (TK/pigeon)	150	110	130	120	150	120	130	110	150	130	130
Mortality (%)	2	4	2	12	10	6	4	18	10	8	8

4.6. Cost benefits analysis of the pigeon farms

The cost benefits analysis of the pigeon farms was shown in (Table 4). The data showed that the total average monthly income varies from 4450 TK to 18,770 TK due to the differences in the number of reared pigeons, breeds of pigeon, feed intake, feed cost, mortality and selling price.

Table 4: Cost benefits analysis of the 10 Pigeon farms

Parameter	Farm No.										Average
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
No. of pigeon reared (In pair)	28	31	14	10	10	13	18	25	53	16	22
No. of squab production /year (Average 2 squab produce per month/pair)	450	430	210	160	120	180	230	300	830	240	315
Feed intake (gm/day/ pigeon)	35	38	43	37	31	38	32	46	36	40	37.6
Feed cost (TK/month/ pigeon)	42	44	45	42	35	40	38	49	40	45	42
Mortality (%)	2	4	2	12	10	6	4	18	10	8	8
Selling price of squab (TK/pigeon)	150-800	100-750	150-500	150-650	150-750	100-800	150-500	150-600	100-550	100-800	400
Average selling price of squab (TK/bird)	475	425	325	400	450	450	325	375	325	450	400
Average selling price of adult pigeon (TK/bird)	900	850	700	550	600	750	950	650	750	600	730
Total average profit (TK/month)	14731	11975	5250	4864	4450	6735	6989	5075	18770	8260	8710

Explanation of farm no: 01 (Cost benefits analysis)

Feed Cost = (56+38) × 42
= 94 × 42
= 3948 tk / month × 12
= 47376 tk / year

Here, Adult Pigeon number = 56
Squab production number = 450/Y
=38 /M
Feed Cost = 42 tk

Labor Cost = 3000 × 12 + 4000
= 36000 + 4000
= 40000 tk / year

Here, Labor Cost = 3000 tk / M
Bonus = 4000 tk / Y

Total Cost = Feed Cost + Labor Cost
= (47376 + 40000) tk / year
= 87376 tk / year

Total Income = (56 × 900) + (450 × 475)
= 50400 + 213750
= 264150 tk / year

Here, Adult pigeon no. = 56
Adult pigeon price = 900 tk
Squab production no. = 450/Y
Per squab price = 475 tk

Profit = Total Income – Total Cost
= 264150 - 87376
= 176774 tk / year ÷ 12
= 14731 tk / month

Chapter 5: Discussion

In Bangladesh, Under the Dinajpur district Hakimpur Upazila is a potential place for pigeon farming. Many types of pigeon are reared in this area, such as: Giribaz, Deshi, Siraji, Loton, Homer, King, Fantail, Lakha, Chila etc.

The present study was done on pigeon farming where 10 pigeon farms were selected randomly and observed that among all of the breeds, Giribaz was the largest proportion as reared of the pigeon farmer. However, Asaduzzaman *et al.,* (2007) reported that most of the pigeon farmers of Bangladesh had no idea about the breeds or varieties of pigeon. In the present study a picture was focused that most of the pigeon farmers are illiterate. This result is agreements with the findings of Asaduzzaman *et al*., (2009), who observed that pigeon farmers had lower educational level (53.3% illiterate and 46.7% literate) in the context of Bangladesh.

Pigeons are quite territorial about their housing or nesting area Castoro *et al.,* (2008). In the current study, pigeons were reared in semi-intensive system. Construction materials used for pigeon house were wood and bamboo. The house was placed at a reasonable height for the protection of pigeons against predator. The housing cost of pigeon was about TK 2.00/month/pair, appears to be very cheap and reasonable which is similar to Asaduzzaman *et al.,* (2009). The quantity of feed supplied to semi scavenging pigeon from 32.5-42.5 gm/day, with an average of 38.1gm/day Islam, (2010), this result is similar to the present study. But Anonymous (1901) and Bretton (1914) reported that feed intake per pigeon per day was 47.35gm which was higher than the present study. The differences have possibly been arisen because in the present study, pigeon were reared in semi scavenging system whereas; in other studies the pigeons were reared in confinement area. Pigeon feed cost was TK 28 per kg. Therefore, spending on feed 37gm/day for each pigeon was TK 1.00 per day. Feeding one pair of pigeon requires about 74gm of feed which costs about TK 2.00 per day. Monthly cost of feeding for a pair of pigeon was TK 60.00 which is similar to Asaduzzaman *et al.,* (2009).

Usually, Pigeons are reared as pairs. Therefore, male female ratio should be 1.00. Levi, (1957), indicated that male female ratio varied in different breeds and varieties. During marketing, farmers carry their pigeon and squab in a special type of bamboo made cage called “Pingira”. Some others carry them in a banana tree made “Khol”. It is evident that the squab weight ranged from 200 to 300gm with an average of 258gm Asaduzzaman *et al*., (2009).

In the present study maximum production of squab was 18 numbers/year/pair and minimum production was 12 numbers/year/pair. This result is similar to Levi, (1957), who belief that a good commercial pair of pigeon should produce 18 to 20 squabs/year, whereas Platt *et al.,* (1937) recorded 11.4 squabs/pair/bird. The variation in squab’s production may be due to differences in breed and area. The price of squab is high in comparison with that of other poultry meat because it is sold as fancy meat bird considering their palatability, delicacy and taste.

Domestic pigeons are affected with infectious diseases such as Salmonellosis, Colibacillosis, Staphylococcosis, Newcastle disease, Pigeon pox. This finding corroborates with Herdt *et al.,* (2000) who reported Newcastle disease is a globally distributed avian disease that can cause severe economic losses in commercial poultry. Pigeon pox is a slow spreading disease which is responsible for morbidity and mortality in all ages of pigeons. Mortality and morbidity related to pigeon pox virus infection may be very high in pigeons Tripathy, (1991). Several health problems but parasite infections play a major role. They constitute a major source of infection and transmission of diseases Marques *et al.,* (2007). During clinical manifestations of those diseases if proper treatment is applied the survivability of this bird can be increased, bringing more economic benefits to the owners and that’s why by vaccines application is the important preventive measure to control viral diseases.

Chapter 6: Conclusion

Pigeon farming in Bangladesh is a profitable business. But most of the owners of the pigeon farms were illiterate that was recorded in this study. Feed was a major task here. Farmers didn't know the feed value and actual ration of pigeons. Farmers were not well conscious to clean pigeon lofts. So, they often faced a lot of problems especially Newcastle disease, Pox, Eye problems and Diarrhea. Most owners didn't know the actual characteristics of pigeons. So, need to use very common disinfectants once a week. Feed ingredients, amount of feed, clean water all are very important to manage a commercial and well profit farm. Moreover, the pigeon farming may be increased with government initiative providing training to farmers and extending loans facility. Future study is needed for meat yield investigation of squab among different breeds and varieties of pigeon available in Bangladesh for better performance. In addition, a survey on pigeon population and their economic feasibility in Bangladesh should be done.

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Appendix 1

A. General Information's:

1. Name and address of the farmer/owner:

   Name: ……. Village: ……

   P.O.: …….. Upazila: ……

   District: ……... Mobile no: ……

2. How long have you been rearing pigeons?

   a) <1-year b) 1-2 years c) 2-5years d) >5 years

3. a) How many breeds of pigeon that you have

   …….

   b) Number of pigeons belonging to each breed

   ……

B. Housing:

4. a) Housing materials: ……

   b) Single / Multiple housing: ……

   c) Cost of housing/pair: ……

C. Feeding:

5. a) Individual feed / Mixed feeds (With ingredients) …….

   b) Amount of Feed supply per pair / day (once/twice) ……..

   c) Cost of feed per pair of bird / month …….

D. Production information's:

6. a) No of egg laying per pair / month ……... b) Egg weight…….....

   c) Incubation period …… d) Pause of laying ……...

   e) Birth weight /squab ……. f) Market weight /squab …….

   g) Price of squab …….

7. a) Mortality rate / year …… b) Predators ……

   c) Vaccination (yes/no), Types ……... d) Diseases …….

8. Other bird farming (yes / no) …….....

E. Income:

9. Total cost of pigeon production per pair / month ……

10. Net income per pair / month ……...

Appendix 2 (Photograph)

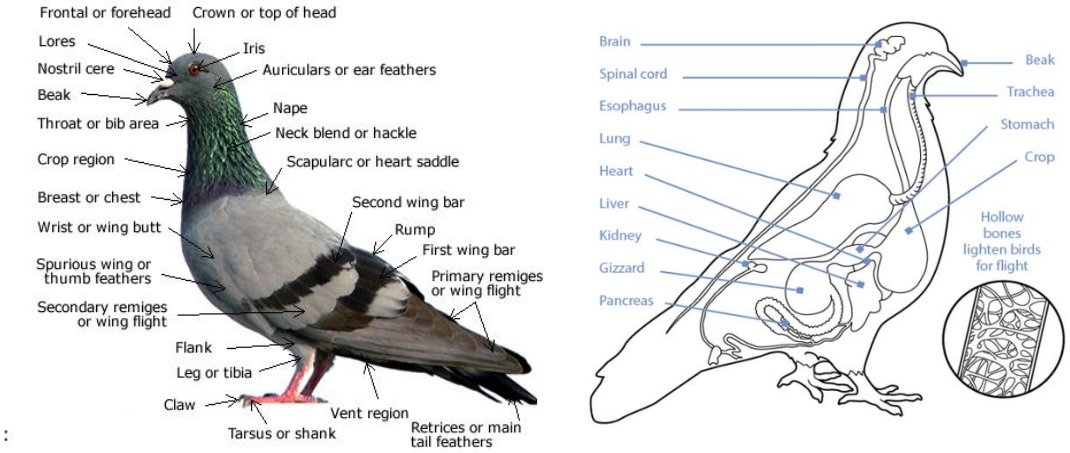

Figure: Different Body parts of Pigeon

Figure: Collection of Data

Figure: Examination of Pigeon

(a)

(b)

(c)

(d)

Figure: Different Housing system of Pigeon


Figure: Feeding system of Pigeon

Biography

Name	Md. Nahid Imtiaz Chowdhury
Present position and Affiliation	Intern Student, 20th Batch, FVM, Chattogram Veterinary and Animal Sciences University
Educational background and year	Doctor of Veterinary Medicine in 2020, Chattogram Veterinary and Animal Sciences University. I completed my S.S.C. with GPA 5 and H.S.C. with GPA 5 from Osmanpur High School, Ghoraghat, Dinajpur and Cantonment Public School and College, Parbatipur, Dinajpur Respectively
Research Interest	Poultry Sector
Aim	I want to be a good Veterinary Doctor