CHAPTER 1

INTRODUCTION

Over the past 12,000 years, more than 6,300 breeds of livestock belonging to 30 domesticated species were developed following domestication and selection. These livestock populations have evolved unique adaptation to their agricultural production system and agro-ecological environments. Their diversity provided a unique resource to respond to the present and future needs of livestock production in both developed and developing countries. In the national socio-economy of third world countries, the role of poultry farming has huge impact and it also helps to improve both the nutritional and production status of the country. The benefit of poultry production among rural and small scale farmer has been mentioned in many research articles. Chicken is one of the most common and widespread domestic animals, with a total population of more than 19 billion as of 2011. There are more chickens in the world than any other bird or domesticated fowl (UN's Food and Agriculture Organization reported in the Economist).

Humans keep chickens primarily as a source of food (consuming both their meat and eggs) and less commonly as pets. Originally raised for cockfighting or for special ceremonies, chickens were not kept for food until the Hellenistic period (fourth–second centuries BCE). Genetic studies have pointed to multiple maternal origins in Southeast Asia, East Asia. Early Holocene chicken domestication in northern China) and South Asia, but with the clade found in the Americas, Europe, the Middle East and Africa originating in the Indian subcontinent. From India, the domesticated chicken was imported to Lydia in western Asia Minor, and to Greece by the fifth century BC(Richell 1997)

In Bangladeshi farms now-a-days the crossbreed Sonali variety (RIR cock crossed with Fayoumi hen) is reared most in the Government and private farms. The exotic breeds like RIR, Fayoumi, Broiler, ISA Brown and White have been adapted with our temperate climate due to the culture of these varieties for a long time and they can easily maintain their life under farm rearing conditions The indigenous chicken

population is composed of a number of breeds/types such as non-descript Deshi Aseel Naked Neck and Hilly. Some dwarf chickens and Red Jungle Fowls can also be seen in the country. The non-descript Deshi chicken is more acceptable to rural people as an important source of meat and eggs due to lower nutritional demand and higher resistance to diseases and heat stress. Fowl, especially poultry, is a promising sector for poverty reduction in Bangladesh. Approximately 140 million chickens are scattered throughout 68 000 villages in the country, mostly of indigenous, non-descriptor type. Bhuiyan, A.K.F.H *et al.* (2005).

Kaptai is a upazila of Rangamati district under Chittagong division located at 22.5000°N 92.2167°E and the area is about 259 sq. km. This area is oriented with various types of rare and endangered flora and fauna. The economy of this area is mainly depends on agriculture and livestock and more than 60% peoples depends on it. Most of the peoples of this area are small scale farmers or livestock holder. Most common species of livestock are -swine, cattle and poultry where poultry plays a vital role in the economy of local people. Chicken rearing is popular in the villages since a long time ago as a source of money and nutrition. Chicken rearing is culturally acceptable and technically and economically viable. The common production method in the villages is backyard scavenging (Ahmed, S.T. and Ali, M.A. 2007). The village chicken is a low producer because of poor genetic makeup and inadequate nutrition and management. Indigenous chickens have the advantage of being well adapted to the local environmental conditions (hot humid dry and rainy weather).Indigenous chickens are scavengers by nature and a system of supplementary feeding is not practical. The birds scavenge for their own feed from morning to evening around houses and fields. They depend on field grains, insects earthworms green matters crop residues homestead pickings and kitchen wastes. No commercial diets are given to them. The eggs are naturally incubated under broody hens (Roberts 1995). Ninety nine per cent farmers keep their chickens in earthen houses. Out of 99% about 22% keep their chickens inside the owner's bedroom. In most of the mud house space and ventilation system are not adequate. The chicken sheds are mainly made of wood pieces with tin roof or straw roof, inside the houses

some building materials (litter) such as ash and sand are used. These materials are easily available to the farmers and cost nothing. The owner does not or cannot clean the houses every day but about once in 15 days cleaning takes place and is normally done by women. The chickens sometime lay eggs outside the chicken houses, e.g. in the store room or similar quiet places .Many phenotypic variations exist among the native chicken population; especially plumage colors, e.g. Black, Red, Spotted, Ash and combination of different colors furnished the chicken's appearance. Hilly birds are covered with plumage of white with black tips (85%) followed by multicolor (15%) (Roque L, Soares M.C 1994). The comb type of Hilly chicken was 100% single, and in 100% cases, no feather was observed in the shank. The shank color of hilly chicken was whitish 35%; yellowish 25% and others 35%. The overall mean indicated that. The earlobe color of Hilly chicken was 80% white followed by red and admixture of red and white reported 1429 gram body weight of hilly chicken at 38 weeks of age. Bhuiyan *et al*. (2009) reported that Deshi chickens are genetically diluted in about 60% cases depending on phenotype character. The adult body weights of female and male birds were 1701 gram and 2690 gram respectively. The average daily feed consumption per bird was 101gram during the laying period. The average egg weight of hilly chicken was 42.6 gram. Indiscriminate random breeding among native chickens and unplanned crossing with exotic breed have been eroding the original characteristics of native chicken. Limited work pertaining to the phenotypic and genotypic constitution of the indigenous chicken of Bangladesh was carried out. For fulfilling the protein demand of rapidly increasing population of our country, we have to improvise the current status of chicken breeds available in our country. Hilly chickens are resistant to many diseases genotypically by themselves and are adapted to the environment of Bangladesh since a long time. Proper conservation and utilization of the genotypic and phenotypic characteristics of these hilly chickens will help to improve the status of poultry in Bangladesh. However, before going to conserve and improve the local genotypes, it is crucial to know their productive and reproductive characteristics.

Objectives:

The objectives of this study were

- To describe the physical features of different populations of indigenous chickens.
- To assess the morphological variations among the populations in order to depict the useful attributes of hilly chickens.
- To identify and note down the different production, reproduction parameters and management of hilly chicken in Kaptai Upazila.

CHAPTER 2

MATERIALS AND METHOD

2.1 Study Period

The study was carried out from July 1st, 2018 to September 1st, 2018.

2.2 Study Area

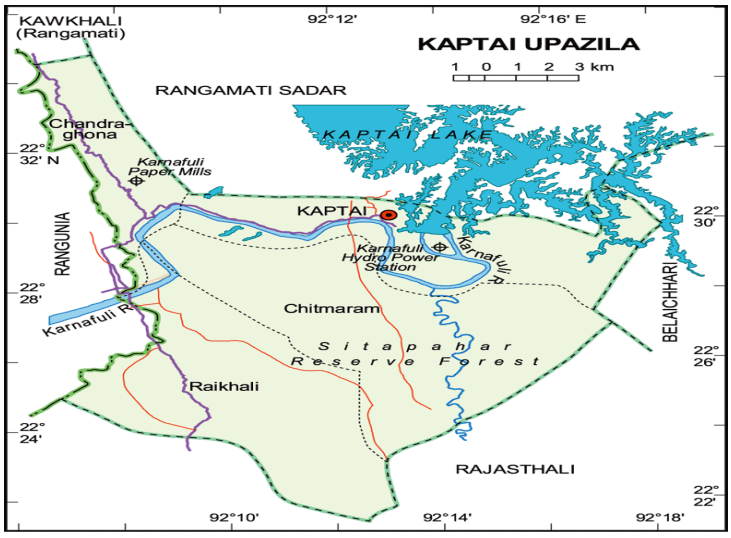
The study was conducted in topographically in the hilly area of the Kaptai upazila under the Rangamati district. Most of the area is hilly forest with some plain lands too and different types of green forages and forests are available in that area. In choosing the areas of data collection the probability of poultry population, climatic condition and geographical location was the main parameters.

The whole Kaptai Upazila was divided into 3 study area for the ease of data collection and calculation.

Area 1 contains Chandraghona and Chitmarang Union

Area 2 contains Wagga Union

Area 3 contains Kaptai and Raikhali Union



Picture 1: Map of Kaptai Upazila

2.3 Study Population

During this investigation we consider 25 households where we found 74 hilly chicken (35 was female and 39 was male) and collected 60 eggs.

2.4 Phenotypic identification of hilly chicken

Hilly birds are covered with plumage of white with black tips (85%) followed by multicolor (15%). The comb type of Hilly chicken was 100% single, and in 100% cases, no feather was observed in the shank (Ali, A. and Faruque, M.O. 1998). The shank color of Hilly chicken was whitish 35%; yellowish 25% and others 35%. The overall mean indicated that. The earlobe color of Hilly chicken was 80% white followed by red and admixture of red and white (Biswas, S.R. 2005)

2.5 Data collection

Data were collected directly from farmer house with periodic visit by the researcher and a supporting stuff by using a predesigned well structured questionnaire.

2.6 Data collection on housing management and feeding of chicken

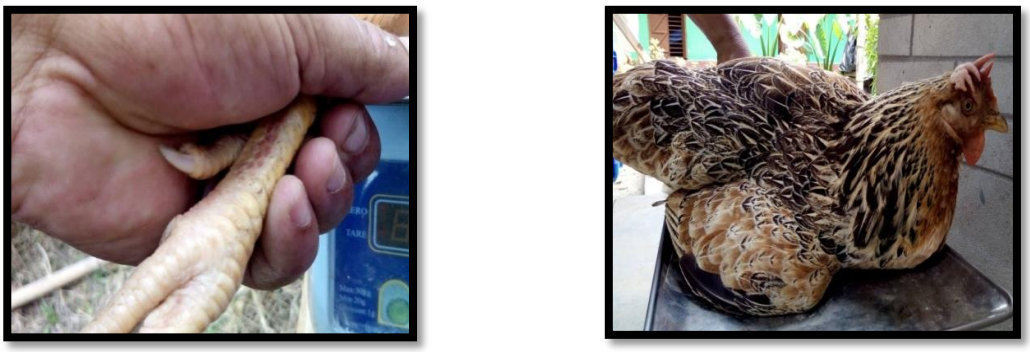
Data collection on management was performed by direct observation of the housing systems of chickens and data on feeding collected through different queries and visual observation.

Picture 2: Housing system of chicken

2.7 Data collection on phenotypic and reproductive characters of chicken

- ✓ By using a digital weighing balance, all the chickens and day old chicks under this investigation were measured carefully. Before taking every weight, the machine was switched off to re-zero option and weight of every chicken was taken two times to avoid any measurement error.

Picture 3: Collection of weight from study samples



Picture 4: Checking of poultry phenotypic characteristics

- ✓ Poultry plumage color, beak color, shank color etc. was measured by direct observation in day light and comparing it with color meter for measuring the exact color.

- ✓ From the owners of matured female chickens, the age and weight of sexual maturity, hen day egg production, clutch size was noted down in questionnaire answer paper.

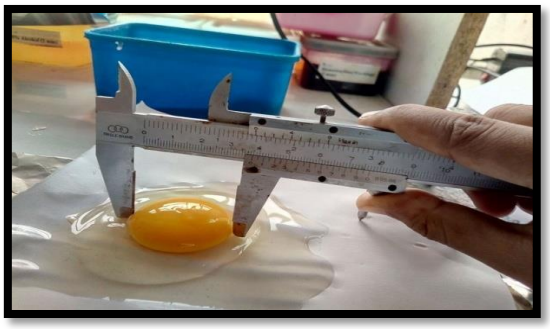
Clutch size: Clutch size refers to the number of eggs laid in a single brood by a nesting pair of birds.

Sexual maturity: Sexual maturity is the capability of an organism to reproduce.

2.8 Collection of egg data

At first 60 eggs was collected from different hens and they are kept in a box. In case of taking the information about the hilly chickens egg, the slide calipers scale, yolk height measuring machine and electric balance was used. By using all this materials the egg weight, egg size, egg shell thickness, egg albumin height and weight, egg yolk height and weight, egg yolk index was measured. While using the slide calipers, actual measurement was taken by using verniar constant value and error factor.

Picture 5: Measuring the weight of egg



Picture 6: Measuring the egg yolk width of egg

2.9 Data Analysis

Collected data were corrected and fed to microsoft office excel sheet. All mean value, standard error and graphs were obtain by Microsoft Office Excel 2010.

CHAPTER 3

RESULTS AND DISCUSSION

3.1 Housing and feeding system of hilly chicken

Under this investigation, the housing and feeding system of hilly chicken was observed. The poultry houses of this area is made of bamboo slits either with tin roofs or straw roofs and floor of these houses are finished with wooden having around half inch distance between every slit for proper disposal of litters and these sheds usually placed one or two feet higher from the ground to protect the birds from the preators. Most of the hilly chickens were found as very good scavenger as they collect their foods from the jungles, nearby fields, yards and other areas. Sometimes the owners provide some feed like broken rice, rice husk etc. The outcome of this study found similar to the findings of Huque *et al*. (1993) where they have mentioned similar types of housing system and feeding system.

3.2 Phenotypic characteristics of hilly chicken

Under this study considering plumage color, highest percentage found in case of red brownish (39%) and lowest was brown black color (1%) shown in figure 1 where as in case of comb type single type (70%) was found maximum and rose type (10%) minimum shown in figure 2 but in case comb color, pale color found almost twice in number than rose color shown in figure 3.All this results are approximately in line with the study of Harris *et al. (*1984) .

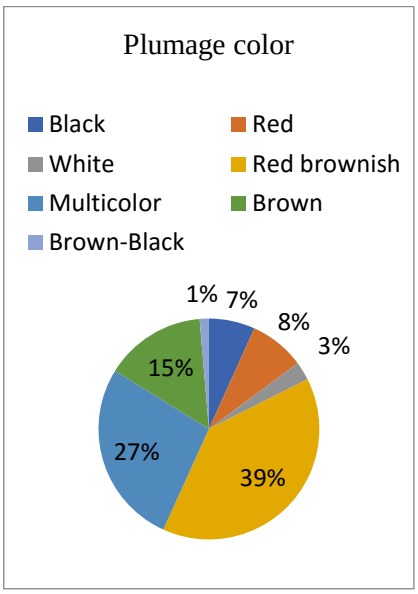


Figure 1: Pie chart of Plumage color variation of hilly chicken

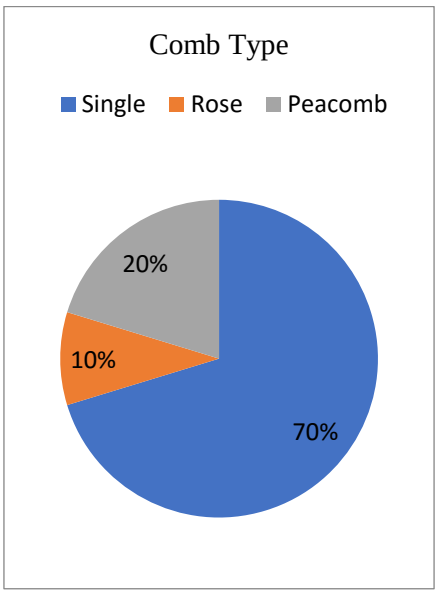


Figure 2: Pie chart of comb variation in hilly chicken

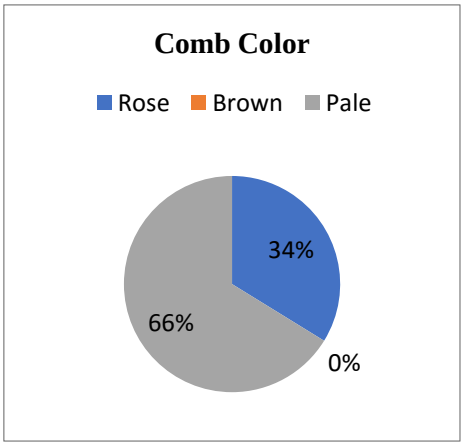


Figure 3: Pie chart of Comb Color variation of hilly chicken

Here, considering ear lobe color, reddish white earlobe found as highest (57%) and Brown color is the lowest (8%) one shown in figure 4 where as in case of 78% black eye color were highest and with 22% result the brown color is the lowest eye color in hilly chickens shown in figure 5,but in figure 6 where among beak color black beak color is the highest (46%) and yellow beak color is the lowest one with 19%.The following results are approximately similar to the result of Marks, H.L. *et al*.(1985)

but slightly lower than the study value of Okada, I *et al* 1998,this variation maybe due to the genotypic differences and topographical differences of study areas and samples.

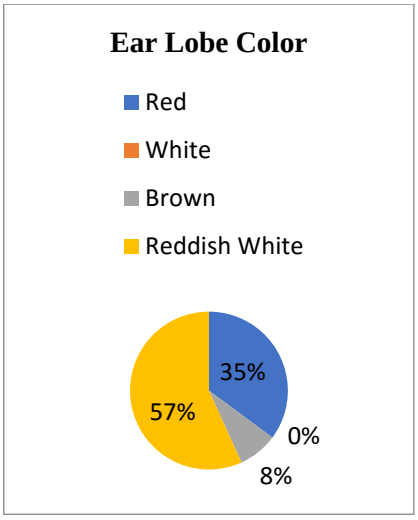


Figure 4: Pie chart of Ear Lobe color variation in hilly chicken

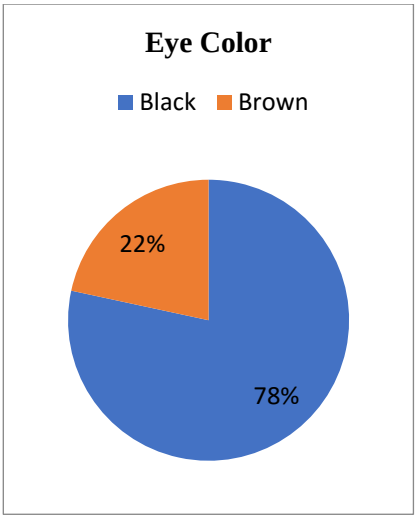


Figure 5: Pie chart of Eye color variation in hilly chicken

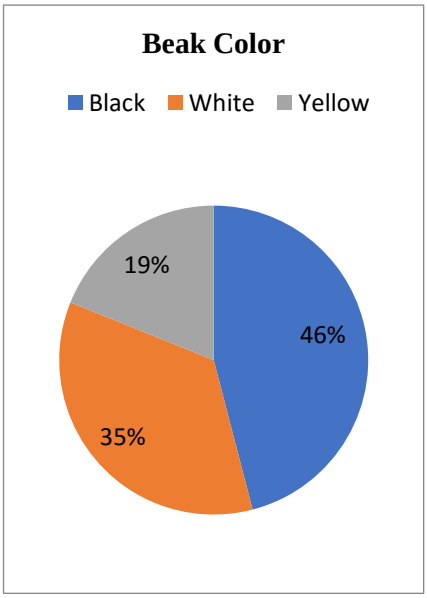


Figure 6: Pie chart of Beak color variation in hilly chicken

In this study we found that in 100 % chicken the shank feather is present and among them the highest shank color was Yellowish one (81%) and the lowest was Black shank color(4%),In case of skin color we can see that the white one was highest with 96% availability and with 4% availability yellow was the lowest one. Besides that, the highest wattle color found in this study is Red (70%) and lowest one is Reddish white of 30 %. These results are approximately similar with the study result of Hunton (1990) and Kumar, Zachary (1980) and Siegel and Dunnington (1990).

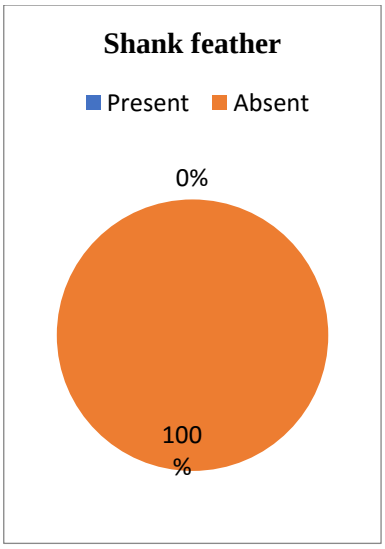


Figure 7: Pie chart of Shank feather presence in hilly chicken

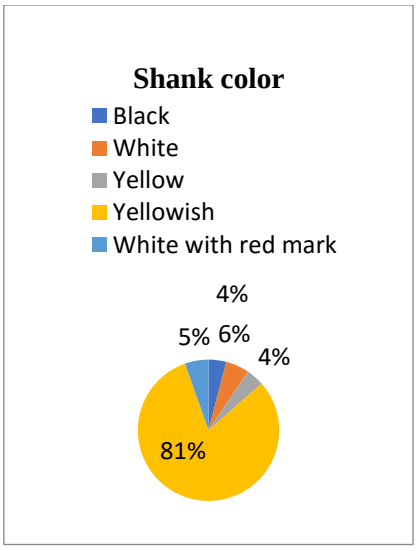
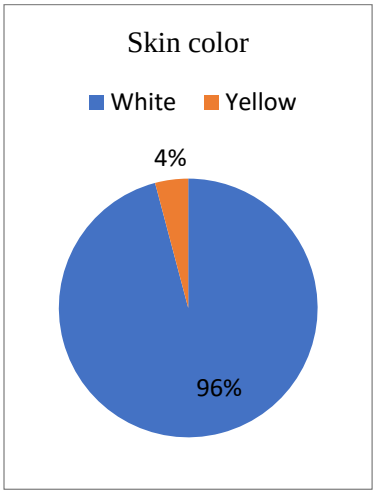


Figure 8: Pie chart of Shank color variation in hilly chicken



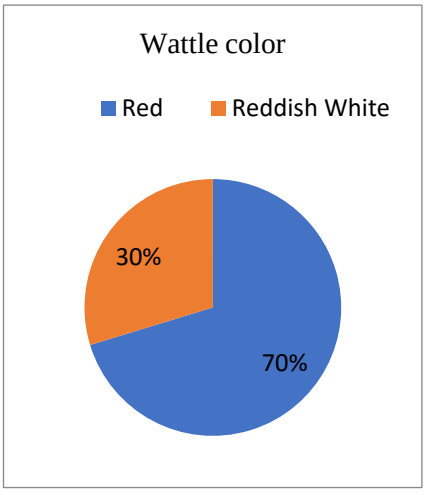


Figure 9: Pie chart of Skin color variation in hilly chicken

3.3 Reproductive performances of hilly chicken

In this study, we have checked the reproductive performances of 35 chickens according to various parameters and the result was given in table 1.In this table we can see that Area 1 chicken samples have early sexual maturity (181days) and higher number of clutch per year (4.18), where Area 2 gives us the largest clutch size (6) .

The results of our study is in line with the study of Siegel, P.B. and Dunnington, E.A. 1990 and Scogin *et al*. (1982). But the Number of clutch per year and Age at sexual maturity result in our study is slightly lower than the study result of Sergeyev 1986, Singh RP, Kumar J. 1994 and Fisinin *et al* (1990). The difference between the results may be due to the nutritional, managemental and genotypic variations among the study sample.

Table 1: Reproductive performance

Reproductive Performances (Sample 35)

Parameter	Area 1	Area 2	Area 3
a. Clutch size	**5.45±0.71**	**6 ±0.63**	**5.53±0.51**
b. Egg weight	**32.10±0.49**	**31.31± 0.65**	**32.43±0.50**
c. Age of DOC	**30.10±0.26**	**30.09 ±0.50**	**30.7±0.35**
d. Age at sexual maturity	**181.09±4.10**	**188.8± 1.80**	**187.92 ± 1.63**
e. Wt at sexual maturity	**1019.45±44.144**	**913.8 ±16.22**	**1012.69 ± 44.41**
f. Number of clutch per year	**4.18±0.25**	**3.6± 0.266**	**3.692 ± 0.23**
g. Avg. birds per household	**8.81±1.38**	**9.2 ±1.61**	**10.92 ±1.37**

3.4 Egg parameters

Different external parameters of hilly chicken egg were measured during the study period.

Table 2: External egg parameters

Sample 60	Average
a. Egg height	4.42 ± 0.05
b. Egg diameter	3.30 ± 0.03
c. Egg weight	36.11 ± 1.12
d. Shell weight	0.12 ± 0.003
e. Shell thickness	0.019 ± 0.0014
f. Shape index	70.71
g. Yolk index	91.66

Table 3: Internal egg parameters

Sample 60	Average
Albumin width	2.41 ± 0.30
Albumin height	4.91 ± 0.29
Albumin weight	13.57 ± 0.73
Yolk width	3.08 ± 0.08
Yolk weight	9.27 ± 0.07

The outcomes of the study on external and internal parameters of egg was approximately similar with the study result of Garrigus (2007) and Rahman *et al.* (2010) but slightly different than the result of Faruque *et al.*(2010) and Barua *et al.*(1990).

Variance of this result may be due to difference in Sample size, sample quality, egg quality, collection time and calculation error.

CHAPTER 4

CONCLUSION AND RECOMMENDATION

This study reveals that chicken of this area are reared in a semi intensive household system where they are maintained by scavenging system. Various performance of hilly chicken found moderate in comparison to deshi chicken. To conclude final summary further study needed with larger population and more time. Hope it will help for making further decision to develop chicken production in the kaptai area as well as remaining hill tracts.

CHAPTER 5

LIMITATIONS

There were many limitations in this study, some of them are:

- Duration of the study was one month only.
- Small sample size.
- Lack of sufficient recording system.
- Randomly selected samples.

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The Author

June 2018

Brief Biography

This is Urmi Tanchangya, daughter of Ajit Kumar Tanchangya and Uma Chakma from kaptai Upazila under Rangamati District of Bangladesh. She passed the Secondary School Certificate Examination in 2010 followed by Higher Secondary Certificate Examination in 2012. She is intern student of Doctor of Veterinary Medicine (DVM) of Chittagong Veterinary and Animal Sciences University (CVASU), Bangladesh. She has keen interest to work in research on microbiology and Public health and enhancing the prestige of Veterinarian and Livestock Sector of Bangladesh.