LIST OF ABBREVIATIONS

Abbreviations	Elaboration
DLS	Department of Livestock Services
Govt.	Government
Kg.	Kilogram
No.	Number
NGO	Non-Government organization
Sl.no.	Serial no
Tk.	Taka

ABSTRACT

The study was conducted to know the present status, existing production system of duck and assess the potentiality of duck rearing in rural areas of Gaibandha district in Bangladesh. Data were collected randomly from 20 duck rearing farmers using a pre-tested interview schedule during February to March 2018 from several villages under Shadullahpur Upazila of Gaibandha. Beside this, socio-economic conditions of the farmers, feeding system and availability of feed for raising ducks, productive performances of scavenging ducks and profitability of raising those ducks were evaluated. In the study area most of the farmers were women. The level of education of farmers varied from primary to higher secondary. Most of the duck rearers (65%) were found primary educated. The average farm size was 18 and it always remains variable with the duck's loss attributed to different causes. About 43% of the farmers housed their ducks in bamboo made cage while the rest of the farmers kept ducks in house made of wood, tin, brick or mud. Duck reaches first laying at 6 months of age, produces average 110 eggs per year. Egg production reaches peak during winter especially after crop-harvesting season. Around 55% of the respondents fed their birds with mixture of boil rice and rice polish as it is available and cheap. Approximately 10% respondents said that they do not spend any money on supplementary feed. The mortality rate was 19% and it is highest in winter (27%). Duck were vaccinated against duck plague mainly. Around 80% households sold eggs to the local market and 20% sold to the bepari and others. Total annual expenditure and annual income per duck were on an average 443.35 and 959.20 taka, respectively. It can be concluded that duck rearing knowledge of the farmers such as breeding, feeding, housing, prevention and control of diseases are not satisfactory of this areas. Introducing of improved duck breeds/varieties, training to duck farmers, ensuring vaccination to ducks, financial and technical support to the farmers could increase the duck rearing with increased household income and employment to youth, rural women and the small-holder marginal farmers.

Key words: Household duck, Scavenging system, Feeding practices, Farm profitability.

CHAPTER-I
INTRODUCTION

Poultry plays a significant role in the subsistence economy of the country and contribute 1.6% in GDP (SAEDF, 2008). Among the poultry species, duck ranks 2nd just after chicken in producing poultry meat and eggs. DLS has given an estimation of duck population of 45.00, 47.25, 48.86, 50.52 and 52.24 million for the year of 2011, 2012, 2013, 2014 and 2015 respectively (DLS, 2015), while FAO given population of duck in 2005, 2006, 2007 and 2008 as 20, 21, 22 and 23 million, respectively (FAO, 2009). The variation also clearly indicates the house hold and small scale duck production in Bangladesh. Bangladesh has the third largest population of duck after china and Indonesia with a population of 41.5 million (Dolberg, 2008). At present, prices of meat and eggs are beyond the buying capacity of the poor people. Increased ducks egg and meat production can play a vital role in solving these problems.

Among the species of poultry duck is a potential source of meat and eggs in rural areas of Bangladesh (Hoque *et al.,* 2010). Chicken, and duck or both rearing practiced are reported in Bangladesh. There are different types of duck rearing system which can be classified as house hold (scavenging), Semi Intensive (semi scavenging) and Intensive duck farming (Khan *et al*, 2013). House hold duck farming or scavenging system provides no feed to the duck while semi scavenging system provides little of supplementary feed. However, at least the first two duck rearing system are greatly influenced by present of large water body like Beel, Hawor. The intensive farming of duck is less and mostly operated by the government to facilitate the small scale farmer (Hoque *et al*., 2011). The house hold duck scavenge in nearby large water bodies for snail, duck weed, fish and algae. The availability of feed is varies on season to season.

The distribution of duck population varies in Bangladesh. The areas of distribution are Char Fasson on the Island of Bhola in Barisal division, the coastal areas of Lakshmipur district, Tarail and Netrakona in Mymensingh division and Kalia in Khulna division. But Gaibandha district is also important for duck rearing. There are many small scale duck farmers establish their duck farm near to water bodies. The management system of duck is moderate of semi scavenging duck farming system. The performance and profitability of the semi scavenging farming system is not yet evaluated in this area. Little study was conducted mainly in the Noakhali, Netrokona and Haor area of Sylhet. Shadullahpur Upazila under Gaibandha district occupies an important place in respect of backyard duck practice in Bangladesh, because of having availability of

natural feed during harvesting season and available pond and fellow waterlogged land for duck foraging. It is a densely populated Upazila and they are traditionally practice cattle, buffalo, sheep, goat, poultry and duck rearing. There is a considerable amount of low land in this Upazila which riches with natural feed. The backyard duck has been identified as a focus area in the human development programmers. Information on the household duck is scarce. Improvement programmers cannot be checked out due to lack of accurate data on production of backyard duck. This study was undertaken to provide data, which will help to overcome the lack of knowledge regarding production and utilization patterns of family ducks and the income generated in rural households through duck rearing.

The objectives of the study are as follows:

i. To evaluate the production performance and management system of scavenging ducks and profitability of rearing ducks.
ii. To determine feeding system and availability of feed for raising ducks in this locality.
iii. To identify the major constrains and prospect of duck farming.

CHAPTER-II
MATERIALS AND METHODS

Study area and period:

A months (1st February – 1st March, 2018) long study was carried out on house-hold duck rearing system in 4 selected villages of Shadullahpur Upazila under Gaibandha district. The villages were selected on the basis of availability of duck farms and communication facilities with a view to collect information on rearing practices. Twenty households duck farms were selected randomly from 4 villages under the Upazila. Households having at least 5 ducks reared under scavenging condition was included in the study. Breed, age, types of housing, feeding system, no.egg production, egg hatching, duckling brooding, socio-economic condition of the farmer were recorded in the data sheet through farmer's interview.

Duck characteristics:

Breed was defined according to phenotypic characteristics of duck. Deshi white, Deshi black and Deshi mixed, Jinding were included in this study. Sexing of ducklings was done by color, feather and vent sexing method. Age was recorded by interviewing to farmers. Vaccination, types of treatment, intervention and types of drugs used for each case, marketing system of eggs and duck were also recorded.

Data collection and analysis:

Simple random sampling technique followed for collection of necessary data to obtain the specific objectives of the study. Data obtained were entered into Microsoft Excel 2010 and descriptive statistics were performed. Results were expressed as frequency number and percentage against each category of variable.

CHAPTER-III

RESULTS

Age of duck farmers

Age of the duck farmers ranged from 25 to 70 years. The farmers were stratified into 3 age categories; namely young ≤35, middle age 36-50 and old >50 (Table 1).

Literacy level of the duck farmers

Level of education is an important indicator for duck farming. The literary level of the studied duck reared is categorized as four groups such as illiterate, primary, secondary, higher secondary and above. In the study area, it was showed that 10% farmers were illiterate followed by 65% had primary education and rest 25% had schooling after primary education (Table 1).

Duck rearing experience of farmers

Duck rearing experience indicates the proper management knowledge of duck farmers. The duck farmers were classified into 3 categories; namely shorter (<10 years), moderate (10-20 years), and longer (>20 years). (Table 1)

Land holding sizes of the farm owners

Land holding sizes of the households are classified into four groups such as Landless farmers (0-0.49 acre), Small and marginal farmers (o.50-1 acre).Medium farmers (1 acre- 1.5 acre) and large farmers (Above 1.5 acre). The maximum farm owners are land less farmers group which are estimated as 55% and minimum are in the group of large farmers, which are 5%.(Table 1)

Table 1: Farmer's personal information

Characteristics	Category	No. of Farmer(n) (N=20)	Percentage (%)
Age (Year)	Young (≤35 years)	02	10
	Middle age (36-50 years)	11	55
	Old (>50 years)	07	35
Education (Year of schooling)	Illiterate	02	10
	Primary	13	65
	Secondary and above	05	25
Rearing experience (Year)	Shorter (<10 years)	08	40
	Moderate (10-20 years)	10	50
	Longer (>20 years)	02	10
Land holding sizes of the farm owners	Land less farmers (0-0.49acre)	11	55
	Small & marginal farmers (0.5-1 acre)	05	25
	Medium farmers (1-1.5 acre)	03	15
	Large farmers (Above 1.5 acre)	01	5

Rearing of duck

In the rural areas of Gaibandha district, farmers reared Deshi, Khaki Campbell, Jinding and Crossbred of ducks (Figure 1). Figure shows that about 52% farmers reared only Deshi, followed by 18% farmers reared only Khaki Campbell, 10% farmers reared only Jinding. There were also combinations of two or more breeds in the area. Rearing of duck in the studied area are shown in figure 4.

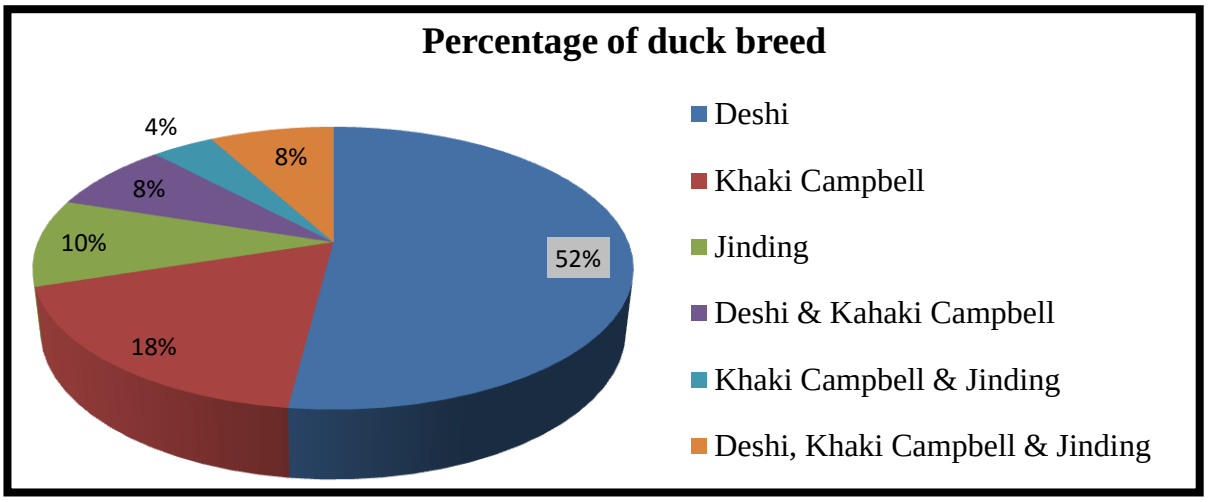

Figure-1: Percentage of duck breed reared by farmers

Population of duck

According to flock size of duck, the farmers were classified into three categories; namely low producer having less than 11 no's; medium producer having 11 to 20 no's and high producer having 21-80 no's of duck. The number of duck reared by each farmer ranged from 5 to 80 with an average of 18 (Table 2).

Table 2: Population size of duck

Category (flock size)	**Farmer (n)**
Small (5-10)	07
Medium (10-20)	11
Large (21-80)	02

Percentage of duck according to age group and breed

The table shows the percentage of duck according to age group and breed. From table 3, it can be shown that the highest percentage of duck is laying (37%) and lowest percentage of ducks is drake (10.5%) in the study area.

Table 3: Percentage of duck according to age

Age of ducks	**Percentage**
Duckling (0-2 months)	10 %
Grower (2-9 months)	15.5%
Drake	10.5 %
Duck	27 %
Laying duck	37 %
Total	100 %

Management practices followed by the owners of ducks

i. Housing:

Farmer used a variety of materials for duck housing (Figure 2). Figure show that about 40% farmers used wood and tin followed by 15% farmers used brick, 35% farmers used bamboo and soil, 8% farmers used only bamboo and rest of the farmers used other materials for constructing duck house. About 85% of the farmers used single or combinations of materials (straw, ash, rice husk) as litter where the rest of the farmers kept ducks without using any litter. (Figure 4)

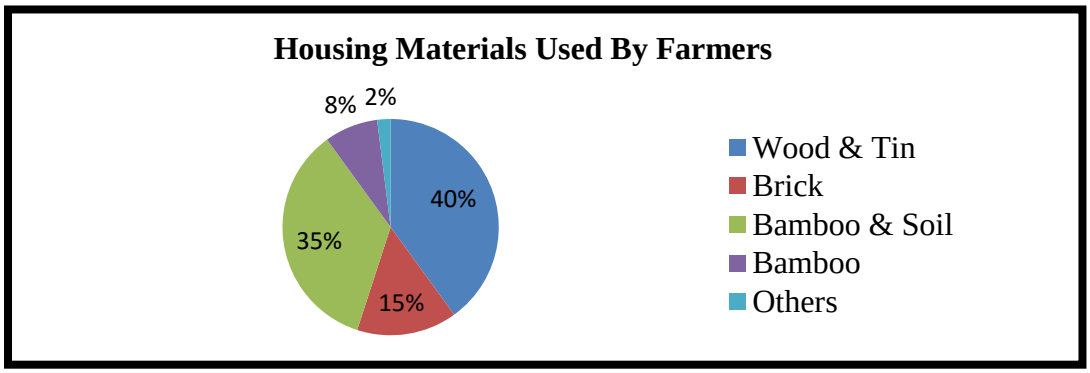

Figure 2: Housing Materials Used By Farmers

ii. Feeds and feeding of duck:

Farmers used a wide variety of supplementary feed for their ducks. Most of the households fed their duckling with snail, duck weed etc. Around 10% respondents said that they do not spend any money on supplementary feed. Other 90% spend a considerable amount of money on

supplementary feed (Figure 5). Frequency of feed offered to ducks varied from two to three times in a day. It was shown that about 55% farmers used rice and rice polish, 10% farmers used rice, rice polish and paddy, 15% farmers used rice, rice polish, wheat bran and broken rice, 10% farmers used rice, rice polish and commercial feed and rest of the farmers used rice, rice polish , snail and as a feed ingredients for duck (Table 4) .

Table 4: Feed ingredients in supplemented diet of ducks

Feed ingredient	Farmer (%)
Rice and rice polish	55
Rice, rice polish and paddy	10
Rice, rice polish, wheat bran and broken rice	15
Rice, rice polish and snail	10
Rice, rice polish and commercial feed	10

Most common places for ducks to scavenge around household were observed to be pond, digi (transitory fallow land), paddy field, Nala and ditch. A wide range of scavenging feed such as snail, duck weed, earthworm, crabs, frog, land and water insects were noticed to have been available. Around 8-9 months in a year duck are grazed in marshy land. (Figure 6)

iii. Breeding and hatching:

Natural mating is done for rural ducks. Maintenance of standard 1:5 drake and duck ratio was reported by most of the farmers. Most of the farmers said that sexual maturity at deshi breeds of ducks attained between 5.5-6 months and average egg production 110 per year (Table 5). It was also found that egg production reaches peak during winter especially after crop harvesting season. Mortality rate of duck is high in winter, and due to less vaccination mortality varies from place to place.

Table 5: Productivity of duck in the studied area

Parameters	Category	Farmer (%)
Sexual maturity	Early (<190 days)	80
	Moderate (190-200 d)	10
	Late (>200 days)	10
Egg production/year	Low (80-100)	35
	Medium (101-150)	45
	High (150-200)	20
Hatchability (%)	Low (<84%)	30
	Medium (84-88%)	60
	High (>88%)	10

Table 5 shows the average age of first laying egg, egg production per year and Hatchability rate. It was found that most of the house holder use natural procedure of hatching by using hen and brooding also by hen itself. But hardly select artificial brooding.

iv. Vaccination and medication:

Most of the households said that duck are affected mostly in winter season and they used to slaughter duck due to sick. They hardly treat the sick duck. About 80% farmers said that duck plague and duck cholera are the main reasons for mortality where the rest said that, they were not aware of and could not identify the diseases. Due to lack of awareness a considerable number of households do not vaccinate regularly to their ducks.

Controlling procedure of duck diseases were varied among farmer to farmer. Most of the farmers (55%) controlled their duck disease with medication, only 30% farmers used vaccine to prevent duck disease and rest 15% did nothing for controlling diseases (Figure 3).

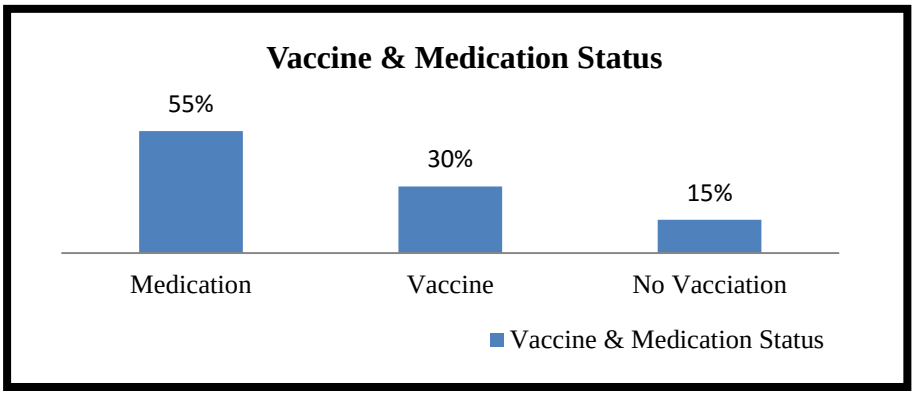

Figure 3: Vaccine and medication status of farms

Cost, Return and Profitability of Duck Rearing

i. Per bird annual gross cost:

Average annual expenditures and economic return of rearing ducks in the study regions are showed in tables 6 and 7. The farmers with 3-20 ducks usually do not hire any labor and work by themselves. It was found from the data that the average cost for ducklings, feed, housing, vaccination and medication was 30.80, 342.00, 18.50 and 50.20, respectively.

Table 6: Per bird annual gross cost (average)

Item	Per bird annual cost (Tk.)	
	Gross cost	Depreciation cost (10%)
Duck ling cost	30.80	-
Feed cost	342.00	-
Medication & vaccination	50.20	-
Housing cost	18.50	1.85
Total deprecation cost	-	1.85
Total gross cost	441.50	
Total Cost	(441.50+1.85) = 443.35	

ii. Per bird gross return:

Table 7 shows that per bird total income is 959.20 taka per year.

Table 7: Per bird gross return (GR)

Item	Per duck annual GR
Return from selling eggs	739.20
Return from selling ducks	220.00
Total income/return	959.20
Total cost	443.35
Net annual return	515.85

Marketing of eggs and ducks

Around 80% households' farmers sold eggs to the local market and 20% sold their ducks eggs to the bepari. Duck meat has high demand in Gaibandha and that's why most of the households sold ducks and also consumed by themselves (Figure 7).

Figure 4: Backyard duck farming system

Figure 5: Duck feeding system

Figure 6: Duck scavenging on pond

Figure 7: Egg collection and marketing

CHAPTER-IV
DISCUSSION

Duck farming is profitable because less investment is required. Better utilization of feed resources under water and wastage feed materials. Most of the lands of the study area are low lands which are very much suitable for duck rearing. The proportion of farmers reared deshi duck in this study was about 52%, followed by 18% farmers reared only Khaki Campbell, 10% farmers reared only Jinding. The proportion of deshi duck was lower than that of Rahman (2009). He found 82.25% farmers reared deshi duck. The reason for decreasing of deshi duck may be for substitution of deshi duck by Khaki Campbell and Jinding. Duck farming create employment opportunities among rural people especially for the unemployed youth, rural women. The average egg production of the Deshi duck and duck under study population is 110 per duck per year. The observation of egg production of duck was lower than that of Ukil (1992). He stated that indigenous ducks reared for egg and meat laid 150-200 eggs per year under semi-scavenging system but the observation was higher than that of Islam *et al.* (2003) and Sarker (2005). They stated the egg production of indigenous duck was 85-90. Most of the farmers (60%) obtained hatchability of duck egg were 84-88% (Table 6). Hatchability of duck eggs was higher than that of Alam and Hossain (1989). They reported that hatchability of duck egg ranged from 60 to 85%. The observation of hatchability was also higher than that of Rahman (2009) and Hamid *et al*. (1988). Rahman (2009) found 79% hatchability of duck egg. Hamid *et al.* (1988) reported the hatchability (%) of Deshi ducks was 66%.

Moreover the cost for production and maintenance of ducks is very low because of feeding on natural resources. Duck meat is of high demand in winter season in my study area. So all these point contributed in the sustainability of the household duck rearing. But the farmers have limited knowledge about the production performance of improved breeds/varieties of duck. Farmers do not know scientific feeding and management system of duck. Most of the farmers do not know about vaccination and its advantages in preventing duck disease.

There was insufficiency in keeping data from record book. Limited access of entrance in particular sections of the duck farm. Vaccination schedule is not well developed that leads to insufficient study. Most of the data was collected through interviewing. The authority showed their negligence to give accurate data of the study due to some rules and regulations for their

jobs. However this study will help in providing data, which will help to know the current status of duck farming in Shadullahpur Upazila, Gaibandha and will provide knowledge regarding production and utilization patterns of family ducks and the income generated in rural households through duck rearing.

CHAPTER-V
CONCLUSION

The study concluded that most of the farmers reared deshi duck. Duck rearing knowledge such as breeding, feeding, housing, prevention and control of diseases are not satisfactory of the farmers. Therefore, a need-based extension program should be introduced among the farmers giving more focus on building awareness and ability about duck production. Regular vaccination and use of balance diet can have a positive effect on duck rearing providing quality products for human consumption and reducing nutritional deficiencies and poverty of the country.

Recommendations to improve duck farming:

a) For increasing duck meat and egg production it is needed to introduce improved duck varieties in the rural areas with informing the farmers about the advantages of rearing improved varieties. The farmers can even use improved deshi duck like deshi black and deshi white.

b) Training is necessary to all duck farmers for better feeding and management of duck to get better production.

c) Vaccination against common diseases of duck should be ensured.

d) Good quality of duckling should be supplied to the farmers. Vaccine and medicine of duck should be available in market.

e) Government should give financial and technical support to farmers for rearing duck.

f) Duck rearing in the rural areas of Bangladesh could be a good source of income, nutrition and employment generation, especially for the unemployed youth, rural women and the small-marginal farmers.

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APPENDIX
QUESTIONNAIRE

Study on house-hold duck rearing system in Shadullahpur Upazila under Gaibandha district in Bangladesh

1 .a) Name of the farmer: … … … …
b) Father/husband's name: … … …
c) Address:
Village: … … … … Union: … …
Upazilla: … … … … District: …
d) Occupation: Service / Agriculture / Business/ Labour

2. Family details:

SL.NO	Name of the member	Relation	Age	Sex	Education	Name of association with which he/she related
1.						
2.						
3.						
4.						

3. Land (acre):
a) Residential b) Cultivable c) Non-cultivable

4. Source of income:
a) Agriculture b) Service c) Business d) Duck rearing e) Poultry
f) Dairy g) Other

5. Total income of family… … … … Tk

6. Presence of electricity: Yes/No

7. Number of Duck

Type	Deshi			Hybrid			Crossbred
	White	Black	Mix	Indian Runner	Khaki Campbell	Jinding	
Duckling (0-2m) Grower (2-9m) Drake Duck Laying duck							

8. Information on housing:
   a) Elements of house: Bamboo / Straw / Tin / Polyethylene / Mud / Wood / Others
   b) Type of rearing: Extensive/Intensive/Semi-intensive.
   c) Cleaning of house: Yes/No
   d) Type of litter used:
   e) If any integrated farming: Yes/No
   f) Integrated duck & poultry rearing in a common place: Yes/No

9. Feeding information:
   a) Type of feeding: Natural/Artificial/Both
   b) Name of ingredients in case of natural feed:
      … … … … … … … … … … … … … … …
   c) Source of feed:
   d) Frequency of feeding:
   e) Supplementary feeding:

10. Presence of marshy land: Yes/No
    If yes, what type – Degi / Pond / River

9. How many months in a year duck are grazed in marshy land:

12. Name and quantity of artificial feed ingredients

Ingredients	Quantity/duck/day		
	Duckling	Grower	Duck

13. Information on disease management of duck:
   a) Regular vaccination-Yes/No
   b) If yes type of vaccine:
   c) Treatment of diseased duck: Yes/No
   d) Govt. help in duck treatment: Yes/No
   e) Name of some disease of duck-
      a) b) c) d)
   f) In which season duck is affected mostly: Summer Rainy Winter
   g) Source of duckling: Govt. farm NGO Family Personal

14. Information on laying of duck:
   a) Age at 1st laying:
   b) Egg production/year:
   c) Average egg weight:

15. Marketing of eggs:
   a) Where eggs are sold:
   b) Approximate selling cost of egg/year:
   c) Problems of selling:
   d) Bird selling:……. /year

16. Information on cost:

Duckling cost:	Medicine:
Housing:	Labors:
Vaccine:	Feed:

17. Information on hatching:
    a) Procedure of hatching: Natural/Artificial
    b) If natural use of- duck/hen
    c) Process of brooding of duckling

18. Source of money for duck rearing- Own/ NGO / Govt / Others

19. Duration of duck rearing: Throughout the year/definite time of a year

20. Problems of duck rearing:

21. What is your future plan about duck rearing-?

Name of Interviewee:……	Name of Interviewer:…….
Date:……	Date: ……
Signature:…….	Signature:……

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The Author

BIOGRAPHY

I am Suriya Sultana Sorna. I passed my Secondary School Certificate examination in 2010 followed by Higher Secondary Certificate examination in 2012. Now I am an intern veterinarian under the Faculty of Veterinary Medicine in Chittagong Veterinary and Animal Sciences University. In future I would like to work as a veterinary practitioner and do research on clinical animal diseases in Bangladesh.