PROFITABILITY AND RESOURCE USE EFFICIENCY OF LAYER FARMING IN SELECTED AREA OF BANGLADESH

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CERTIFICATE

This is to certify that thesis entitled, **"PROFITABILITY AND RESOURCE USE EFFICIENCY OF LAYER FARMING IN SELECTED AREA OF BANGLADESH"** conducted by **MD.ROBIUL ISLAM**, bearing Registration No.**10-03964 (July-December/2018)** under my supervision and guidance, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE(M.S) in DEVELOPMENT AND POVERTY STUDIES**, in the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka 1207,Bangladesh.No part of the thesis had been submitted for any other degree or diploma**.**

I further certify that any help or source of information received during this study has been dully acknowledgement by him.

Dated: December, 2018

Dhaka, Bangladesh

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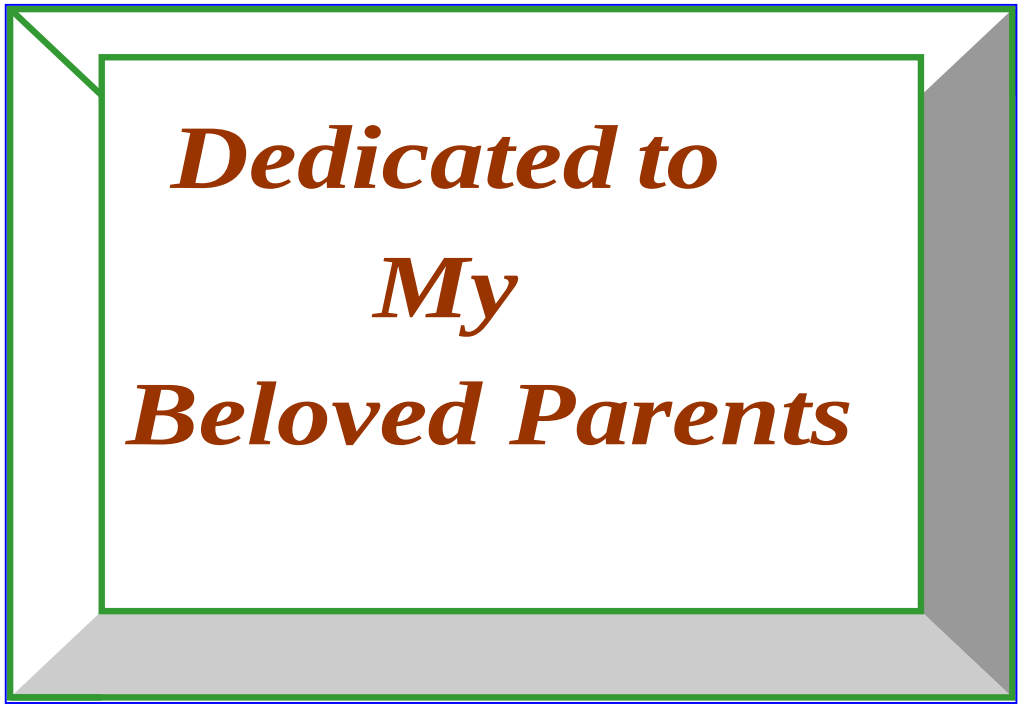
Dedicated to
My
Beloved Parents

ABSTRACT

Bangladesh is graduating from least developed country (LDC) to developing country and Poultry sector as a sub-sector of agriculture plays a crucial role to create employment and income in the context of this country. The present study was conducted to delineate the socio-economic characteristics of the layer farmers, to estimate the costs, returns and profitability of layer enterprise and to determine the contribution of the key variables to the production of layer farms. For achieving these objectives, 60 layer farms were selected randomly from Kaliganj upazila of Lalmonirhat District. Both tabular and econometric techniques were used to find out the results.The average number of farm was 1250. Costs and returns were calculated separately through tabular analysis to find out the profitability of layer production. The results of the analysis showed that on average total cost of layers per farm per year was Tk 18,34,406. It was found that the variable cost per farm per year stood at Tk. 16,91,440.72 which accounted for 91.89 percent of total cost. The total fixed cost per farm per year accounted to Tk. 1,49,242. It is evident from the study that the gross return per farm per batch stood at Tk. 21,42,492. The net return over total cost per farm per year was calculated at Tk. 3,01,809. The benefit cost ratios of layer farming were 1.26 on variable cost basis and 1.17 on total cost basis. Findings of the study clearly indicated that layer production was a profitable enterprise. Cobb-Douglas production function analysis was used to estimate the contribution of the key variables of the production of layer farms. The functional analysis indicated that most of the selected variables had significant impact on the production of layer farms. This study also identified some economic, marketing, technical, social and natural problems in layer production. Finally, on the basis of findings of this study, some recommendations were made for the development of layer farming in Bangladesh.

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December, 2018, *The Author*

TABLE OF CONTENTS

CONTENTS (cont.)

CONTENTS (cont.)

LIST OF TABLES

LIST OF FIGURES

ABBRIVIATIONS

ABFL : Aftab Bhumukhi Farm Limited

BBS : Bangladesh Bureau of Statistic
BRDB : Bangladesh Rural Development Board
GOB : Government of Bangladesh
BER : Bangladesh Economic Riview
CFG : Canadian Food Guide
DLS : Department of Livestock Services
DOC : Day-Old-Chick
Etal : Et alia (L.) and others
GDP : Gross Domestic Product
i.e :(L. idest), that is

M.S. : Master of Science

NGOs : Non-Government Organizations

% : Percentage

Etc : Etcetera

Gm : Gram

Kg. : KiloGram

Tk : Taka

IOC : Interest on Operating Capital

IR : Interest Rate
OC : Operating Capital

GP : Grand Parent

BRAC : Bangladesh Rural Advancement Committee

PROSHIKA : Proshikkon Shikkaand Unnoyan Karma Suchi
ASA : Association of Social Advancement
SSS : Society for Social Service

P.S.C : Primary School Certificate

J.S.C : Junior School Certificate

S.S.C : Secondary School Certificate

H.S.C : Higher School Certificate
Ln : Natural log
ULO : Upazilla Livestock OfficE

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Bangladesh is a developing country and the economy of Bangladesh mostly depends on agriculture. Livestock is an integral part of the complex farming system in Bangladesh as it not only a source of meat protein but also a major source of farm power services as well as employment. The overall contribution of livestock to the agriculture GDP 13.60 percent at current price (DLS, 2019). About 40.06 percent of total human power of Bangladesh is related to agriculture (MoF, 2019). Livestock plays a crucial role in the agricultural economy. Poultry sector becoming the second biggest about 36 percent of the total animal protein comes from the livestock products in our everyday life (USDA, 2019). It also helps to earn foreign exchange every year. In Bangladesh, about 20 percent people are directly engaged in livestock sector, and 50 percent indirectly associated in livestock production (DLS, 2019). The contribution of livestock sub-sector to the GDP is 1.47 percent and poultry sector alone contributes 1% of total GDP (DLS,2019). Layer farming has prominent significance to the rural, urban as well as the national economy and also is an important source of animal protein. The poultry industry in Bangladesh started to grow in 1947 and currently became a burgeoning agricultural sub-sector and supplying about 90 percent of chicken meat and eggs in the country. Poultry is a part of subsistence farming system in Bangladesh and layers one of the main products of poultry farming. Layer is most vital due to its contributions to national economy in the spheres of generating employment opportunity, additional income and improving the nutritional level. Layers are chickens bred and raised specifically for egg production. A silent resurgence in poultry sector has portrayed a promising prospect of Bangladesh. Investment in poultry sector has spiked from 179 million USD to 3.573 billion

USD. About 2.5 million direct and another 3.5 million indirect jobs were created, where women account for 40 per cent of the total workforce. This has led to the poultry industry being the second largest job creator in Bangladesh. At present,the stakeholders, along with the concerned government agencies, are praising the local entrepreneurs for this remarkable success. They are also giving due credit to the 'International Poultry Show & Seminar', which has opened a new era of technological development.

Total poultry (chicken and duck) production in Bangladesh is 347millions in number whereas chicken covers alone covers289.28millions. (DLS, 2019). Poultry meat particularly from layer is superior to other meats available for human consumption from the point of its palatability, tenderness and digestibility. Poultry meat and eggs offer considerable potential for meeting human needs for dietary animal supply.

The poultry sector has emerged as the most flourishing and promising commercial sector in recent years. In the past, poultry farming was not considered as an important occupation. The villagers have been keeping the chickens mainly for their domestic consumption. From the beginning of early 1947 in response to the wide market opportunity, a commercial poultry sector (broiler and layer) has emerged using intensive production techniques and is getting more and more popularity. Local breeds are not commercially reared due to low productivity, poor nutrition, and high mortality. At present, layer production and marketing in the country has been contributing a lot in terms of both economic and nutritional point of view. The demand for layer has been escalating day by day and millions of people have been getting engaged in layer production and marketing in the country. Layer egg has a great demand as compared to other egg due to the limitation and religious taboos in the concern of pork and beef. It is also one of the fastest growing sectors with bright future and plays a crucial role in ensuring food safety and income generation. As a least developed country, unemployment, inadequate nutrition and poverty are the major problems in Bangladesh.).

Commercial layer farming create avenues as a ready source of income among the poor people and not only creates the employment opportunity for educated unemployed youth but also for women. It has been using as an important tools for protecting the migration of rural poor people to the urban areas. Now, millions of rural women are involved in layer rearing under the poverty alleviation programmers of Non-Governmental Organizations (NGOs) and the Department of Livestock Services (DLS). The per capita availability of cultivated land in the country is decreasing day by day, for this reason the scope of development livestock industry through the development of large animals is limited. Therefore, people from different parts of the country become interested in developing poultry farming on commercial basis. Thus, the number of chicken has increased significantly over the past several years (Table 1.1). As a result, the productions of meat and per capita availability of animal protein have increased.

Table 1.1: Number Of Poultry And Production Recent Five Years In Bangladesh.

Year	Number of poultry (in Million)		
	Chicken	**Duck**	**Total**
2014-15	261.77	50.52	312.29
2015-16	268.39	55.24	320.63
2016-17	275.18	54.01	329.20
2017-18	282.14	55.85	338.00
2018-19	289.28	57.75	347.04

Source: DLS, 2019.

Bangladesh has a long historical record of poultry rearing under traditional backyard farming. In the beginning, commercial poultry farming started on small scales and got poor rural women and unemployed youth involved and thus employed. It also involved some semi-urban and urban poultry raisers which helped to meet the growing demand for eggs and meat.

Since the year of 1990, a significant annual average growth rate in the commercial poultry has been achieved. The commercial poultry gained 15-20% annual average growth rate during this period.

1.2 The poultry industry status in Baangladesh at a Glance:

The figure below show the poultry industry status in Bangladesh-

- No. of GP Farms in Operation: 16 (8 Companies)
- No. of Listed Breeder Farms: 206 (large & small)
- Production of Broiler DOC: Weekly production is around One crore seventy thousand (at present)
- No. Registered of Feed Mills: 198 (as per Department of Livestock Services)
- Production of Industrial Feeds: 5.3-5.4 Million Metric Ton
- No. of Commercial Farms: 65-70 thousand
- Production of Commercial Layer Eggs: Daily egg production is around 3.30 crore
- Share of Broiler Meat out of Total Meat Consumption: Around 40%
- In 2020 Per Capita Poultry Meat Consumption is expected to be reached: Around 7 Kg
- In 2020 the Expected Contribution of Poultry Meat could Increase to: 2 million MT (annual)

Currently there are 16 Grandparent farms in operation which belong to 8 Companies and 206 small & large scale listed Breeder farms producing around One crore seventy thousand broiler Day Old Chicks (DOC) per week. About 65 to 70 thousand commercial farms which produces around 3.30 core commercial eggs daily. (WPSA, 2019).

1.3 Importance of layer in Bangladesh

As a under developed country, poverty, unemployment and malnutrition are the major problems of Bangladesh .According to the Government estimation of the total number of educated but unemployed people in the country is about 3.6 million. The worst

victims of malnutrition in the society are usually the children and mothers. In Bangladesh, about 50 percent children are born underweight and 55 percent children have stunted growth. About 83 percent of the children below the age of six suffer from anemia (MoF, 2019). In this situation, poultry rising appears to be a good way of mitigating the protein gap, employment generation and poverty alleviation in the shortest possible time. The financial benefits from poultry farming is also noteworthy, which in turn encourages the new investments in the poultry sector and therefore, poultry has become one of the most important emerging agro-industry in the country.

1.3.1 Socio-Economic Importance

Layer farming in Bangladesh reflecting bright future in poultry industry and it will play a significant role in agro-based economy. With a view to popular layer farming and to meet the uprising demand for egg and meat, a good number of NGOs and government have already come forward to initiate small layer development programs. Layer farming is best fit to the country's social context and it is very easy for all kind of people to start a poultry enterprise

The layer farming provides more cash income within a short time and creates employment opportunity for the rural people particularly for small farmers, landless labors, unemployed people and destitute women. Income earned from sale proceeds generally is used to meet farm and family expense. It also helps them to satisfy their various economic needs. Expansion of poultry industry creates various job opportunities for the unemployed people through the establishment of hatchery, feed mill, pharmaceutical company, equipment manufacturing and marketing of poultry. As a result, it helps improve the socio-economic conditions of the people of Bangladesh. Poultry waste is an excellent source of organic manure, which is utilized for growing crops. The manure obtained from the poultry consists of more essential nutrients of nitrogen, phosphate and potash than other organic manure. About 40 adult birds raised on deep litter can produce about ten quintals of organic manure having three percent nitrogen, two percent potassium and phosphorus (Rahman, 2004). In recent years, manure price has gone up, so, poultry excreta have become a considerable source of income to the poultry farmers. If the poultry manure is utilized properly in the crop fields, it can produce organic food grains. Poultry litter is also used as feed for fish.

Therefore, additional income may be obtained from the use of poultry excreta.
This industry provides various opportunities for increasing the Gross Domestic Product (GDP), growth rate plus equitable distribution through arranging food security as well as ensuring self-employment at a large scale. The poultry sector is playing a vital role in reduction of poverty, malnutrition and unemployment problems of the country. Thus the contribution of poultry industry to the national economy is very significant.

1.3.2 Nutritional Importance

Poultry egg and meat can help to grow muscles and body cells. It is able efficiently and rapidly fill up the necessity of human body. In the context of different nutrients in chicken egg and meat and other animals, poultry is easily digestible with less fat compared to other animals' meat and it is generally accepted by all religions and casts. Among the different types of poultry meat, layer egg and meat is gaining increasingly popularity to the consumers. Layer meat is tender, tasty, soft, pliable, textured and egg is very nutritious. The production statistics of meat and eggs is shown in Table1.2.

Table 1.2 The Production Of Meat And Eggs In Recent Five Years.

Product	**Production**					
	Unit	2014-15	2015-16	2016-17	2017-18	2018-19
Meat	Lakh tonnes	58.60	61.52	71.54	72.60	7514
Eggs	Crore	1099.52	1191.24	1493.31.	1552.00	1711.00

Source: DLS, 2019.

The poultry meat provides various nutrients, which are very essential for building up our body and it is necessary to provide properly balanced diet or human body.

Table 1.3: Food Value of Layer Egg.

Content of Nutrient	Amount	Percent
Food energy (K.cal)	70	
Sugar	0	0
Protein (gm.)	6	10%
Carbohydrate(gm)	1.00	1%
Fat (gm.)	5	8%

Saturated + Unsaturated fatty fatty acid (gm.)	1.5	8%
Sodium(mg)	65	3%
Cholesterol (mg.)	195	3%

Source: CFG, 2019.

Table 1.4: Food Value of Layer Meat Compared to Poultry Meat.

Poultry	Energy calorie	Protein (gm.)	Fat (gm.)	Mineral (gm.)	Riboflavin (microgm.)	Moisture (%)
Chicken(layer)	104	20.2	0.5	3.8	90	65.4
Chicken(broiler)	219	24	6.6	3.9	160	63.93
Duck	326	16.0	28.6	4.1	240	64.0
Koiel	168	25.0	6.8	4.7	-	-
Pigeon	279	18.6	22.1	3.8	240	-
Tarki	268	20.1	20.2	3.9	140	-

Source: USDA, 2012.

Food of animal origins provides higher proteins, vitamins and minerals than that of food of plant origin. It includes beef, goat meat, poultry meat, etc. Among these, poultry meat is the most desirable source of animal protein and highly accepted by most of the people of Bangladesh. The context of different nutrients in chicken meat and other animals are presented in Table 1.4 and table 1.5. Chicken meat contains large amount of high quality and easily digestible vitamins and minerals.

Table 1.5: Content of Nutrient of Chicken Meat And Others (Per 100 Gm).

Content of Nutrient	Chicken meat	Beef	Milk
Food energy (K.cal)	219.0	197.0	64
Water (gm.)	63.93	66.60	87.70
Protein (gm.)	24	20.20	3.30
Ash (gm.)	1.00	0.90	0.70
Fat (gm.)	6.6	12.30	3.60
Saturated fatty acid (gm.)	1.8	4.70	2.05
Unsaturated fatty acid (gm.)	4.0	5.75	1.25
Cholesterol (mg.)	60.00	70.00	11.00

Source: USDA, 2012.

1.4 Justification of the Study

Bangladesh is an agro-based country in the South Asia region, having small territory, but large population. It is characterized by her low productivity, food shortage, external dependence, poverty, unemployment and malnutrition. It had a modest beginning of industrialization but due to various reasons, progress of industrialization has stagnated. Given this situation, poultry farming seems to be a good way to solve the problems of the country in the shortest possible time.

Layer farming plays an important role in agro based economy in this country. The climate of Bangladesh is suitable for layer farming, so the layer birds can be raised easily to fulfill daily nutrient requirements. Layer farming has a great potential for providing additional income to both male and female members of rural families through creation of employment opportunities.

Layer farming agribusiness in the country like all over the world. The major part of the people irrespective of religion, caste and culture prefer chicken. As a result, the price of this product has gone up. Having received the signal of higher price and demand in the domestic market, recently a tendency to establish small scale commercial farms is observed among people both in rural and urban areas. Poultry is shaping up as an industry day by day. Many NGOs have come forward to give them assistance for setting up small poultry farms. However, the number of poultry farm is decreasing in recent year as sharply as it was expected due to many reasons. High price feed and low price of egg may be the reason. The present study is an attempt to find out the recent panorama of layer production in an area of Lalmonirhat district.

The study expects to provide valuable and important useful information to layer producers, intermediaries, consumers and other concerned people of Bangladesh. The extract of the study are also expected to be helpful to the layer farmers and enterprise for taking exact decision regarding further enlargement of commercial layer farming and production of live layer.

The results of this study will provided some basic information to policy maker,

production economics specialists, and extension workers, enable them to formulate policies regarding effective production plan of layer farming. The study will also help to disseminate information to the researchers interested in conducting studies further.

1.4 Objectives of the Study

The overall objective of this research is to investigate various socio-economic aspects of layer farming in a selected area of Lalmonirhat district. The specific objectives of the study are as follows:

1. To identify the socioeconomic characteristics of layer farmers;
2. To determine the financial profitability;
3.To determine the resource use efficiency of layer farming;
4. To find out the problems of layer farming;
5. To suggest solutions of problem for profitable layer farming in Bangladesh.

1.6 Thesis Organization

The thesis is organized as follows: Following introduction in chapter 1, chapter 2 describes theoretical insight or the literature review while chapter 3 is concerned with the research methods detailing about the general process of research and analytical approach of the study including description of the study area has been presented. In chapter 4 socio-economic characteristics of layer farmers are delineated. Chapter 5 discusses the profitability of layer farming. Chapter 6 presents production function analysis of layer farming. Chapter 7 includes problems of layer farming and some policy guidelines to solve those constrains. Finally, chapter 8 contains general conclusions and recommendations based on the empirical results of the study.

CHAPTER 2

REVIEW OF LITERATURE

Review of literature is an attempt for reviewing the findings that give a proper instruction in designing the future research problem and validating the new findings. It also helps conduct the research work successfully by providing various knowledge and information related to the proposed study. With this end in view, a literature review was carried out in line with the present study. In this section, the most common and relevant studies that were conducted in the past at home and abroad are highlighted.

Hasan (1997) examined the relative profitability of poultry rearing of four different categories of farms under the supervision of Bangladesh Rural Advancement Committee (BRAC) in the Mirpur upazila of Kushtia. The study revealed that, on average, the total cost per poultry farm per year was Tk. 1367.65, 6259.13, 24558.76 and Tk. 76703.75 for Key rarer, Model rarer, Chick rarer and Mini Hatcheries, respectively. The gross returns and net returns per poultry farm per year were Tk. 6533.25 and Tk. 5165.00; Tk. 17150.40 and Tk. 10899.27; Tk. 42996.50 and Tk.18437.74; Tk. 92611.20 and Tk. 45907.45, for Key rarer, Model rarer, Chick rarer and Mini Hatcheries, respectively.

Bhuiyan (1999) conducted an economic analysis of small poultry farming of Kotwali Thana in Mymensingh District. He worked on a total of 60 poultry farms taking 30 layer farms and 30 broiler farms from the Sadar upazila of Mymensingh district. The study revealed that on average the total costs per poultry farm per year week. 1314620 Tk. 299482 for broiler and layer farms, respectively. The gross returns per year were Tk. 355,772 and Tk. 437477 for layer and broilerr farms. It was revealed that most of the selected variable inputs had some significant impacts on the production of the broiler and layer farms.

Begum (2000) conducted a study to estimate the relative profitability of small, medium and large categories of layer and broiler farms and to determine the contribution of key variable to poultry farming income. For layer farms total costs per farm per year stood at Tk. 215255, Tk. 432179, Tk. 1192688 and Tk. 535129 for small, medium, large and all farms respectively. She found that total costs per broiler

per farm per year stood at Tk. 238051, Tk. 525095, Tk. 1420630 and Tk. 663943 for small, medium, large and all farms, respectively.

Ahmed (2001) conducted a study on comparative economic analysis of broiler production under Proshika's supervision and Private management in some selected areas of Tangail district. The study revealed that total costs per farm per year stood at Tk. 173839.40 and Tk. 146325.55 under Proshika's supervision and Private management. The total costs per bird, on average were estimated at Tk. 72.53 andTk.70.38 under Proshika's supervision and Private management farms respectively. The variable cost per farm per year under Proshika's supervision and Private management stood at Tk. 133363.70 and Tk. 133119.88, respectively, which accounted for 86.69 and 90.97 percent of their respective total. The total fixed cost per farm per year amounted to Tk. 20485.70 for Proshika's supervision and Tk. 15177.80 for Private management. Gross returns per farm per year stood at Tk. 205623.39 and for farms under Piroshika and Private management, respectively. The study revealed that broiler rising under Piroshkies' and Private management were profitable but broiler production under Private management was more Profitable.

Rahman *et al*. (2001) completed a study on prospects and problems of poultry industry in selected areas of Bangladesh with particular reference to marketing practices. For the study Gazipur and Kishoregonj districts were purposively selected. They selected 130 respondents which included 25 contract growing farmers, 4 traders of broiler and 20 farmers and 45 traders of layer. They identified six channels in broiler marketing. Farmers average cost of raising broiler per batch stood at Tk. 73322 for 1000 birds and the net return per broiler farm per batch was accounted for Tk. 8058. The average marketing cost of broiler in Dhaka city and in Kishoregonj for wholesaler- cum-retailers and retailers were estimated at Tk. 2844, Tk. 2046, and Tk. 2543 and Tk.2370 per 1000 birds, respectively.

Biswas *et al.* (2001) organized economic analysis of poultry rearing by rural women. They found that poultry rearing by rural women was profitable although they faced various problems relating to social, financial and management. Scientific method of poultry rearing was not adopted by rural women in the study areas. As a consequence, they losses as many of the birds died by diseases. Further, they did not clean the

poultry house with disinfectant that increased disease attack.

Rashid (2001) conducted a comparative economic analysis of broiler and layer production in some selected areas of Sadar Upazila in Mymensingh district. To find out profitability, the researcher took a sample of 70 farmers of which 36 were layer and 34 were broiler. The result showed that the gross cost per bird per day stood at Tk. 1.3826, Tk. 1.2289, Tk. 1.1716 and Tk. 1.2480 for small, medium, large and all layer farms. The net return per bird per day was calculated at Tk. 2444, Tk. 0.3845, Tk. 0.4721 and Tk. 0.3667 for small, medium, large and all broiler farms. So the results showed that layer farmers were more profitable than broiler farms. Finally, the researcher identified some major problems of layer and broiler farms and suggested some policy guideline.

Islam (2002) studied the economics of poultry farms of different sizes in some selected areas of Dhaka city. He found that the overall mean profitability in terms of net returns from 113 birds was Tk. 1691 with a benefit cost ratio of 1: 2: 1. Important implications emerging from the findings of the study include the lack of electricity in the remote rural areas where its supply is frequently interrupted, even if available, broiler rearing without electricity is also feasible and profitable that to generate income, alleviate poverty and socio-economic improvement of the hard core poor families.

Bhuiyan (2003) conducted a study comparative economic analysis of poultry production under supervision of ABFL and farmer own management in some selected areas of Kishoreganj district. The study revealed that in ease of broiler farm total cost per year was Tk. 833860 and Tk. 653952 under ABFL supervision and farmers own management. Respectively the figures for layer farm per 18 months were Tk. 3281098 and Tk. 709712, respectively the cash expenses of broiler farm per year were Tk. 77.413 and Tk. 607177 for ABFL supervised farm and fanners own management farm, respectively, which accounted for 92.51 and 92.84 percent of their total costs. The cash expenses of layer farm per 18 months were estimated at Tk. 2937367 and Tk. 6380011. The gross returns of broiler farm per year were Tk. 1101786 and 884482 under ABFL supervision and farmers own management, respectively. The average gross returns at layer farm per 18 months stood at Tk. 6266456 and Tk. 1008381. The net returns over full cost of broiler farm per year were Tk. 267926 and Tk. 230530 under

ABFL supervision and farmers own management, respectively.

Tohura (2004) conducted a study on economics of small-scale commercial broiler farming in Sadar upazila of Rangpur district. The study revealed that on average the total cost per farm per year was Tk. 786615. It was found that the variable cost per farm per year was Tk. 774689, which accounted for 98.48 percent of total cost. The total fixed cost per farm per year amounted to Tk. 11926 which shared 1.52 percent of total cost. It is evident from the study that the gross return per farm per year's stood at Tk. 176643. The net return over total cost per farm per year was calculated at Tk.390028.

Alam (2004) conducted a study on backward and forward linkages of poultry farming in some selected areas of Savar upazila under Dhaka district. This study was conducted mainly to understand the dynamics of poultry farm and to determine the cost and returns of poultry farming and explore the backward and forward linkages of the study. Backward and forward linkage effects created great potentials of capital investment by private entrepreneurs.

Bairagi (2004) examined an economic study of contract broiler farming under Aftab Bahumukhi Farm Limited .Aftab Bhumukhi Farm Limited (ABFL) is one of the commercial integrated farms that introduced contract growing of broiler and layer in 1994 and integrated it with a supply chain to survey the urban consumer. The study analyzed the economics of broiler farming with special reference to an understanding of the supply chain management. It suggested that ABFL should gain experiences and bring about efficiency at the contract growers level.

Khatun*et al.* (2005) conducted a study on growth performance of broiler under different management. All the management producers were similar for birds under the study. Broiler performance in terms of live weight gain, feed consumption, feed conservation efficiency, livability, cost affectivity, meat yield characteristics were evaluated. The study found that the live weight gain, feed consumption, livability and cost affectivity of broiler production were better on salt system than other two management system.

Kulkarni (2006) examined the correlation of need based expert system on commercial poultry production. They studied 75 commercial poultry farms, 44 layer and 31 broiler farms in Ranga Reddy district and Andhra Pradesh, India and identified the correlates of their information need and explored the applicability of need based expert system called Poultry Expert System (PES). Scientific orientation, income and term size were found to be the crucial factors determining the information need of different categories of poultry farms. Income and farm size had the highest direct and indirect effects, respectively, on the applicability of PES. Significant inter correlation was found between information need and the applicability PES (poultry expert system).

Peter and Mia (2006) undertook a study on poverty alleviation and broiler raising programs of BKB and BRDB in selected areas of Bangladesh. The study revealed that 410 and 268 man-days of employment opportunity were created per farm per year under BKB and BRDB. Average annual income per household under BKB and BRDB increased from Tk. 48758 and Tk. 28815 (187%) to Tk. 140065 and Tk. 73437 (35%), respectively over five years. Average amount of savings per household increased from Tk. 1280 and Tk. 497 (12 times) to Tk.16805 and Tk. 8291 (16 times). About 63% and 83% of total households under BKB and BRDB were unable to overcome the poverty situation. The broiler farming households with limited institutional facilities developed their economic status towards poverty reduction within a short time.

Islam (2006) conducted an economic study on broiler farming and its impact on livelihood improvement in selected areas of Gazipur district. The researcher took fifty farmers for the analysis. The study revealed that most of the broiler farmers were at the age group of 23-45 years. For an average per batch per farm of 100 birds, total cost, gross return, gross margin and net return were estimated at Tk. 96075.42, Tk. 106650, Tk. 13239.50 and Tk. 10574.58 respectively. Gross return and net return indicated that broiler farming was a profitable business. The study identified some economic, marketing, technical, social and natural problems, with their provable solution.

Ironkwe and Ajayi (2007) Studied on profitability of broiler production in oyibo

Local Government Area of Rivers State, Nigeria. This study analyzed the profitability of broiler production in five communities in Oyibo Local Government Area, Rivers State, Nigeria. They provided descriptive statistics, gross margin and return-to-management analysis. It was concluded that broiler production as part of a poultry investment or as a whole business venture is profitable. The results revealed that the investment after six months yielded net profit of 100%. The net profit had a positive value because the birds grew to heavy weights over a short period of time, thereby attracting high prices and return. These are clear indications that broiler production is a viable venture.

Leone and Estevez (2008) studied on economic and welfare benefits of environmental enrichment for broiler breeders. Design to enrich the environment is crucial in the effort to fully address the biological needs of domestic animals. They investigated the potential benefits of cover panels for broiler breeder reproductive performance in a commercial setting. The result demonstrate that environment enrichment is not only beneficial for broiler breeder welfare, but can also be economically advantageous, resulting in a win-win situation for poultry welfare and production.

Akther and Rashid (2008) conducted a comparative efficiency analysis on broiler farming under Aftab bahumuhkhi farm limited supervision and farmers under own management. A total of 90 farmers were selected under both management from three upazilas named Bajitpur, Kuliarchar and Kishoregonj Sadar. The Cobb-Douglas production function was used in the present study to examine the effects of the independent variables on gross return in broiler production. The total cost and average net return per batch per farm for 1000 birds were estimated Tk. 99429; Tk. 106330 and Tk. 4259; Tk. 3631 for the Aftab bahamuhkhi farm limited supervised farmers and own managed farmers, respectively. The study identified some major problems of broiler farming and suggested some recommendations for the development of broiler farming.

Raihan *et al*. (2008) conducted a study on trade and poverty linkages of the poultry industry in Bangladesh. This industry is particularly important in the sense that it is a significant source for the supply of protein and nutrition in a household's nutritional intake. With a high population and income growth, urbanization and high income

elasticity of demand, the demand for poultry products will be increased day by day. The poultry industry in Bangladesh is very important for the reduction of poverty and creation of employment opportunities. In order to protect the poultry sector from fierce foreign competition, the government has adopted various measures. There is also a serious lack of technical know-how among the people involved in this industry. They concluded that the poultry sector received adequate access to credit mainly from NGOs, access to working capital by smaller firms in particular still remains a major hurdle.

Sultana (2009) conducted a study on profitability of broiler farming in some selected areas of Mymensingh. This analysis showed the profitability of broiler production in Mymensingh district. The Cobb-Douglas production function was used in the study to examine the effects of the independent variables on gross return in broiler production. She found that the average total cost of broiler per farm per batch for 500 birds was Tk. 63366.84 where total variable cost for per batch was Tk. 60946.29 and total fixed cost Tk. Was 2420.55. Gross return for batch was Tk. 70150.00 and gross margin for per batch was Tk.9203.71.

Akhter (2009) conduct a study on comparative profitability of broiler farming under Aftab bahumukhi farm limited supervision and farmers under own management. The Cobb-Douglas production function was used in the study to examine the effects of the independent variables on gross return in broiler production. The study revealed that average, total cost of raising broiler per batch per 1000 birds was estimated at Tk. 99,429.00 and Tk. 1,06,330.00 for ABFL supervised farms and farms under own managed farms, respectively. The average variable costs and fixed costs per batch per 1000 birds were calculated at Tk. 96,218.00 and Tk. 1, 02,926.00, respectively. The average gross margin per batch per farm for 1000 birds were at Tk. 7,470.00 and Tk. 7,035.00 for the ABFL supervised farms and for farmers' own managed farms, respectively and average net returns were estimated at Tk. 4,259.00 for ABFL supervised farms and Tk. 3,631.00 for farmers' own managed farms respectively. The statistical analysis showed that profit earned by ABFL supervised broiler farms and own managed broiler farms were not significantly different.

Halcyan (2011) conducted a socioeconomic study on household poultry rearing in

some selected areas of Mymensingh district. In the study, researcher selected sixty household farmers in Sadar upazilla and Trishal upazila under Mymensingh district. The Cobb-Douglas production function was used in the study to examine the effects of the independent variables on gross return in broiler production. The total cost, average gross return, net return and benefit cost ratio were Tk. 9810, Tk. 11087, Tk. 1277 and 1.13 respectively. It was concluded that socioeconomic development can be achieved with the help of household poultry farming.

Rana*et al.* (2012) conduct a study on profitability of small scale broiler production in some selected areas of Mymensingh. This study aimed to determine the cost, return, and profitability of broiler production in some selected areas of Mymensingh district. This study estimated the average cost of raising broiler to be Tk. 8, 35,910.65 per farm per year. It was found that the variable cost per farm per year stood at Tk. 8, 23,735.93 which accounted for 98.54 percent of total cost. The total fixed cost per farm per year amounted to Tk. 14,041.66. It was evident from the study that the gross return per farm per year stood at Tk. 10, 78,022.39. The net return per farm per year was calculated at Tk. 2, 42,111.47. The findings revealed that broiler production was a profitable enterprise. Cobb-Douglas production function was applied to explore the specific effect of factors on broiler production. It was observed that most of the included variables had significant impact on broiler production.

Khan (2013) conducted an economic study on broiler farming in selected peri- urban areas of Bangladesh. The Cobb-Douglas production function was used in the study to examine the effects of the independent variables on gross return in broiler production. The results of the analysis showed that on average the total cost of broiler per farm per batch of 500 birds was Tk. 83305. It was found that the variable cost per farm per batch (500 birds) stood at Tk. 80175 which accounted for 96.24 percent of the total cost. The total fixed cost per farm per batch amounted to Tk. 3130. It was evident from the study that the gross return per farm per batch stood at Tk. 12375. The net return over total cost per farm per batch was calculated at Tk. 9245. The benefit cost ratios of broiler farming were 1.15 percent on variable cost basis and 1.11 percent on fixed cost basis. Findings of the study clearly indicated that broiler production was a profitable enterprise.

Akter (2014) conducted an economic study on Broiler poultry production in selected areas of Dhaka district: The results of the analysis showed that on average total cost of broilers per farm per year was Tk. 301142.103. It was found that the variable cost per farm per year stood at Tk. 238728.73 which accounted for 79.28 percent of total cost. The total fixed cost per farm per year accounted to Tk. 62413.373. It is evident from the study that the gross return per farm per batch stood at Tk. 431400. The net return over total cost per farm per year was calculated at Tk. 130257.90. The benefit cost ratios of broiler farming were 1.80 on variable cost basis and 1.43 on total cost basis.

It is clear from the above discussion that there are many economic studies on poultry farming in Bangladesh. The present study updates the profitability and resource use efficiency status of layer production with some more insights. Moreover, this study was conducted using latest data to get recent information regarding production and will help both the researcher and the farmers concerned with layer farming.

CHAPTER 3

METHODOLOY

1.1 Introduction

The reliability of a survey research depends, to a great extent, on the appropriate methodology used in the research. Use of improper methodology very often leads to erroneous results. Proper methodology is determined by the nature, aims and objectives of the study. It also depends on the availability of necessary funds, materials and time. There are several methods of collecting data for survey research. The present study was based on primary data, which were collected from the field survey and on secondary data. Those were collected from reliable sources. In this study, survey method was chosen because it is less expensive, it requires less time and after all it is simple and easy technique. But it has also some shortcomings. The main shortcoming of this method is that the investigator has to depend upon the memory of the respondents. To overcome the shortcoming, repeated visits were made to collect data in the study area and the questions were asked in such a manner that the respondents could answer from memory. The design of the survey for the present study involved some necessary steps.

3.2 Selection of the Study Area

Selection of the study area is an important step for conducting a study. It depends on the objectives of the research. For the present study, Kaliganj upazila area of district Lalmonirhat was selected randomly. Primary data was collected from, Kakina, Dologram, South Gopalroy and Chalbala village. The main reasons for selecting the study area were as follows:

1. Availability of large number of layer farms in the study area.
2. Expected better cooperation from the owners of layer farms since the area is well known to the researcher.

3.3 Method of Investigation

The method of data collection indeed depends upon nature, aim and objectives of the study. There are several methods of data collection of which survey method is one of them. For this study, survey method has been adopted for collecting data. Necessary data

have been collected by the researcher himself by using questionnaire through face to face interview. The respondents were layer farm owners, from the study areas.

3.3 Sampling Procedure

It is very difficult to make a farm business survey covering all farms. For this reason sampling is done to select representative farms to minimize cost in terms of time and resources for the study. A sample of representative farms was therefore, chosen which could represent a reasonably true picture of the region. In selecting samples for a study, two things were taken into consideration. The sample was as large as to allow for adequate degree of freedom in the statistical analysis and administration of field research, processing and analysis of data were manageable with the limits imposed by physical, human and financial resources. There are many villages in Kaliganj Upazila. From there 4 villages were randomly selected for the study. There are 89 layer farms in four villages. Among them 60 layer farms and 15 farms from each were randomly selected for the present study. Generally there are two types of layer such as white feather and brown feather. The researcher was collected data from brown feather (ISA brown) layer farmers.

3.4 Preparation of the Survey Schedule

The success of the research and survey depends on the proper design of the interview schedule. Keeping in view the objectives of the study, interview schedule was prepared to collect the expected information. Before preparing the final schedule, draft schedule was prepared in accordance with the objectives of the study. Then the schedule was pre- tested to verify the relevance of the questions and the nature of the response. After pre testing and necessary adjustment, final survey schedule was developed. The final survey schedule was developed in logical sequences including items of information as noted below:

1. Socio-economic condition of the layer farmer;
2. Layer farm related information;
3. Sources of income of farm families;
4. Cost of day-old-chick;
5. Cost of feed;
6. Cost of human labor;

7. Vaccine and medicine cost;
8. Cost of tools and equipment;
9. Housing cost;
10. Income from layer
11. Problems faced by layer farmers and
12. Suggestion of layer farm owners to solve those problems.

For the present study, data were collected during the month of February and March, 2019 through face to face interview with the respondents. For collecting data a number of field visits were made by the researcher himself during the period.

3.5 Collection of Data

Collection of accurate and reliable data from the field is not an easy task. The result of any study depends on the accuracy and reliability of data. Reliability of data mostly depends on the method of data collection. For the accuracy of the survey, schedules must be unambiguous. To ensure reliability, data were collected from the sample respondents by direct interview with interview schedules designed for the study. Schedules were used for collecting information from the layer farmers. During the interview, each respondent was given a brief introduction about the nature and purpose of the study. So, they could talk freely. Irrelevant questions were avoided to save time for the respondent and researcher. To attain accuracy and reliability of data, care and caution were taken in the course of the data collection. Attention was paid to the mode of the respondent and a congenial relationship was maintained between the respondent and researcher. Secondary data were collected from different journals, published paper as well as from different organizations such as Bangladesh Bureau of Statistics (BBS), Bangladesh Economic Review (BER) etc.

3.6 Problems Faced in Collecting Data

In collecting primary data, following problems and difficulties were faced by the researcher:

1. Most of the farmers in the selected areas hesitated to give actual information about their income sources. Because they thought that the researcher was government agent; therefore they were shy of giving actual information.
2. Another important problem faced by researcher in selected areas was that the researcher had to depend solely on the memory of the respondents for collecting data

because they did not keep any written record.

3. Most of the respondents in the study areas did not have any knowledge about research study. It was therefore difficult to explain the purpose of this research to convince them.

4. Sometimes, the farmers did not cooperate willingly with the researcher. They did not find any benefit to give information to the researcher.

5. On many occasions farm respondents were not available at home and in such cases the researcher had to give extra effort and time to collect the information from them.

3. 8 Processing and Tabulation of Data

The processing of data is necessary on the basis of objectives of the study. After collection of data from the field all data for the present study were then coded, tabulated, summarized and processed for analysis. The data have been transferred into SPSS sheet from the interview schedules. Finally, required numbers of tables were prepared and results were obtained by using various statistical techniques.

3.9 Analysis of Data

3.9.1 Analytical Techniques

Data were analyzed with a view to achieving the objectives of the study. For this study, the following techniques were used.

a)Tabular analysis and

b) Functional analysis

3.9.1.1Tabular Analysis

The most important objective of our study was to delineate the socio-economic status of layer farmers. The collected data were analyzed on the basis of the objectives of the study. Tabular analysis is an analysis that is generally used to find the crude association or variations between variables. In the present study, tabular techniques were applied with the help of statistical measures like the sum average, percentage, etc., to show the comparative performance of layer farming. Profitability analysis was done on the basis

of variable Cost, fixed cost, etc.

The following profit equation was applied to assess the profitability of layer farms.

$\Pi = PEQE + P_L Q_L + P_L Q_L - \sum (P_{xi}.Xi) - TFC$

Where,

Π =Profit (Tk./farm/year);

PE= Per unit price of egg (Tk. /egg);

QE=Quantity of egg (farm/yer);

P_b= Per unit price of live layer (Tk. /kg);

$Q_{b=}$ Quantity of live layer (Kg. /year);

P_L= Per unit price of used litter and excreta (Tk. /kg);

Q_L= Quantity of waste litter (Kg./farm/year);

P_{xi} = per unit price of ith (variable) inputs used in the layer farm (Tk.);

Xi= Quantity of ith (variables) inputs used in Kg;

i= (1, 2, 3,…….……60) and TFC = Total fixed cost

3.9.1.2 Functional analysis

One of the most widely used production function for empirical estimation is the Cobb Douglas production. This function was originally used by C.W. Cobb and P.H. Douglas in twenties to estimate the marginal productivities of labor and capital in American manufacturing industries. The original form used by Cobb and Douglas was

$$\mathbf{Q = aL^{\alpha}K^{1-\beta}U}$$

This forces sum of elasticity's to one. Their later modification was

$$\mathbf{Q = aL^{\alpha}K^{\beta}U}$$

Where, $\boldsymbol{\alpha} + \boldsymbol{\beta}$ need not equal one.

The Cobb–Douglas production function, in its stochastic form, may be expressed as

$Yi = \beta_1 X_{2i}\beta_2 X_{3i}\beta_3 eui$ …….. (3.1)

Where, Y = output

X_2= labor input

X_3= capital input

u = stochastic disturbance term, e = base of natural logarithm.

From Eq. (3.1) it is clear that the relationship between output and the two inputs is nonlinear. However, if we log-transform this model, we obtain:

$\ln Yi = \ln\beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + ui$

$= \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + ui$ ….. (3.2) Where $\beta_0 = \ln\beta_1$.

To determine the contributions of the most important variables to the returns of a layer farm, the Cobb-Douglas production function was used in the present study. The model took the following shape:

$$\mathbf{Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}e^{Ui}}$$

The function was estimated as follows:

$\ln Y = \text{Ina} + b_1 \text{ In } X_1 + b_2 \text{ In } X_2 + + b_3 \text{In } X_3 + b_4 \text{ In } X_4 + b_5 \text{ In } X_5 + b_6 \text{ In } X_6 + Ui$

Where,

Y= Gross return (Tk. /kg); a=Constant or intercept value;

X_1= Cost of day old for ith farm (Tk. /year);

X_2= Cost of feed chicks for ith farm (Tk. /year);

X_3= Cost of hired labor for ith farm (Tk. /year);

X_4= Veterinary expanses for ith farm (Tk. /year);

X_5= Cost of transportation for ith farm (Tk./year);

X_6 = Cost of electricity for ith farm (Tk. /year) Ui = Error term;

i= 2, 3, ... 60;

b_1, b2, b3, b4, b5, b6= Regression co-efficient of respective variables and ln=Natural log.

3.10 Procedure for Evaluation of Costs and Returns

The cost items were classified into two broad categories, i.e.

(1) Fixed cost and

(2) Variable costs. The costs and returns were estimated per farm for the reference year. The cost items were divided under the following heads.

3. 10.1 Calculation of Feed Cost

Feed was the largest and the major cost items of layer farms. The efficient utilization of this cost possibly helps a farm to achieve the maximum level of profit. Cost of feed included ready feed, such as rice bran, wheat bran, bone meal, fish meal, oil cake, salt, mineral, vitamin, oyster shelled.

3.10.2 Day Old Chick Cost

Day old chicks cost is another major cost of layer production. Day old chicks cost was the money value of total layer birds, purchased by the owners of the layer farms in the present study. This cost was calculated by multiplying the total number of day- old-chicks by the price of each chick.

3.10.3 Human Labor Cost

There are broadly two different kinds of labor, (1) hired labor and (2) family labor. Again, hired or family labors were of two categories i.e., male and female. The children and female man-days were converted into adult equivalent male man-days using the ratios, 1 adult man = 1.5 adult women = 2children

3.10.4 Veterinary Expenses

Veterinary expense is another important cost item of layer production. Veterinary services included cost of vaccine, medicine and fees of doctors. Total medicine costs were calculated by taking into account real cost incurred on the above items.

3.10.5 Housing Cost

Maximum Layer houses were tin-shed with bamboo caged and earth floor. In the present study, housing cost was calculated by applying straight line depreciation method. In this method, the depreciation during each period is same. The amount of depreciation to be charged during a year is worked out as follows:

$$\textbf{Depreciation} = \frac{\textbf{Original Value- Salvage Value}}{\textbf{Life of the house}}$$

3.10.6 Cost of Tools and Equipment's

Tools and equipment are necessary for successful layer farming. The layer farmers generally used brooder, water pot, feeder, fan, bulb, the heating material etc. Cost of tools and equipment were determined by applying straight line depreciation method.

3.10.7 Interest on Operating Capital

Interest on operating capital was charged on taking all variables costs incurred for various operations in layer farming such as day-old-chick cost, feed cost, hired labor cost, veterinary services and medical cost, electricity cost, transportation cost and litter cost. As the variable cost items were short time investments, interest rate (IR) on these items was charged at the rate of 5 percent per annum. It was assumed that if the owners of layer farmers had put money in bank, he would have received an income in the form of interest money at the above rate. The cost of land use may be estimated using one of the alternative concepts: Interest on operating capital (IOC) was computed by the following formula:

$$\mathbf{IOC} = \frac{\mathbf{OC \times IR \times Time\ consideration}}{\mathbf{2}}$$

Where, OC = Operating capital; IR=Interest rate

3.10.8 Transportation Cost

The transportation cost of layer farmers included expenses on transportation for purchasing day old chicks, feed collection, paddy husk collection, veterinary services, collection of market information, etc.

3.10.9 Electricity Cost

It is another cost for layer enterprise. Electricity is needed for maintaining temperature inside the house or for protecting the birds for hot and cold climate.

3.10 Calculation of Benefits

The return items included values of live layer, used litter and excreta. The value of layer was calculated on the basis of weight (kg) of live layers sold, multiplied by the average prices of layer.

3.11 Gross Margin

Gross margin is defined as the differences between gross return and variable cost. For short run as well as for farm planning, gross margin analysis is widely used.

3.12 Net Return

Net return on total cost was arrived at by deducting all the costs from the gross return.

3.13 Benefit Cost Ratio

Benefit cost ratio was calculated by the following formula

$$\textbf{BCR} = \frac{\text{Total Benefit}}{\text{Total Cost}}$$

3.14 Profile of the Study Area

A brief description of the study area is depicted in this chapter. The knowledge of the study area is essential to understand and interpret the findings of the study. The description of the study area includes location, physical features and topography, climate, temperature and rainfall, population, religion and culture, agriculture, NGOs, transport, communication and marketing facilities of the study area.

3.14.1 Location

The study area covers Kaliganj Upazila of Lalmonirhat District. Countryside of Kaliganj upazila (Kakina, Dologram,South Gopalroy and Chalbalavillage) was selected for this purpose. KaliganjUpazila area 236.96 sq km, located in between 25°54' and 26°04' north latitudes and in between 89°07' and 89°22' east longitudes. It is bounded by Hatibandha upazila and Westbengal of India on the north, Gangachara upazila on the south, Aditmari upazila on the east, Kishoreganj(Nilphamari) and Jaldhaka upazilas on the west.

3.14.2 Physical Features and Topography

Grey flood plain soils and non-calcareous brown floodlpain soils are main feature of this area.Seasonaly wet or shallowly floodplain soils on lower ridges and in depression with moderately well drained ,rather acid, brown loom soil higher ridges.This region includes the active floodplains of Teesta, Dharlar rivers. It has complex patterns of low, generally smooth ridges, inter-ridge depressions, river channels and cut-off channels.The area has irregular patterns of grey stratified, sands and silts. They are moderately acidic throughout and parent alluvium is rich in minerals. Four general soil types occur in the region; of which, Non calcareous Alluvium predominates. Organic matter content is low and CEC is medium. Soil fertility level, in general, is low to medium.

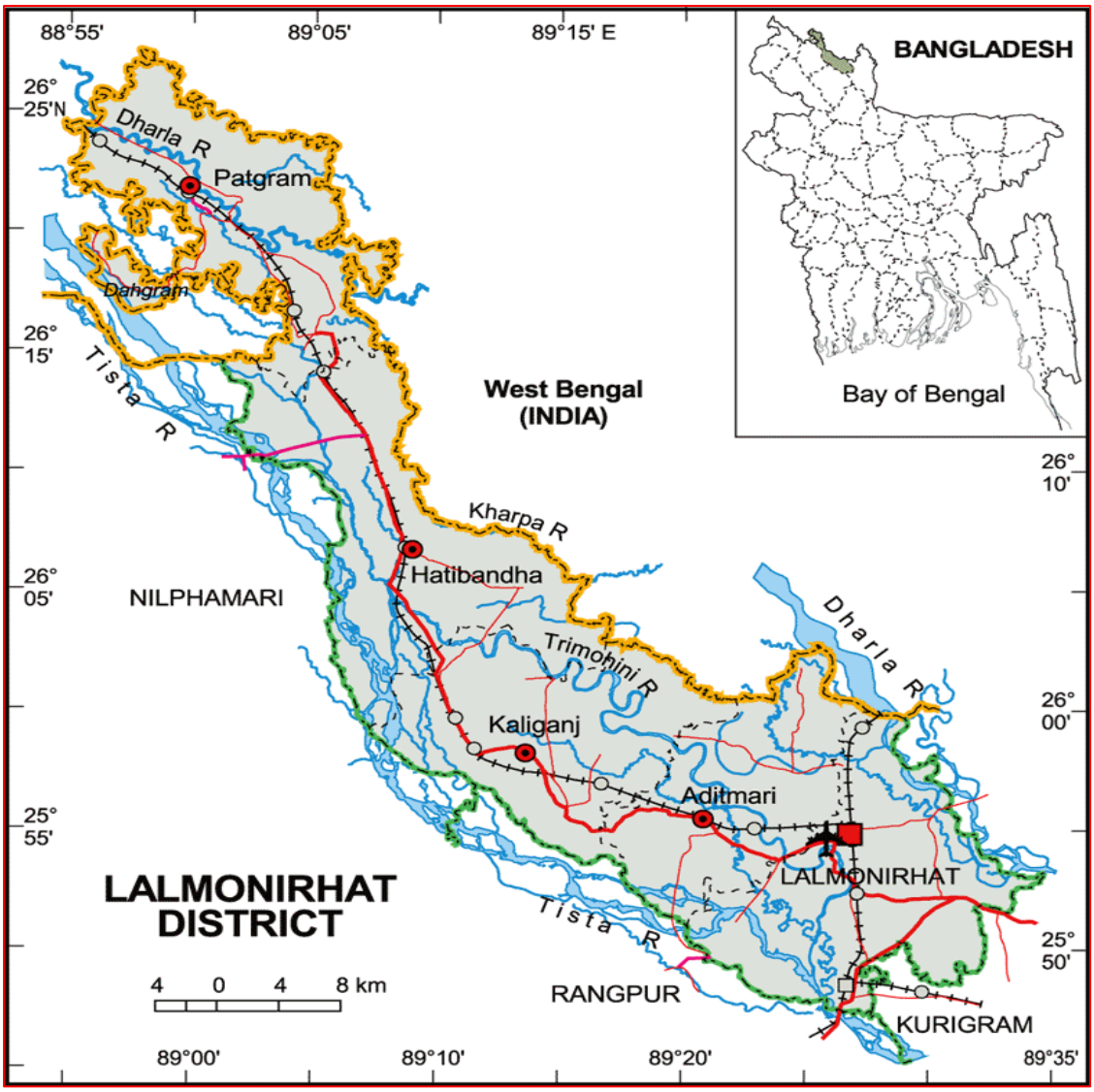


Figure 3.1: Map of Lalmonirhat District

The climatic condition of the study area covered is not different from that of other parts of the district. August is the warmest month of the year. The temperature in August averages 28.7 °C. At 17.5 °C on average, January is the coldest month of the year. There is a difference of 582 mm of precipitation between the driest and wettest months. The variation in annual temperature is around 11.2 °C.

Table 3.1: Monthly Average Temperature, And Rainfall of the Study Area In2019

Months	Maximum temperature (0°c)	Minimum temperature (0°c)	Average temperature	Average humidity (%)	Rainfall (mm)
January	24.3	10.7	17.5	73	10
February	26.8	12.5	19.6	66	11
March	31.1	16.5	23.8	63	30
April	33.2	21	27.1	72	95
May	32	23	27.5	77	343
June	31.2	24.5	27.8	86	584
July	31.2	25.5	28.3	84	532
August	31.4	26.1	28.7	83	406
September	31.4	25.3	28.3	84	345
October	30.6	22.6	26.4	76	160
November	28.1	16.5	22.3	71	12
December	25.3	12.6	18.9	74	2

Source: Banglapedia, 2019

Table 3.1 shows that maximum and minimum temperature in the study area ranged from 32.2°c to 12.5^{0}c. The average maximum temperature was the highest in August which was 28.7°C and the average minimum temperature was recorded in January which percentage was recorded as 63% in March. The maximum average rainfall is about 584 mm in July and the lowest during the month of December (Banglapedia, 2019).

3.14.3 Area, Population and Literacy Rate of the Kaliganj Upazilla .

Total area of Kaliganj236.96 square km. having population216868 with a sex ratio 101:100 4.3). The literacy rate is 50.8% and number of household is 45459.(Table 3.2)

Table 3.2: Area, Population, Household, Gender And Literacy Rate of Kaliganj Upazila.

Name of the area	Area sq. km	No. of household	Population			Sex ratio	Literacy rate%
			Male	Female	Total		
Kaliganj	236.96	45459	123225	124370	247595	100:101	65.8%

Source: UAO, 2019

3.14.4 Non- government Organizations (NGOs)

There are large number of non-government organizations (NGO's) like BRAC, PROSHIKA, ASA, Grameen Bank, SSS (Society for Social Service) etc. are engaged in Different types of rural development programmes in the study area. In recent years, NGOs are providing technical supports in livestock, poultry, fisheries, homestead gardening, handicraft etc. They are also engaged in educational programmes. They provide loans in small amount (microcredit) to poor women and landless farmers.

3.14.5 Religion and Culture

Most of the villagers in the study area are Muslims except a few. The non-Muslim villagers are mostly Hindus. The relations between Muslims and Hindus are cordial. The villagers are very faithful on their own religion. Their livings are simple and straight forward. They are in general cooperative to each other in all sorts of social functions and the hospitality of the villagers is noteworthy.

3.14.6 Agricultural production and Use of state of the art technology

In the study area Agriculture is the main field of production and development. In Kaliganj upazilla, the principal agricultural crop is rice which is grown in three seasons such as Aus, Aman and Boro. The winter crops such as tobacco, wheat, jute potato,

mustard, and vegetables like brinjal, cucumber, bottle gourd, bean, tomato, lalshak etc are also grown in the study area. Modern technology namely deep and shallow tubewells, power tiller, HYV seeds, chemical fertilizers, insecticides are widely used in the study area .Major cropped areas and production in Kaliganj upazilla are shown in table 3.3.

Table 3.3 Major Cropped Area And Production By Kaliganj Upazila In 2018- 2019.

Particular	**Aus**	**Aman**	**Boro**	**Wheat**	**Jute**	**Potato**	**Tomato**
Area (Acres)	594	38385.5	15880	775	1849.5	275	3973
Production (Metric ton)	569	43837	24938	946	8390	1225	2956

Source: BBS, 2019

Table 3.4 describes the number of poultry resource in fiscal year 2018-19.It shows that toal number of layer farm was 89 and total poultry was 323457 and broiler farm was 144 and total number of broiler was 265825 while duck ,pigeon,turkey and koel farm was 82,40,15 and 8 respectively.

Table 3.4: Total Poultry Resource In Kaliganj Upazila In 2018-19 Year

Name of the poultry	Number of farm	Amount of poutry
Local Breed		145632
Layer	89	323457
Broiler	144	265825
Duck	82	194729
Pigeon	40	2700
Turkey	15	31025
Koel	08	3425

Source:BBS, 2019.

Table 3.5 shows the daily demand, demand per year and production and surplus of meat and egg production in the study area.

Table 3.5: Demand and Production of Meat and Egg in Kaliganj Upazilla In 2019.

Product	Demand per day(per person)	Demand per Years	Production per Years	Surplus
Meat	120gm	1090(Metric ton)	15390(Metric ton)	25 (Metricton)
Egg	104(per year)	301900000	302000000	100000

Source: BBS, 2019.

3.14.7 Communication, Transport and Marketing and Other Facilities

Transport and communication helps to leverage the economy of rural area. Transport, communication and marketing facilities are the main agricultural infrastructure and play an import role in agricultural as well as economic development of a country. Without well-developed transport system, it becomes impossible for the rural people to enjoy the facilities of modem technology. Tracks, Buses, bicycles, rickshaw, tempo and van services are the major means of transport in the study area. The marketing systems in these Upazilla headquarters are moderately good. There are many hats and markets in the study area. Generally farmers purchase daily necessities including agricultural inputs and sell their products to the village markets and to the middlemen e.g. Paikers, Beparies, Arat dars etc. The villagers seldom receive fair price of their products.

CHAPTER 4
SOCIOECONOMIC CHARACTERISTICS OF THE LAYER FARMERS

4.1 Introduction

This chapter provides a brief description of the socioeconomic characteristics of poultry farmers in the study area. Decision making behavior of an individual is determined to a large extent by his socioeconomic characteristics. The socioeconomic characteristics considered in the present study were age, education, occupation, family size, land ownership, sources of family income etc.

4.2 Age Profile of the Sample Farmers

Age profile is very important to maintain a profitable poultry farming. The selected poultry farmers were grouped into three categories according to their ages. The age groups were presented in the Table 4.1.

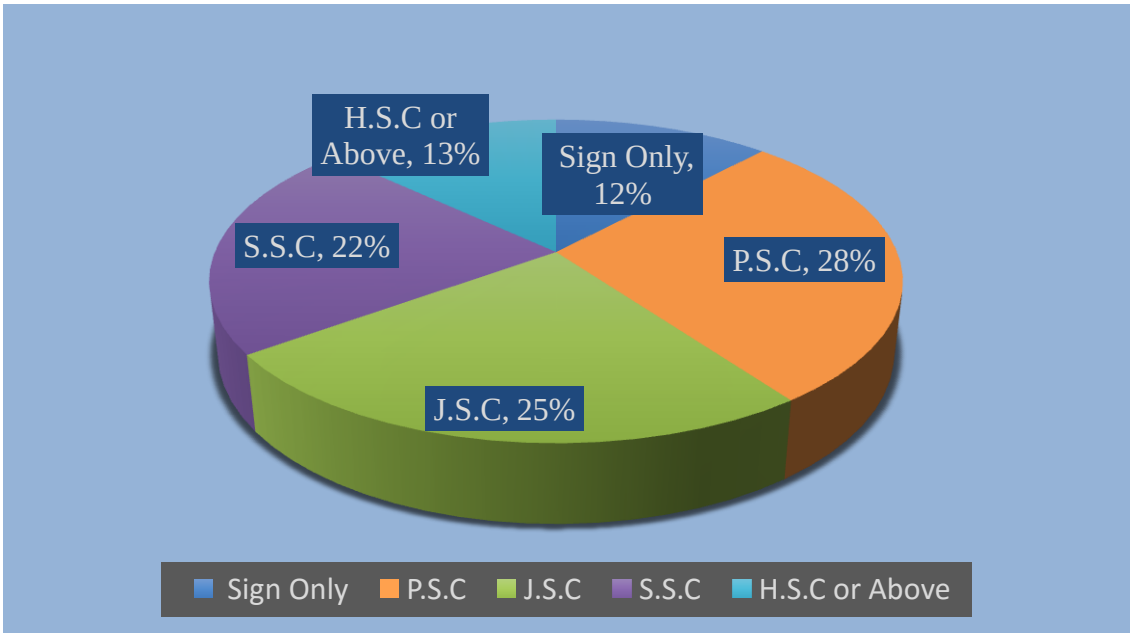
Table 4.1: Age Profile of Layer Farmers.

Category of Years	Number	Percentage
Young Age(>35 year)	22	37
Middle Age(35-50 year)	32	53
Old Age(<50 year)	6	10
Total	60	100

It is clear from the table that farmers between 35-50 years of age named as middle age accounted for 53.3 percent of the total sampled poultry farmers while farmers aged less than 35 years constituted 36.7 percent. There are only 10 percent sample farmers whose age were above 50 years. Figure 3.1 revealed poultry farmers were of mostly middle aged group.

4.3 Education profile of the Layer farmer

Education act as the main important factor to make the poultry farming profitable and efficient. Formal education gives the farmer hands on training and cope with the modern management practices and make able to use state-of-the-art technologies in this sector. Education enables man to make the best of his scare resources and make profitable enterprise. The farmers were categorized into six groups (Figure 4.1). They were can sign only, P.S.C, J.S.C, S.S.C and H.S.C or above class only. The figure represent that 28 percent of farmers attained P.S.C level only and in J.S.C, S.S.C ,H.S.C level or in above class is 22 percent,22 percent and 13 percent only. The lowest percentage is can sign only 12 percent..Upto J.S.C level education contributes more to the layer farming.



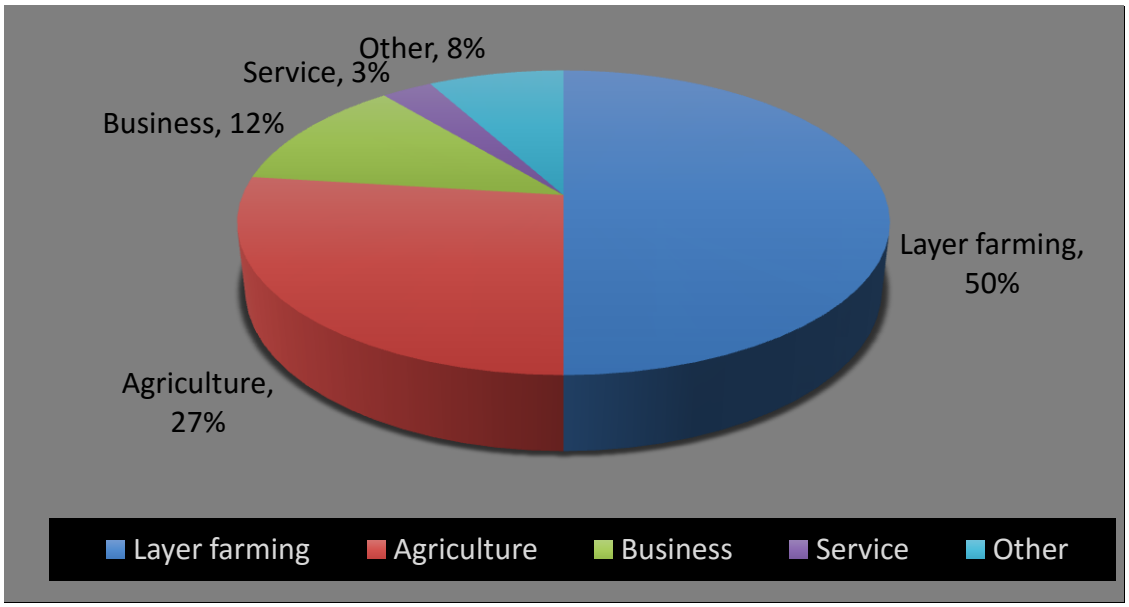
Source: Field survey, 2019.

Figure: 4.1 Education Level of Farmer.

4.4 Occupational Status of Layer Farmers

Occupation represents the way of earning of a layer farmer. The figure below shows that farmers are now shifting into different occupation. As a result new income source of the farmer are increasing.In Bangladesh, rural people's occupations are increasingly diversified. About 50% of rural people do not own any land. They seek off-farm and on-farm income earning opportunities. In the selected area, the layer farmers were

engaged in different occupations along with layer farming. In the case of main occupation, layer farming accounted for 50 percent, business accounted for 12 percent, agriculture accounted for 27 percent and service and others accounted for 3 and 8 percent, respectively (Figure 4.2) .



Source: Field survey, 2019.

Figure 4.2: Occupation of layer farmers

4.5 Experience of layer farmers

Experience increases the farmers capability of farm production and capacity do deal with the risk and uncertainties .Through experience people learn the art of most efficient and effective use of scarce resource to make production profitable. Table 4.2 illustrate that highest number of people was 1 to 4 years experienced is about 45 percent. One year experienced people was 23.3 percent which is almost half of the 1 to years experienced. Experience level 5 to 8 years and 9 years or above constituted 18.3 percent and 8 percent respectively.

Table 4.2: Experience profile of layer farmers

Category	Number	Percent
1 Years	14	23.3
2 to 4 Years	27	45.0
5 to 8 Years	11	18.3
9 Years or Above	8	14.3
Total	60	100

Source: Field survey, 2019

4.5 Family Size

Size of the family has an incentive to work as labour ,household task and large family provide social security. Data represented in the table shows that highest number of people belonged to medium family (72%) followed by small sized family (18%) and the lowest percentage contributed by large family (10%). On the basis of the report of national household survey average family size in total is 4.35 where in rural it is 4.36 and urban is 4.29. In this study most of the respondent hold small family belonging to the members of medium family (4 to 6).

Table 4.3 Family Size of Layer Farmer

No. of family members group	No. of farm family	Percent	Average family size
Small family(1-3)	11	18	
Medium family(4-6)	43	72	4.72
Large Family(7 or Above)	6	10.0	
Total	60	100.0	

Source: Field survey 2019.

4.6 Training of the Layer Farmers:

Training helps the farmer to maximize their farm scarce resource, improved knowledge and skill and better management practices of the layer farming. Table 4.3 shows that about 23.3 percent of people have no training .Three to five days training constitutes 21.7 percent of the respondent farmers while 35 percent of people take part in training for six to ten days which is the highest. Lowest number of people take part in training for 15 days or above which is 8.3 percent.

Table 4.4: Training of Layer farmers in Number of Days

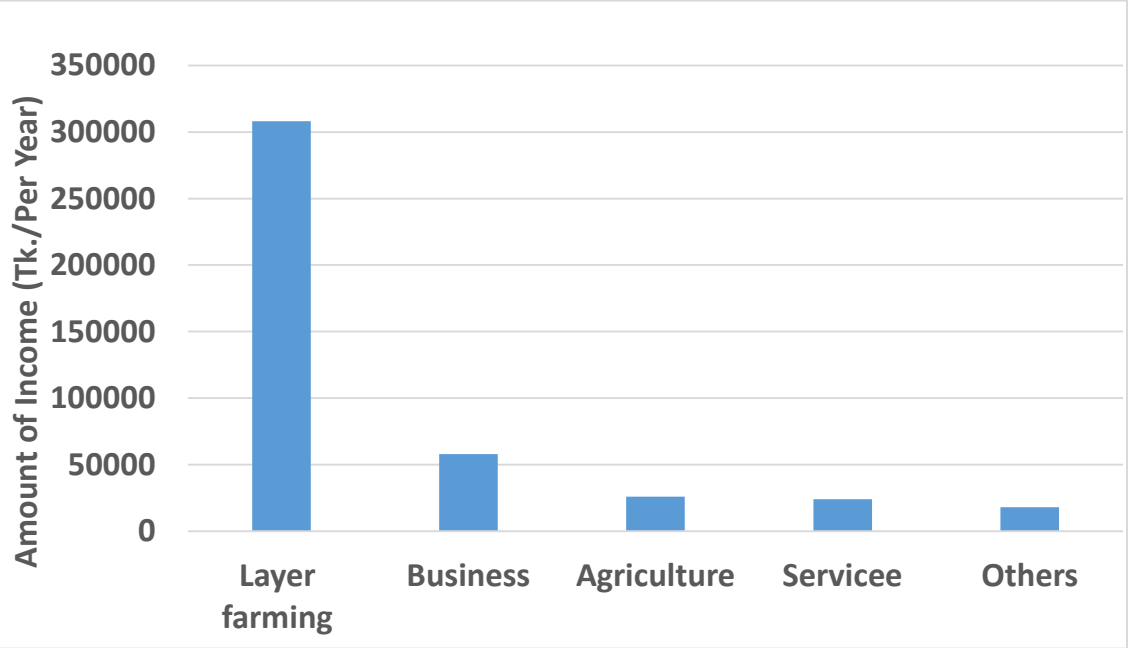
Training in Number of Days	Frequency	Percent
No training	14	23.3
3 to 5 days	13	21.7
6 to 10 days	21	35.0
11 to 15 days	7	11.7
15 days or Above	5	8.3

Total	60	100.0

Source: Field Survey, 2019.

4.7 Income Level and Other Sources of Income

Income contributes to economic transformation and life satisfaction of farmer**.** Family income of the farmers comprises different sources. Annual family incomes of layer farmer's income from layer farming, business, agriculture, service, and others.



Source: Field survey, 2019.

Figure 4.3: Income Level and Other Sources of Income

Annual family incomes of layer farm owners are shown in Figure 4.3 The figure indicates that the family income derived from layer farming was greater than others. On average, annual family income from layer farming was Tk.301809 which covers 70.89 percent of the total income and almost twice of national average income which is about tk.1,77,888 On the other hand, average annual income from business of layer farmers were estimated at Tk.57000 which was13.38 percent of the total income. Income from agriculture, service and other was 26000, 23000 and 18000 respectively.

4.8 Land information of the poultry farmer

Table 4.5 represents that about 25 percent respondent layer farmers fall under the category of marginal farmer while70 percent of the farmer are the small farmer which is the highest. According to the table 5 percent people are medium farmer.The number of

large farmer was zero. The average land owned by the farmer is about 1.80 acre which is above the national average land owned by the farmer 1.68 acre.

Table 4.5: Land Information of the Poultry Farmer

Amount of land ownership	**Amount of land ownership (%)**	**Number of farmer**	**Average land(acre)**
Marginal farmer (0-0.49 acre)	25	15	1.80
Small farmer (.50-2.49 acre)	70	42	
Medium farmer (2.50-7.49 acre)	5	3	
Large farmer (> 7.50 acre)	0	0	
Total	**100**	**60**	

4.9 Size of the Layer Farms

Table 4.6 represents size of the different poultry farms. The lowest farm size 500 to 1500 which constitutes 60 percent of the total farm. The highest farm size was 4501 or above constitutes about 7 percent of the total farm

Table 4.6: Size of the Layer Farmer.

Number of Poultry	**Number**	**Percent (%)**	**Average farm Size**
500-1500	36	60	1250
1501-3000	11	18	
3001-4500	9	15	
4501 or Above	4	7	
Total	**60**	**100**	

Source: Field survey, 2019.

Other farm size was from 1501 to 3000 and 3001 to 45000 which constitutes 18 percent and 15 percent respectively. Average farm size in the study area was 1250 chicken.

4.10 Disease Control

Disease is the main threat of the poultry farming. Disease may cause heavy damage to the layer farmers. Disease can make the farmer to bitter experience of loss.Table 4.7 depicts the way of preventing method of disease adopted by the farmers.

Table 4.7: Method of Controlling Disease Adopted by the Layer Farmers.

Method	Responses	Percent
Quarantine method	46	24
Vaccination	53	29
Antibiotic use	39	21
Biosecurity	47	26
Total	185	100.0

Source: Field survey, 2019.

This was studied on multiple response basis which represent that highest 29 percent of people practice vaccination while lowest number of farmer about 21 percent farmer adopt Antibiotic method. Quarantine, Biosecurity method adopted by the farmer were 24 and 26 percent respectively.

CHAPTER 5

PROFITABILITY OF LAYER FARMING

5.1 Introduction

The insight of this chapter is to estimate the costs, returns and profitability of raising layer birds and to focus on the main factors affecting return of layer production. In estimating cost of rearing layer birds, total costs per farm per year were considered. Variable costs were determined for day old chick, feed, veterinary expenses, hired labor, litter costs, electricity cost and transportation cost. On the other hand, fixed cost included housing cost, tools and equipment, family labor, and interest on operating capital etc. On the return side, gross margin, net return, returns per taka invested on total cost were estimated. The item wise costs and return of layer production are discussed below.

5.2 Layer Production Cost

The production cost of layer farms here refers to the total amount of funds used in production. In the present study, the total cost of layer production was estimated at Tk. 1834406 per farm per year. Table 5.1 represents the total costs of layer production. Total variable cost and total fixed cost were Tk. 1691440.72 and Tk**.** 149242 that were 91.89and 8.11percent of total cost, respectively. The item wise costs of layer production are discussed below.

5.2.1 Variable Cost

5.2.1.1 Day Old Chick Cost:

This is the first crucial variable cost of layer farming. In my study area the farmers collected the day old chick mainly from the hatcheries and some from local agent. No one were found to use parent stock. The hatcheries collected the parent stock from the breeder farms who produce the hybrid chicken for the local farmers. It is evident from the table 6.1 that the day old chick cost was 36321 which is 1.97 percent of the total cost.

5.2.1.2 Feed Cost

The feed cost of the layer farms contributes the highest amount of total cost. In my

study the area average feed cost per farm per year was calculated. In the study area most of the farmers used commercial ready mixed feed, which included fish meal, bone meal, rice bran, wheat bran, oil cake, oyster shell, minerals, salt, vitamin, etc. And some used handmade feed buying the ingredient from the local market. The purchased feeds were valued according to the average prices actually paid by the owners of the layer farm. Average, price of per kg. Feed was Tk. 34. Table 5.1 shows that the average feed cost per farm was Tk. 15,73,573.75 covering 82.98 percent of the total cost.

Table 5.1 Total Cost of Layer Production Per Farm Per Year

Cost items	**Unit**	**Unit Price**	**Per farm per year**		**Percentage of total Cost**
			Quantity	**Total Cost**	
A. Variable cost	**Tk.**			**1691440.72**	**91.89**
a) Feed cost	Tk.	34	44928.6	1527573.75	82.98
b)Day-old-chick cost	No	29	1250	36321	1.97
c) Hired labor	Man-day	300	336	100800	5.48
d) Veterinary service and medicine cost	Tk.			17092.88	.93
e) Electricity cost	Tk.			4697.56	.25
g)Transportation cost	Tk.			8070.23	.43
B. Fixed cost	**Tk.**			**149242**	**8.11**
a) Housing cost	Tk.			16487	0.89
b)Land use cost				3023.75	0.16
c) Family labor cost	Man-day	300	245	73500	3.98
d)Tools &equipment's cost	Tk.			12350	0.66
Interest on operating capital	Tk.			43882.2	2.37
Total cost (A+B)	**Tk.**			**1834406**	**100**

Source:FieldSurvey,2019

5.2.1.3 Hired Labor Cost

The cost of farm labor were calculated by considering works of both hired and family labor. Family labor includes the farmers himself and other working members of the family while the hired labor includes permanent hired labor, part time hired labor and labor employed on daily contract basis. The cost of family labor was estimated on the basis of the principle of opportunity cost. It is revealed from Table 5.1 that the cost of hired labor per farm per year was Tk. 100800 which covered 5.48 percent of the total cost. On the other hand, family labor cost was calculated at Tk. 73500 which covered 3.98 percent of the total cost.

6.2.1.4 Medicine Cost and Veterinary Cost

The layer farmers in the study area were very careful about the possibility of their layer diseases. Vaccine, medicine, doctor's fee were the major component of veterinary expenses. Table 6.1 shows that the average veterinary cost per year was Tk.17092 which covered less than one percent of the total cost.

5.2.1.5 Transportation Cost

Transportation helps to facilitate the farm activities smoothly .Transportation cost include mainly bringing feed and selling of farm product to market. It is evident from Table 6.1 that transportation cost per farm per year stood at Tk. 8070.23 which covered 0.43 percent of the total cost

5.2.1.6 Electricity Cost

Another important cost item for layer farm is electricity cost. Electricity is needed for maintaining temperature inside the layer house or for protecting the birds from hot and cold climate. It is evident from the table 5.1 that the annual electricity cost was Tk. 4697.56 which covered 0.25 percent of the total cost.

5.2.2 Fixed Cost

5.2.2.1 Housing Cost

In layer farms construction of farmhouse claims an important part of the production cost. A house is required for layer birds to protect them from sunshine, rainfall, cold weather, storms, and wild animals. It also provides comfortable condition for layer birds. In the study areas, most of the farm houses were tin shed with bamboo caged fenced by the bamboo. Some were found semi pucca house with iron net. Average life time of farm house is considered 10 years. Table 5.1 shows that total housing cost per layer farm per year was Tk16487 which representing 0.89 percent of the total cost.

5.2.2.2 Tools and Equipment Cost

To make layer farms successful tools and equipment arc necessary element. The major tools and equipment used by the layer farmers were bamboo cage, feeds brooder, water pot, electrical instruments, feeder and heating materials. The tools and equipment cost per farm per year was Tk. 12350 which covered 0.66 percent of the total cost.

5.2.2.3 Interest on Operating Capital

It is evident from the table 6.1 that interest on operating capital per farm per year was Tk. 43882.20 which covered 2.37 percent of the total cost.

5.3 Returns from Layer Production

The main aim of the commercial layer farms, like all other businesses is to earn profit by selling layer birds. The purpose of this section is to estimate the gross return and net return (Profit) from raising layer. To determine the gross return from layer farming, it was necessary to calculate the return earned from selling egg, live layer birds and chicken dropping. Gross return was determined by adding income earned from sale of live layer, used litter and birds excreta.

5.3.1 Gross Return

Gross return reveals as the overall earning of the farm table 5.2 shows the average gross return received by each layer farmers from his farm business. It includes the return from egg sold, live layer sold etc. It can be noticed from the Table 5.2 that, on

average, price of live layer received by layer farmers was Tk. 136. An average farmer produced 2357 kg layer per year. The gross return per farm per year was Tk**.** 4142492(Table 5.2).

Table 5.2 Gross Return from Layer Production Per Farm Per Year

Items	Unit	Unit Price	Per farm/year	
			Quantity	Value(Tk.)
1.Egg sold	number	7	256909	1798365
2.Live layer	Kg	136	2357	320587
3. Excreta sold	Sack	10	864	8640
4. Bag sold	Sack	50	308	14900
Total (1+2+3+4)	-			2142492

Source: Field Survey, 2019

5.3.2. Gross Margin

Gross margin can be defined as the difference between gross return and total variable costs. The argument for using gross margin analysis is that the farm owners like to maximize return over variable cost. Moreover in the context of short run analysis and farm planning, the gross margin analysis is widely used. It is evident from table 5.3 that gross margin per farm per year was Tk.4,51,052.

Table 5.3 Gross Margin, Net Return, and Benefit Cost Ratio Per Layer Farm Per Year

Margins & Returns	**Per farm /Year**
A. Gross return	21,42,492
B. Total variable cost	16,91,440.72
C. Total cost	18,34,406.72
D. Gross margin (A-B)	4,51,052.28
E. Net return (A-C)	3,01,809
F. Return per taka invested (Variable cost basis) A/B	1.26
G. Return per taka invested (Total cost basis) A/C	1.17

Source: Field Survey, 2019

5.3.3 Net Return

Net return on total cost of the enterprise was calculated by deducting all the costs from the gross return. Table5.3 shows that net return per layer farm per year stood at Tk. 3,01,809.

5.3.4 Benefit Cost Ratio

Benefit cost ratio denotes the amount of return per taka invested in the enterprise. It helps to analyze the financial efficiency of the farm. It is evident from the study that the benefit cost ratios of layer farming were 1.26 on variable cost basis and 1.17 on total cost basis(Table 5.3).Thus it emerges that layer farming is a profitable enterprise.

CHAPTER 6

PRODUCTION FUNCTION ANALYSIS OF LAYER FARM

6.1 Introduction

The focus of this chapter is to relate main factors affecting returns of layer production operation in the framework of functional analysis. Cobb-Douglas production function was applied to determine the effects of resources used on gross returns of layer production.

6.2 Layer Production and Relative Factors

Production function refers to the relationship between the inputs of factor services and the output of rearing layer. Rearing of layer was considered to be explained by a number of inputs namely feed, day-old-chicks, hired labor, veterinary expenses, housing cost .On the other hand, unexplained variables were considered to be land use cost and family labor.

6.2.1 Functional Analysis

To explore the effects of variable inputs both liner and Cobb-Douglas production function models were estimated initially. The results of Cobb-Douglas models appeared to be superior on theoretical and econometric grounds like

i) adequate fit of the data, ii) computation feasibility, iii) sufficient degrees of freedom to allow for statistical testing. So this model was accepted.

Cobb-Douglas production function analysis was done taking 60 layer farms. The function was specified as:

$$Y= aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}e^{Ui}$$

The function transformed into the following log liner form:

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + Ui$$

Where,

Y= Gross return (Tk. /kg); a=Constant or intercept value;

X_1= Cost of day old chick for ith farm (Tk. /year);

X_2 = Cost of feed for ith farm (Tk./year);

X_3 = Cost of hired labor for ith farm (Tk. /year); X_4= Veterinary expanses for ith farm (Tk. /year); X_5 = Cost of Transportation (Tk. /year);

X_6 = Cost of Electricity for ith farm (Tk. /year) Ui = Error term;

i= 1, 2, 3 ..... 60;

b_1, b_2, b_3, b_4, b_5, b6= Regression co-efficient of respective variables and ln =Natural log.

6.3 Interpretation of Results

The estimated Co-efficient and related statistics of the Cobb-Douglas production function for layer production are presented in Table 7.1. Major characteristics of the model are noted below:

i) For testing the significance level of individual co-efficient 1 and 5 percent probabilities were used.

ii) Total variation of output was measured by multiple co-efficient of determination$R^{2.}$

iii) Goodness of fit for different types of inputs were measured by F-values.

6.3.1 Day-Old Chick (X_1)

The regression co-efficient of expenditure on day-old-chicks cost was 0.016 which was significant at 5% level. The results of the analysis indicated that 1 percent increase in day-old-chicks cost as expenditure, keeping other factors constant, would result in an increase of the gross return by 0.016 percent for layer farms.

6. 3.2 Feed (X_2)

The regression co-efficient of feed cost was 0.443 and significant at 1% level. It implies that 1 percent increase in feed cost, keeping other factors remaining constant, would result in an increase of return by 0.443 percent (Table 7.1).

6. 3. 3 Hired Labor (X_3)

The regression co-efficient of hired labor cost was 0.036 which was significant at 5% level. It implies that one percent increase in the human labor, keeping other factors constant, would result in an increase of the gross return by 0 .036 percent (Table 7.1).

6. 3. 4 Veterinary Expenses (X_4)

The regression co-efficient of veterinary expenses was 0.029, which was significant at 1% level. It implies that an increase in one percent of veterinary cost, remaining other factors constant, would result in an increase of the gross return by 0.029 percent (Table 6.1).

Table 6.1 Values Of Estimated of Co-Efficient And Related Statistics of Cobb-Douglas Production Function For Layer Farms (n=60)

Explanatory Variables	Co-efficient, T and P Values		
	Co-efficient	T-Values	P-Values
Intercept	**6.92**	**4.50**	**.000**
Day-old chicks (X_1)	**.016**	**2.47***	**.017**
Feed(X_2)	**.443**	**4.17****	**.000**
Hired labor (X_3)	**.036**	**2.45***	**.016**
Veterinary expenses (X_4)	**.029**	**5.31****	**.000**
Transport and Marketing cost(X_5)	**.021**	**4.55****	**.000**
Electricity Cost($X_{6)}$	**.014**	**1.22**	**.223**
R^2	**0.86**		
Adjusted R^2	**0.85**		
F-value	**58.27**		
Returns to scale	**.56**		

Source: Field Survey, 2019.

Note: ** Significant at 1% level and * Significant at 5% level

The estimated Cob Douglas function of layer production was-

Log Y = 6.92+ 0.016 log X_1 + 0.044 log X_2 + .036log X_3 + 0.029 log X_4+ 0.021log X_5 + 0.014 log X_6.

6.3.5 Transport and Marketing (X_5)

The regression co-efficient of feed cost was 0.021and significant at 1% level. It implies that 1 percent increase in tools and equipment cost, keeping other factors remaining constant, would result in an increase of return by 0.021percent (Table 7.1)

6.3.6 Electricity(X_6)

The regression co-efficient of feed cost was 0.014 that was positive and insignificant.

6.3.7 The Co-efficient Of Multiple Determinations (R^2)

The co-efficient of multiple determinations was 0.868. It suggested that 86 percent of the variation in the gross returns was explained by the independent variables included in the model.

6. 3.8 Goodness of Fit (F-value)

F value finds out whether the explanatory variable does actually have any significant influence on the dependent variables. The F-value of layer production was 58.27 and significant at 1 percent level implying that all the included explanatory variables were important for explaining the variation in return of layer production.

6. 3.9 Returns to Scale

Returns to scale denotes at which output changes when all inputs are changed proportionally. If changes in output is less than changes in all input, it is known as decreasing return to scale, if changes in output is greater than changes in all inputs, it is known as increasing returns to scale, if output and all inputs changes in same proportion, it is known as constant returns to scale. Returns to scale of layer farms were computed by adding co-efficient of regression of broiler farms. The sum total of all the production co-efficient of the equation for layer production was 0.56. This indicates that the production function exhibits decreasing returns to scale.

6.4 Resource Use Efficiency

To accomplish the aim of profit maximization i.e., for efficient allocation of resources, one should use more of the resources, as long as the value of the added product is greater than the cost of added amount of the resources in producing it. The resources are considered to be efficiently used to maintain the maximum profit when the ratio of marginal value product (MVP) to marginal factor cost (MFC) approaches one; or MPV and MFC are equal for each input. The marginal value product (MPV) is obtained when the marginal physical product (MPP) is multiplied by the product price. The price of one unit of input is called marginal factor cost (MFC).

The optimum use of a particular input would be ascertained by the equality condition of MVP and MFC that is

$$\frac{MVP}{MFC} = 1$$

The marginal productivity of a particular resource represents the additional to gross returns in value terms caused by an additional one unit of that resource with other inputs being held constant. The most useful estimate of MVP is obtained by taking resources (X_i) as well as gross return (Y) at their geometric means. Since all the variables of this model were measured in monetary unit in the function represented the MVP, which was computed by multiplying the production co-efficient (elasticity, in this particular case) of a given resource with the ratio of geometric means of output and input variables.

$$\frac{dy}{dx_i} = bi \frac{Y\ (G.M)}{X_i\ (G.M)}$$

Where,

Y= Mean value (GM) of output. Xi= Mean value (GM) of ith input. i=1, 2, 3, 4.

Therefore MVP (Xi) = $\frac{Y\ (G.M)}{Xi\ (G.M)}$ P_{yi}

b_i= Co-efficient

P_{yi} = per unit price of output

G.M = Geometric mean

Hence, these MVPs indicate the value product per input can be used to express the ratio of MVP and MFC. The criteria of resource use efficiency is that a ratio equal to unity indicates the optimum factor use, a ratio more than unity indicates that the gross return could be increased by using more of the resource and the value of less than unity indicates excess use of resource which should be decreased to minimize the loss. The estimated MVP of different inputs are presented in Table6.2.

Table 6.2 Marginal Value Products (MVP) And Marginal Factor Cost (MFC) Of Different Inputs Included in Production Function

Variables (Cost)	Geometric mean	Co-efficient	MVP	MF C	Ratio of MVP to MFC	Description
Output (Y)	15753					
Day-Old Chick (X_1)	1249	.016	27.42	29	.95	Over utilized
Feed(X_2)	44933	.443	21.13	34	.62	Over utilized
Hired labor(X_3)	334.74	.036	230.40	300	.76	Over utilized
Veterinary (X_4)	286	.029	217.73	60	3.64	Underutilized
Transport(X_5)	134	.021	335.75	60	5.60	Underutilized
Electricity (X_6)	398	.014	75.36	11	6.85	Underutilized

Source: Field survey, 2019.

From Table 7.2 it is evident that, the ratio of MVP and MFC of layer day- old chick (.94) feed (.62), and hired labor (.76) was positive and less than unity indicated that the use of day-old chick, feed and hired labor for layer production was over used. So, the layer farmer needed to decrease the use of these inputs to attain the efficient level respectively.

On the other hand, the ratio of MVP and MFC of Veterinary and medicine (3.64) ,transportation (5.60),Electricity (6.85)was positive and greater than unity indicated that the use of veterinary and medicine ,transportation and electricity for layer production was over used. So, the layer farmer was needed to decrease the use of these inputs to attain the efficient level respectively.

6.5 Conclusions

The overall performance of Cobb-Douglas production function model for layer farms was satisfactory as indicated by the estimated $R^2$and F-value. The estimated values of the model, confirm that the selected variables had significant impacts on the gross return of layer farms.

CHAPTER 7
PROBLEMS OF LAYER FARMING AND SOLUTIONS

7.1 Introduction

Layer industry of Bangladesh is rapidly expanding but the current scenario of layer farming is that almost every day there are new farms coming up and some of the old ones are closing down. It appears that the business environment is quite hazy and full of risk and uncertainty. Layer industry of Bangladesh is passing through crisis time as it has been suffering from various problems. In the existing socioeconomic conditions of Bangladesh, there are various problems in production and marketing of layer. The problems faced by layer farmers and its solutions are given below:

7.2 Economic problem

7.2.1 Lack of capital and credit institution

Most important element input in the poultry farming is the capital. Table 8.1 represent that 78 percent farmers mentioned this problem. There is lack of formal credit institution to give loan to the farmers with low interest .As a result farmers have to take loan from different NGO and village money lenders with and this is hard to find any capital to invest in poultry farming.

7.2.2 High price of feed

Feed is the main factor for profitable production in the poultry farming. Table 8.1 shows that 72 percent farmers indicated this problem. Highest number of poultry farmers mentioned this problem. Due to this problems farmers often have to feed with formulation with local food. This reduces the poultry production more.

7.2.3 High fluctuation of poultry market

High fluctuation is often seen in the poultry market. As a result poultry farmers suffers from uncertainty of profit .Ups and downs in poultry meat and egg and feed price drives them to vulnerable situation. Table depicts that 60 percent farmers reported that problem.

7.2.4 High interest rate

Farmers often have to take loan from different NGO and village money lenders with high interest rate which is about 25 percent .Table 7.1 shows about 33 percent farmers reported this problem. So, the farmers loss most of their capital in interest paying.

7.3 Marketing Problems:

7.3 .1 Lower Price of Meat and Egg

Meat and egg is the main output of poultry farming. Lower price in meat and egg discourages them to continue the poultry farming. Table indicates 75 percent farmers reported this problem. They most of the time get lower price due to market syndicate which far less compare than the urban area.

7.3 .2 Lack of Competitive Market

There is a lack of competitive market in the village poultry market. Table 7.1 represent that 68 percent farmers reported this problem. There is no such bargaining power for the poultry farmer .So, they have to sell their product with low price.

7.3 .3 Problem of Middleman

There is some middlemen in the marketing channel of poultry. About 27 percent farmers reported this problem. The middlemen buy poultry meat and egg with low price and sell high price in urban area.

7.4 Technical Problems:

7.4 .1 Lack of Training Facilities

Most of the farmer fees that they need proper training to conduct the poultry farming. Table 7.1 shows about 62 percent farmers reported this problem. Government training facilities is very low in the village area. So, farmers often unable to make their farm profitable.

7.4 .2 Lack of Storage Facilities

Poultry farmer often suffer from storage facilities. Table 7.1 shows that 45 percent farmers reported this problems. When the price of meet and egg is low they need store the egg and meat. Due to this problem they often fall in loss.

7.4 .3 Lower Quality of Chick

Sometimes farmers fell the problem of lower quality of chick. About 37 percent farmers feels the problem shown in the table 7.1.This often leads to to the high mortality of bird and heavy loss incurred to the farmers.

7.5 Social and Environmental Problem

7.5 .1 Outbreak of Disease

Disease outbreak is a main threat to the poultry farming. There are many serious disease problem faced by the farmers like Ranikhet,Gamboro,fowl pox ,Fowl cholera,Bird flu ,Newcastle disease. These disease create a havoc in the poultry farm and make the farmer to sit on the street. Table 8.1shows that about 80 percent farmers reported this problem.

7.5.2 Predatory Animals:

The most common problem in rural area is predatory animals. The most dangerous is wild cat which sometimes cause many young chick to death and left many seriously injured. Other predatory animal is fox, dogs and prey birds like crow and falcon .That is represent that 60 percent farmers reported this problem are shown in table 8.1.

7.5 .3 Environmental Pollution

Poultry farming in densely populated area cause heavy problems to the local people. Poultry spreads bad odor to the area and often lead to cause many disease. This also leads to quarrel with the neighbor and makes bad destroys the peace of the area Table 8.1shows about 27 farmers complained this problem.

Table 7.1 Different Problems Faced by the Farmers

Problems Faced Farmers	Number of respondent	Percentage	Ranking
Economic Problems			
Lack of capital and credit institution	47	78	1
High price of feed	43	72	2
High fluctuation of poultry market	36	60	3
High interest rate	12	20	5
Marketing Problems			
Lower price of meat and egg	45	75	1
Lack of competitive problems	41	68	2
Problem of middlemen	16	27	3
Technical problem			
Lack of training facilities	37	62	1
Lack of storage facilities	27	45	2
Lower quality of chicks	22	37	3
Social and natural problem			
Outbreak of disease	48	80	1
Predatory animals	36	60	2
Environmental Pollution	18	30	3

Source: Field Survey, 2019.

7.6 Solutions for the Problems

After studied the mentioned area affirmation problems were found and the followings possible solutions could be taken according to farmer's opinion.

1. Poultry is becoming one of the most promising sub-sectors of agriculture in Bangladesh. Thus for the national interest, the government should provide financial support to the farmers. Since most of the farmers complained about higher feed cost and day-old- chick price, the government intervention is needed here to untapped market for the study area and financial help is also needed from the government in this situation.

2.In case of non-availability of feed at proper time, proper steps should be taken by the government and other concerned authority to give incentives to the private feed manufacturing sectors and hatcheries to continue their production smoothly, where about 60 percent according to Daily Star Weekend Magazine parent stock farms have gone out of production.

3. Government should fix a price limit for layer farmer to get rid the problem of price fluctuation of layer

4. Most of the respondents suggested that government should increase its services by supplying necessary DOC at lower price.

5. To get rid the problem of shortage of fund, short term loan for layer farming should be made on easy terms and conditions by government agencies and NGOs.

6. In the study area, the farmers suggested that public media's like television, radio, newspaper should play an active role against the rumors regarding diseases of layer birds. Government should take steps to ensure the stable and reasonable price of layer by ceiling price schemes and providing price incentives.

7. The poultry market in Bangladesh faced a considerable amount of trouble due to recent bird flu creating awareness and taking precautions against avian influenza to keep consumers safe and avoid a human outbreak. Extreme caution needs to be

maintained by poultry farm workers as well as buyers so that the disease does not spread to humans.

8. The respondents suggested that government and NGOs should take proper steps for training on layer rearing, especially to young boys and girls, providing access of people to research and training institutes for layer rearing.

9. The crowded condition that exists in poultry farms of Bangladesh is in the perfect condition for any virus to spread. It is very important for the poultry industry to change its practices. Poultry should be raised in smaller scale under less stressful, less crowded and more hygienic conditions with outdoor access.

10. For solving disease and environmental problems, it is important for everyone, especially all the farmers, to cooperate and comply with the prevention strategy that the government has come up with. In case of bird flu problem, government should provide ample compensation to the farmers whose farms were destroyed using culling method.

11. The empirical results of this study showed that technical advice from livestock experts improved cost efficiency in the study area. In view of this, the government through the Ministry of Fisheries and livestock should train more veterinarians and animal husbandry graduates to be deployed to the various layer farming village communities to enable the layer farmers receive technical advice from a professional source instead of relying more on their fellow farmers for technical advice. This could help improve the efficiency level of the farmers.

Finally, for efficient management of layer farming, adequate supply of electricity should be ensured. Besides, the provision of short term loan for layer fanning should be made on easy terms and conditions to save the farmers from the exploitation of moneylenders.

CHAPTER 8

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

8.1 Introduction

This chapter presents the summary, conclusions and recommendations of the study. In presenting the summary, contents from preceding chapters are discussed in brief. This presentation is followed by conclusions and recommendations of the study.

8.2 Summary

This research was carried out on the profitability through layer farming in a selected area of Bangladesh. Livestock is any valuable subsector of agriculture in Bangladesh. Poultry is one of the most important sector of the livestock subsector. Poultry rearing has emerged as an integral part of agri-business of the farming community. Poultry farming on commercial basis is a recent endeavor started practically during the eighties in Bangladesh. At present a large number of poultry farms have been established on commercial basis throughout the country. As a developing country, Bangladesh is entangled with problems of unemployment, poverty and nutritional deficiency. Poultry production can plays an important role in solving these problems within the shortest possible time. The importance of layer farming can be realized from two stand points such as, economic point of view and nutritional point of view. It creates a great opportunity of employment for the large number of unemployed people. It gives maximum return with minimum expense as compared to other meat producing animals. In respect of nutrition, layer meat is an excellent source of protein of high biological values as it contains the most essential amino acids, carbohydrates, minerals, fats and vitamins which are the most nutritious components of human diet.

Layer can efficiently and rapidly meet the shortage of protein as it produces meat in the least possible time. Poultry farming in Bangladesh was largely a backyard venture in the past. The villagers generally kept indigenous chicken under traditional and semi-intensive conditions mainly for their domestic consumption with very little commercial motives. Most of the people of Bangladesh used poultry farming to meet their home consumption and if there was any surplus, they used it for the purpose of business. In the past they never thought to invest much

on poultry farming. But in course of time, the scenario has changed. At present, the poultry enterprise has developed commercially and the number of birds and their commercial farms has been increasing day by day. Recently, a good number of exotic strains and day-old commercial chicks are available from public and private hatcheries. Layer farming has a great potential for providing additional income to both males and females of the rural and urban areas through creation of employment opportunities. At present, millions of people are engaged in this industry directly or indirectly. However, poultry industry has been suffering from various problems due to lack of appropriate policy planning for which sufficient research work is necessary. The specific objectives of this research program were as follows:

1. To identify the socioeconomic characteristics of layer farmers;

2. To determine the financial profitability of layer farming;

3. To measure the resource use efficiency of layer production;

4. To find out the problems of layer farming;

5. To suggest problem solving opinion for profitable layer farming in Bangladesh.

In order to achieve these objectives, random sampling technique was followed. Kaliganj upazilla under Lalmonirhat District was selected as the study area because a large number of layer farms have been established there. A total of 60 layer farmers were selected for this purpose. To fulfill the objectives, a questionnaire was prepared to collect data and necessary information. The data were collected from primary source by the researcher herself during the period from February and March 2019. Primary data were collected from layer farm owners, while the secondary data were collected from various journals, reports, theses, bulletins, and publications of BBS, newspapers, magazines and official records of the government.

The socio-economic characteristics of layer farm owners were studied. It was observed that 53.3 percent of the total layer farmers aged between 35-50years. People of different education level are involved in layer farming. About 28 percent of the layer farm owners were educated up to primary level. In case of occupation, 50 percent respondents were engaged in layer farming as their main occupation, while 50percent respondents took it as subsidiary occupation.

Around 71.3 percent of the layer farmer has a family size of 5 people and the average family size of layer farmers was 4.72 .Cost and return were calculated to estimate the profitability of layer farms. The total cost per farm per year was estimated at Tk. 1840682.72 where Variable cost stood at 91.89percent and fixed cost stood at 8.11 percent of the total cost.

Feed cost was the major single cost item of raising layer birds. It was found that the average cost of ready feed per kg was Tk. 34.It was the most important cost item that amounted to Tk.152753. and represented 82.98 percent of the total cost. Expenditure on day-old-chicks per farm per year was estimated at Tk.36321 which represents 1.97 percent of the total cost. Price per bird was Tk. 29. Hired labor cost was another important cost item for layer farm owners. Hired labor cost per farm per batch was Tk. 100800 which represents 3.37 percent of total cost. Veterinary service and medicine cost is another cost item for layer farm owners. Average veterinary service and medicine cost per farm was Tk.17092 which represents .93 percent of total cost. Average electricity cost per farm was Tk. 4697.56 which accountedfor.25 percent. Average Transport cost was Tk.8070.23 which represents .43 percent of the total cost. Average housing cost per farm was Tk. 16487 which accounted for .89 percent of the total cost. The cost of tools and equipment per farm stood at Tk.12350 which represents .66 percent of the total cost. Interest on operating capital per farm stood at Tk. 43882.which accounted for 2.37 percent of the total cost.

Average annual gross return per farm per year stood at Tk. 21,42,492. Average gross margin amounted to Tk. 4,50,552. Average net return per farm per year was Tk. 3,01,809 .The benefit-cost ratio per farm per year was 1.26 on variable cost basis and 1.17on total cost basis. The BCR was higher than one. So the findings suggest that layer farming is profitable and there is enough scope and potentials for layer farming development in the country. Cobb-Douglas production function analysis was done to estimate the effects of variable cost namely feed cost, day-old-chick cost, hired labor, veterinary expenses, electricity cost, and Transportation cost of layer farms. The findings suggested that all the selected variables excepting litter had significant impacts on production of layer farming.

8.3 Conclusion

Layer farming is an income generating and highly profitable in the study area. Layer farming in this country reflecting a bright future in future day due to increased demand and meat. The study suggest that the layer farming is inevitable to reduce the poverty rate to zero in terms of employment generation and women empowerment. Poultry farming is also important to make the nation healthy Poultry is making a great contribution to the national economy through creating employment, generating local income and improving nutrition level of the low income people. Lot of problems and difficulties were found in layer production in the study area. To overcome the difficulties of layer raising and to make layer production more profitable in the country, the following recommendations are put forward in order to improve the existing production of live layer.

8.4 Recommendations

On the basis of findings of the study, the following recommendations are made:

1. There should be myriad amount of credit institution where farmers can get loan without red tapism.
2. Government should establish mandatory rules so that the feed company cannot raise feed price at will.
3. Government should support the farmer to keep the spontaneous flow of egg in the market in order to prevent price fluctuation in the market.
4. Government should introduce strict law so that the NGOs cannot charge interest rate more than 15 percent.
5. Government should initiate money incentive during the time low price of egg and high price of feed.
6. Government should initiate a market system of egg which will be meeting point of adequate buyers and sellers to keep the competitiveness of the market.
7. Amount of training institution should be increased and advertising based 1-2 days training of feed and poultry drug company should be stopped.
8. Storage facilities of egg and meat should be enhanced so that the layer farmer may not have to sell the egg and chicken below their production cost.

9. Government should supply the subsequent amount of vaccine and medicine without cost and emergency basis in the time of outbreak of disease.

10. Farmers should be introduced with scientific management of layer farm in order to minimize the environmental pollution.

9.4 Limitations of the Study

The present study contains few limitations which are as follows:

1. The first limitation was the distance of the study area. It was little bit difficult for the researcher to collect more reliable data for this distance.

2 The researcher had depended on the memory of the respondents because they did not keep written records. Thus, the analysis on profitability may contain little bias.

3. The study covered only 60 samples from a small area. This sample size was not sufficient for arriving at a strong conclusion. If the study could cover more areas and more samples, the results and conclusions of the study might have been more meaningful and more useful.

4. The findings of the study are based on the data from a specific area (Kaliganj Upazila in Lalmonirhat) district cautiously, if any greater generalizations are sought for different regions with distinct geophysical conditions of Bangladesh.

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APPENDIX I

QUESTIONNAIRE ON PROFITABILITY AND RESOURCE USE EFFICIENCY OF LAYER FARMING IN SELECTED AREA OF BANGLADESH FOR MY ACADEMIC PURPOSE.

Name of the interviewee	
Village	
Upazila	
District	
Questionnaire No.	
Date of Survey	

2. Information of layer raised

Batch no	**No. of Layer raised**	**Number of died**	**Production (kg)**	**Sold (kg)**	**Price(TK.)/ kg**	**Rearing duration days**

3. Demographic details

Name	**Relation with the HH**	**Age**	**Education**	**Experience**	**Occupation**	
					Main	**Subsidiary**
Total						

* Education: Can sign only -1, P.S.C-2, J.S.C-3, S.S.C-4, H.S.C-5, Above H.S.C -6

*Occupation: Layer Farming-1, Agriculture-2, Business-3, Service-4 Others-5

x3. Land information

Land type	Amount of land(in decimal)
1. Cultivable lands	
2. Non cultivable land	
3. Land in poultry farming	
Total	

4. Layer production

5. Physical characteristics of layer

Characteristics	Description
1.Name of the layer breed	
2.Daily feed intake(gm)	
3.Point of Lay Eggs(weeks)	
4. Laying percentage of egg(daily basis)	
5.Weight at the end of the year(kg)	

6. Cost Information

6.1. Variable Cost

6.1.1 Cost of DOC

Number of DOC	Price per DOC (TK.)	Total value (TK.)

6.1.2. Feed Cost

Items	Unit	Quantity		Price (TK.)	Total Cost (BDT)
		Home supplied	Purchased		
Grain					
Bran					
Bone meal					
Common Salt					
Drinking Water					

Mixed feed (Company Name_____					

6.1.3 Human Labor Cost

Activity	Labour Man-days; (8 hours/day)			Wage rate	Monthly wage
	Family	Hired	Total		
Feeding					
Cleaning shed					
Night Guard					
Monthly employed labor					

6.1.4 Veterinary Care

Activities	Quantity/Frequency	Unit Price (Tk.)	Total Cost (BDT)
Doctors visit			
Medicine			
Vitamin			
Vaccine			
Total			

6.2 Fixed Cost

6.2.1 House

Items	Number	Price	Total Value
Tin shaded Layer House			
Half Building			
Building			
Water pot			
Heating Material			
Fan			
Light			
Feeder			
Bamboo Case			

6.2.2 Utilities (per month)

Description	Unit	Amount Tk.
Power/Electricity		
Water		
Total		

6.2.3 Other Expenses

Description	Total Amount Tk.
Transportation Expenses	
Miscellaneous Expenses	
Total	

7; Gross return from layer production per farm per year

Items Sold	Unit	Unit Price	Per year	
			Quantity	Value(Tk.)
1.Egg sold	number			
2.Live layer	Kg			
3. Excreta sold	Sack			
4. Bag sold	Sack			
Total (1+2+3+4)	-			

8. Where do you get your fund?

Sources of fund	Amount (TK)	Installment period	Interest
Own source			
Bank			
NGO			
Lending from others			

10 .Which Types of Remedial Action Taken?

Diseases	Measure
Bird flue	
Typhoid	
Paratyphoid	
Cholera	
Food poisoning	

1=Vaccine, 2= Antibiotic, 3 =Biosecurity, 4= Weather factor management

11. House hold Income

Occupation	Income	Total
Layer Farming		
Business		
Agriculture		
Day labor		
Service		
Others		

12. Farmers attitude

12.1. List any three major problems that you encounter which affect your production?

1._____

2._____

3._____

12. 2 Problem solving opinion:

1._____

2._____

3._____

13. What do you think about the future of poultry production in Bangladesh?

No idea	Not good	Good	Excellent

Thank you for the time you took out to answer this questionnaire

The confidentiality of your information is assured. ……

Md.Robiul Islam