POULTRY INDUSTRY IN BANGLADESH: A STUDY OF PATTERN, PERFORMANCE AND PROSPECT

Thesis Submitted to the University of Dhaka
for the Degree of
Doctor of Philosophy in Marketing

Ph.D.

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DEPARTMENT OF MARKETING
FACULTY OF BUSINESS STUDIES
UNIVERSITY OF DHAKA
APRIL - 2004

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iv

DECLARATION

The work presented in this thesis is original and has not been submitted by me to any University or Institution for the award of any degree or diploma. The thesis " POULTRY INDUSTRY IN BANGLADESH: A STUDY OF PATTERN, PERFORMANCE AND PROSPECT" submitted by me for the award of the Degree of Doctor of Philosophy at the University of Dhaka is based upon my own work carried under the supervision of Professor Haripada Bhattacharjee, Department of Marketing, University of Dhaka, and that neither of this thesis nor any part of it has been submitted for the award of any degree or diploma anywhere.

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TABLE OF CONTENTS

LIST OF TABLES

Chapter -IV

Chapter -V

Chapter VI

Chapter VII

Chapter XIII

Chapter IX

List of Figures

ACRONYMS

ABFL	=	Aftab Bahumukhi Farm Limited
BARC	=	Bangladesh Agricultural Research Council
BAU	=	Bangladesh Agricultural University
BBS	=	Bangladesh Bureau of Statistics
BCR	=	Benefit Cost Ratio
BES	=	Bangladesh Economic Survey
BLRI	=	Bangladesh Live Stock Research Institute
BRAC	=	Bangladesh Rural Advancement Committee
DLS	=	Directorate of Livestock Service
DOC	=	Day Old Chicks
Et al	=	ET alia (and others)
E.g.	=	Exempli Gratia (for example)
Etc.	=	Et cetera (and others, and so forth)
FAO	=	Food and Agricultural Organization
FC	=	Fixed Cost
FFYP	=	Fifth Five Year Plan
GDP	=	Gross Domestic Product
GOB	=	Government of Bangladesh
Gm	=	gram
Ha	=	hectare
i.e.	=	id est. (that is)
IOC	=	Interest on Operating Capital
Kg	=	Kilogram
MV P	=	Marginal Value Product
M.S.	=	Master of Science
Mt.	=	Metric tons
NCA	=	Non Crop Agriculture
NGO	=	Non-Government Organization
No.	=	Number
PLDP	=	Poultry and Livestock Development Programme
SLDP	=	Small-holder livestock Development Project
Tk	=	Taka
oC	=	Degree Celsius
VC	=	Variable Cost20

CHAPTER- I

BACKGROUND, RATIONALE AND OBJECTIVES OF THE STUDY

Introduction

Bangladesh is an agro-based country in the south-east Asian region, having a small territory (147570 sq. km) and a large population (129.42 million; BBS, 2002). The country has already been marked for her low productivity, chronic food shortage, widespread poverty, malnutrition and high external dependence. The country possesses a large predominant agricultural sector and a small rudimentary industrial sector.

The importance of agriculture in Bangladesh can never be overemphasized. Growth and sustainability of agricultural production is an important prerequisite for attaining the rate of overall growth of the Bangladesh economy. About 29.0 percent of the Gross Domestic Product (GDP) of the country come from agriculture and about 64 percent of the total civilian labour force are engaged in agriculture and other allied activities (BBS 2002). It is a country where the majority of the population (80 percent) lives in villages.

Production of food crops, especially rice, increased significantly over the last two decades. Although livestock and fishery sub-sectors also grew at a steady rate over the past years, the potentials of the sub-sectors could not be fully exploited due to lack of policy initiatives. Cereals, with inadequate share of livestock products dominate the average diet of the people. Animal proteins are the best source of human nutrition.

It has been observed over the recent past years that because of land and technological constraints, growth of crop agriculture has been less than expected. It is, however, maintained that the agricultural growth can be augmented through expansion of non-crop agricultural enterprises such as livestock, fishery and forestry. The contribution of agriculture to GDP (at constant price) declined from 35.92 percent in 1992-93 to 30 percent in 2002 (Old GDP series). The contribution of crop sector also declined from 27.92 percent in 1992-93 to 21 percent in 2002. On the other hand, contribution of non-crop agriculture (NCA) comprising livestock, fishery and forestry increased from 8.01 percent to 12 percent during the same period (BBS 2002).

Livestock plays an important role in the agricultural economy of Bangladesh. Livestock includes cattle, buffaloes, goats, sheep and poultry including ducks. The contribution of the livestock sub-sector to the GDP is estimated at 3.86 percent (GOB 1999). About 20 percent people are involved in poultry rearing, which also provide part time employment to 50 percent people. About 95 percent of land is ploughed with the help of draught animals, and about 80 lakh metric has natural manure is obtained from livestock (Table 1).

Although the contribution of livestock to household welfare is clearly recognized, the issue of improvement of livestock production has not been properly addressed. The relatively inefficient animal production system required continued innovation to make larger contributions to household income and nutritional status of people. With rising income of people, demand for meat, dairy products, and egg rise faster than the demand for crops. Therefore, livestock production needs to be increased at a relatively faster rate than crop production. Further livestock production effectively transfers income from high-income consumers to animal producers.

Table 1: Contribution of Domestic Animals, Ducks and Poultry in the National Economy

Items	Percentage
Contribution of livestock sub-sector to national economy	3.86
Whole time employment	20.00
Part time employment	50.00
Nutrition supply (fisheries joint with sub-sector)	80.00
Export income (livestock sector	4.31
Draught animal (cultivation)	95.00
Transportation in the rural area	50.00
Production of cow dung	80 mm. Tons
Production of manure	10 (chemical fertilizer)
Fuel supply	25.00

Source: BBS, 2002.

History of Poultry Farming in Bangladesh

The term "Poultry" is used to designate those species of birds which render and economic service reproduce freely under proper care. It includes chickens, turkey, ducks, geese, swans, pigeons, ostriches and refers to them whether alive or dressed (Winter Funk, 1951).

History of poultry (particularly broiler and layer) enterprise in Bangladesh is very recent. Commercial broiler and layer chicks were not available in Bangladesh a few decades ago. Of course, some heavy birds like Cornish, Plymouth Rocks, Rhode Island Reds, New Hampshire, Black Australorp etc. were imported from abroad and reared in some government poultry farms. These birds were used for egg and meat production.

3

"Eggs and Hens Ltd."is considered to be the pioneer of the private sector commercial poultry breeding farm established in 1964 at Gazipur near the Dhaka city. It used to import 'Hybro' parent stock of 'Euribrid" Poultry Breeding Company of the Netherlands and started selling day old commercial chicks to the interested farmers from 1973. During late 1980, the Department of Livestock Services (DLS), Bangladesh, imported "Lohamann" layer and "Arbor Acres" broiler parent stocks.

Poultry farming in Bangladesh were largely a backyard venture in the past. The villagers generally kept indigenous chicken under semi-natural conditions mainly for their domestic consumption with very little commercial motives. In 1935 improved variety of birds (White Leghorn) were first imported in India from foreign countries. Raising of improved type of birds was first started in government poultry farm. Later, people became interested in raising these chickens in their own houses after knowing about their better production capacity. In 1947, six poultry farms were first established in different places in this country for supplying eggs and chicks to the villagers. During this period, several small poultry farms were also established under Village Aid Programme for rural poultry development. In 1962-63, the Directorate of Livestock Services also started about 91 small poultry units in 91 thanas with the objectives of supplying improved type of birds to the villagers.

Poultry farming on commercial and scientific line was started in 1970 in Bangladesh. It is known from the records of Directorate of Livestock Services that 70000 commercial poultry farms (with 200 and above number of birds per farm) were established in Bangladesh from 1979-80 to 2000-2001 in private sector (Economic Survey of GOB 2002). The year-wise establishment of poultry farms in private sector is shown in Table 2.

4

Table 2: Year-wise Number of Poultry Farms in Private Sector

Year	Number of farms
1979-80	787
1993-94	31363
1994-95	40133
1995-96	47638
1996-97	53644
1997-98	60670
2000-2001	70000

Source: GOB: Economic Survey of Bangladesh, 2002.

A picture of expansion, which happened in the poultry sector, is shown in Table 3. A total of 60 thousand commercial farms have been established including 50 broiler parent stock farms and 30 layer breeding -cum - hatchery farms. About 12 lakhs and 30 lakhs people are engaged directly and indirectly respectively. About 325 crores of eggs, 9 crores of broiler, 2.5 crores of layer and cockerel, more than 10 lakh tons of poultry feed and feed stuff are being produced only through the initiative taken by the private organizations. A number of mills have started producing poultry feed by this time and more entrepreneurs are coming forward to establish feed mill and poultry processing plants (Siddiqui, 2000).

5

Table 3: Commercial Poultry Production in Bangladesh

Year	Layer hybrid				Broiler hybrid			
	Hatchery/ breeding farm	No. of parent stock	Day old chick produc-tion	Egg produc-tion (in crore)	Hatchery /breeding farm	No. of parent stock	Day old chick produc-tion	Broiler produc-tion (m. ton)
1984-85	2	2000	1.60 lakhs	8.80	2	5000	6 lakhs	4.75 tons
1991-92	8	22500	20.25 lakhs	62.00	6	30000	35.40 lakhs	4540
1993-94	16	65500	59 lakhs	151.00	11	65000	77.80 lakhs	9930
1994-95	20	80000	78 lakhs	186.00	25	1.55 lakhs	18.75 lakhs	24370
1999-2000	30	1.25 lakhs	1.18 crore	325.00	50	5 lakhs	6.10 crores	82350
Projec-tion 2005	50	2.80 lakhs	1.96 crore	533.00	70	25 lakhs	30.50 crores	4.12 lakhs

Source: Siddiqui, 2000.

Livestock Population and Present Status

The present situation of livestock population can be observed from Table 4. The livestock population in Bangladesh is currently estimated at 23.40 million cattle, 0.82 million buffaloes, 33.50 millions goats, 1.11 million sheep, 138.20 million chicken, and 13.00 million ducks (Reza, 1999).

Table 4: Changes in Livestock Population in Bangladesh, 1989-90 to 1997-98

Year	Livestock Population (Million)					
	Cattle	Buffalo	Goat	Sheep	Poultry	Duck
1989-90	22.47	0.69	21.70	0.87	89.86	13.10
1990-91	22.65	0.70	23.88	0.91	95.88	13.20
1991-92	22.83	0.73	25.41	0.95	102.31	13.29
1992-93	23.02	0.75	27.49	0.99	113.38	13.38
1993-94	23.20	0.78	29.74	1.04	116.48	13.47
1994-95	23.38	0.80	32.19	1.09	124.28	13.57
1997-98	23.40	0.82	33.50	1.11	138.20	13.00

Source: Ahmed, 1996 and Reza, 1999.

The expansion of the livestock sector has increased employment opportunities of people living both in towns and villages. At the same time, the sector is contributing to increase meat and egg production in the country. Table 5 shows the production of meat, milk and eggs from 1993-94 to 1997-98 for which data are available.

Table 5: Production of Meat, Eggs, and Milk, 1993-94 to 1997-98

Year	Production of meat (lakh M. tons)	Production of eggs (crore)	Production of milk (lakh M. tons)
1993-94	4.74	227.60	14.87
1994-95	4.78	240.00	15.23
1995-96	5.40	283.09	15.74
1996-97	5.80	302.00	15.87
1997-98	6.20	325.25	16.20

Source: GOB, 1999.

The total production of meat, egg and milk increased from 4.74 lakh m. tons, 227.60 crores and 14.87 lakh m. tons in 1993-94 to 6.20 lakh m. tons, 325.25 crores and 16.20 lakh m. tons respectively in 1997-98 (Table 5).

Production, Requirement and Deficit

Poultry production in Bangladesh is below the minimum level of requirement. Despite discrete efforts made by both government and non-government organizations (NGOs) for poultry development, the situation has not improved much with the passage of time.

According to a report of GOB (1999) average per capita availability of meat is 13 gm per day and egg is 0.06 (no.) per day whereas per capita requirement of meat is 120 gm per day and egg is 0.28 (no.) per day

7

(Table 6). Although there has been an improvement of the livestock sub-sector in comparison with the situation in 1980, the deficit is still of mounting magnitude. Because of the continuous increase of population, the deficit is being sustained.

Table 6: Requirements, Production and Shortage of Livestock Products

Items	Requirement per capita/day	Per capita daily availability	Annual total requirements	Total production	Total annual shortage
Milk	250 ml	35 ml	11.65 m.m. tons	1.62 m.m. tons (13%)	10.03 m.m. tons (87%)
Meat (all)	120 gm	13.0 gm	5.7 m.m. tons	0.62 m.m. tons (11%)	5.08 m.m. tons (89%)
Egg	0.28 (no.)	0.06 (no.)	13227 (million no.)	3252 million no. (24%)	9975 (million no.) (76%)

Note: The deficit in meat is calculated assuming all meat coming from livestock sources.

Source: GOB, 1999.

Importance of Poultry from Economic Point of View

Poultry rearing is considered as a highly viable sector for generation of employment and income for the landless, unemployed youths and destitute women. Poultry farming, unlike crops, are not seasonal. People in this country raise poultry mainly with a view to getting meat, egg, etc. to fulfill their day - to - day consumption. Income from sale proceeds also help them to satisfy their various financial needs.

Broiler has a shorter life cycle and its production requires relatively less capital and land compared to production of meat from animals such as cattle, sheep and goats. With a view to popularizing poultry on commercial basis and to meet the increasing demand for eggs and meat, a good number of educated unemployed youths have already come forward to initiate broiler and egg production.

8

The poultry products have also industrial uses. Eggs are used in the preparation of culture media for the growth of some species of bacteria. Fertile eggs are used in the preparation of vaccines. Inedible eggs are used in the preparation of animal feeds and fertilizers, egg-whites are used in the manufacture of pharmaceutical paints, varnishes, adhesive and printer's ink. They are also used in photography, bookbinding, wine purification, tanning leather and textile dying. Egg yolks are used in the manufacture of soap, paints and shampoos (Winter and Funk, 1951).

Poultry waste is an excellent source of organic manure, which can be utilized for growing field crops. About 40 adult birds raised on deep litter can produce about ten quintals of organic manure having 3 percent nitrogen, 2 percent potassium and 2 percent phosphorus (Sing 1990). In recent years, manure price has gone up. So poultry excreta has become a considerable source of income to the poultry farmers. It is estimated that if the poultry manure is utilized properly in the crop fields, it can produce more food-grains than the birds will consume as feed.

Poultry raising require limited land of marginal and infertile categories, which are easily available. The short production cycle in the case of broiler and continuous production after every 4 months in layer provides a more regular cash flow than other agricultural enterprises.

Importance of Poultry from Nutritional Point of View

Foods of animal origin such as milk, eggs and meat of various kinds provide certain nutrients for well-balanced growth of children, women, farmers and industrial workers. Foods of animal origin have higher nutritional value because of their supply of protein, minerals and

9

vitamins in addition to the energy they provide. Grains and most other plant products are relatively low in protein; but eggs and meat of various kinds have a higher level of protein and contain certain amino acids, which are lacking in plant foods. Foods of animal origin also supply human with more of certain minerals and vitamins than do foods of plant origin.

Protein consumption from animal origin is much lower in Bangladesh than in other countries of the world. According to a report of GOB (1999) total production of meat is 0.62 million tons and total egg production is 3252 million (no.). The annual average deficit of meat is 5.08 million metric tons and the annual average deficit of chicken egg is 9975 million numbers.

In view of the above scenario in Bangladesh, the poultry farming might play a crucial role. Poultry meat and eggs are excellent source of protein in Bangladesh. Poultry can efficiently and rapidly meet the shortage of protein, as the production proposition requires lesser time and small investment.

Government Incentives to Promote the Poultry Sector

From the financial year 1992-93, efforts were made by the government and non-government organizations to increase the production of poultry as a source of income of the poor people and creation of job facilities. The measures taken were:

* financial incentives to farm owners.
* loan on easy term.
* free transport facility to bring in better kind of animals and cows; and
* training on government expenditure.

10

In line with the government directives, commercial banks in Bangladesh provided loan for the development of poultry farms over the recent past years.

During the Fifth Five Year Plan period (1997-2002) the government is expected to undertake some major programmes for the development of poultry in the field of health and diseases control, breeding and breeder multiplication, extension, training, education and research (FFYP 1998). To facilitate the availability of poultry feed, the government will continue the present restrictions on the export of feed ingredients like wheat bran, rice polish and oil cake and will allow duty free import of maize, fish meal, mineral and feed additives.

In the Fifth Five Year Plan period, an estimated amount of Tk. 5435.60 million (at 1996-97 price) will be spent in the public sector and Tk. 20646.40 million is expected to be spent in private sector in order to implement the livestock development programmes. The year-wise allocation of fund, which will be spent in the public sector, is shown in Table 7.

Table 7:   Year-wise Allocation of Fund for Livestock Development during Fifth Five Year Plan (at 1996-97 prices)

Year	Amount (in Million Taka)
1996-97	690.00
1997-98	1000.00
1998-99	1000.00
1999-2000	1012.00
2000-2001	1164.00
2001-2002	1259.60
Total	5435.60

Source: FFYP, 1998.

Justification of the Study

Bangladesh is the ninth most populous country of the world. There are 129.0 million people in this country and they are residing in 1,47,570 sq. km. The population growth rate of about 1.56 percent a year has led to a projected population of 171.61 million by the year 2025 (BBS 2002).

Population pressure in Bangladesh is forcing marginal lands to be brought under cultivation, leaving practically little and exclusively for grazing of animals. Hence, the possibility of expansion of livestock farming is very limited in this country. Poultry, however, have a shorter life cycle and their production requires less land and capital compared to other meat-producing animals such as cattle, sheep, goat, etc. It should also be noted that crop cultivation in Bangladesh is subject to a high degree of risk and uncertainty and provides seasonal irregular and

uncertain income to the farmers. Consumption of non-cereal foods are among the lowest in the world and therefore, need more production of eggs, meat, milk, etc., to get a satisfactory level of balanced diet as well as cash income.

Since the majority of people irrespective of caste / religion, prefer chickens and eggs, its demand is very high and the prices have gone up. As a result, a tendency to initiate small-scale commercial poultry farming is observed both in rural and urban areas.

Protein consumption from animal origin is significantly lower in Bangladesh than in other countries of the world. According to the list prepared by the World Health Organization (WHO), the protein requirement for an adult is 120 gms. At present per capita consumption of egg is 30 approximately in Bangladesh, compared to 60 in China, 65 in Thailand, 258 in Malaysia, 250+ in Europe, 300+ in Japan, 325+ in U.S.A., 45 in Pakistan and 39 in India (Siddiqui 2000). With the rapid increase in total population and urbanization, the demand for poultry products has been increasing. To meet the growing demand for poultry products, the development of poultry industry is very important. (However, expansion of poultry farming in particular locations should be based on financial analysis of performance of the poultry farms.

Some studies on the performance of poultry farming have been done across the country (please see literature review chapter). However, little or no attempt was made to analyze the marketing system of poultry farming in Bangladesh. The present study makes a comprehensive investigation into the marketing performance of poultry sector in Bangladesh.

This study aims at rigorous comparative analysis of broiler and layer poultry production and marketing in Bangladesh. The present study identifies some basic problems that are faced by the owners of broiler and layer farms and also suggests measures for probable solutions. The officials of the relevant government and non-government agencies and extension workers may also use the results of the study in making an appropriate decision regarding further expansion of poultry farming in Bangladesh.

Objectives of the Study

The overall objective of this study is to investigate the marketing patterns and performance of broiler and layer poultry farming industry in Bangladesh. The following are specific objectives of the study:

i.   to identify the socio-economic characteristics of broiler and layer growers,

ii. to assess the marketing patterns of poultry farms,

iii. to evaluate performance of the poultry growers from the marketing point of view

iv. to compare the relative costs, returns and profitability of broiler and layer production of the selected categories of farms.

v.   to determine the contribution of the key variables to the production processes of poultry products.

vi. to identify the major socio-economic and marketing problems faced by the broiler and layer farm owners; and

vii. to put forward some suggestions for improving economic and marketing performance of broiler and layer poultry farms.

Organization of the Study

The study contains ten chapters. Chapter two, which provides some information on poultry industry and products from the global point of view, follows the present chapter. Chapter three furnishes a brief review of the empirical investigations related to this study. Chapter four deals with the methodology of the study. In Chapter five, poultry marketing system and performance in the study area is presented along with a brief description of the socio-economic characteristics of the sample households. The costs, returns and profitability of poultry enterprises are presented in Chapter six. Chapter seven describes factors affecting production, costs and returns of different categories of broiler and layer poultry farms and analyses resource use efficiency in the rearing of poultry. Chapter eight discusses the marketing problems related to poultry rearing. Chapter nine assesses the prospect of the poultry industry in Bangladesh and finally, summary and conclusion are presented in Chapter ten.

CHAPTER- II

POULTRY INDUSTRY AND PRODUCTS: A GLOBAL PERSPECTIVE

Introduction

Poultry, today is a fast-growing agri-business in the globe. Demand for poultry products has been increasing with rapid growing consumption. Population expansion and the rate of growth of individual purchasing power are the most important factors affecting the demand for poultry products. Average annual population growth is slowing round the world but in the developing countries it is increasing. As a result, demand for high quality and costly and protein products have been increasing.

Approximately 60 percent of the world's total population live in Asia. On contrast, average consumption poultry products of the people in this region are well below that in the developed countries. (Poultry International, vol. 37 No. 9 March 1999 p. 4). Poultry has exposed as a very fast-moving industry particularly in developing countries This chapter highlights some of the important aspects of poultry products in the world.

Production of hen-egg

Global hen-egg production is growing at a faster rate, from 35,241 thousand metric tonnes in 1990 to 47,980 thousand metric tonnes in the year 1999. China is the top hen-egg producing country inn the world

which produced 17,814 thousand metric tonnes of hen-egg during the year 1999, the figure of which was only 6558.6 thousand metric tonnes in the year 1990. Other top hen-egg producing countries are the USA, Japan, Russian Federation, India, Brazil and Mexico. India ranks fifth position among the globe and reasonably first among the SAARC countries. Bangladesh ranks 46th position in the global hen egg production which produced 61.0 thousand metric tonnes in the year 1990 which has given a rise in 104.0 thousand metric tonnes in the year 1999. Table 1 presents top hen-egg producing countries in the word.

Table 1: World hen-egg production (in '000' tonnes)

Country	1990	1995	1999
China	6558.6	13699.9	17814.4
USA	3965.2	4417.0	4724.0
Japan	2419.0	2550.5	2580.0
Russian Federation	2641.0	1876.0	1700.0
India	1282.0	1500.0	1611.0
Brazil	1230.4	1415.3	1415.3
France	886.8	1024.5	954.1
Mexico	1009.7	1241.9	1422.4
Germany	985.0	836.0	847.0
Italy	655.9	721.0	751.0
World total	35241	42978	47980
Bangladesh	61.0	82.0	104.0

Source: Watt Poultry Statistical Yearbook: 2000 p. 12 -16

Production of Poultry Meat

Poultry meat production in the world is growing sharply over the years, from 27,628 thousand metric tonnes in 1992 to 39,113 thousand metric tonnes in 1999. The USA appeared to be the top producer of poultry meat in the world producing 13,218 thousand metric tonnes in 1999 which produced 27,628 thousand metric tonnes during the year 1992. The USA shares almost 33% of the world's total poultry meat production. Other top poultry meat producing countries are Brazil, China, Mexico, France, The UK, Japan and Thailand. The production of broiler meat in Bangladesh has also got the momentum during the early 1990s mainly due to the private initiatives. In 1992 Bangladesh produced 72,000 metric tonnes of broiler meat which reached to 111000 metric tonnes during the year 1999. Global poultry meat production situation is presented in Table 2.

Table 2: World Poultry meat production (in '000' tonnes)

Country	1992	1996	1999
USA	9482	11849	13218
Brazil	2872	4052	4715
China	2310	5000	5750
France	1020	1178	1225
Japan	1252	1130	1080
Mexico	1346	1478	1615
UK	941	1064	1172
Thailand	680	840	960
World Total	27628	35027	39113
Bangladesh	72	91	111

Source: Watt Poultry Statistical Yearbook -- 2000 p. 22 -- 26

18

Hen Egg Consumption

Global per capita consumption of hen egg has risen slowly during the last decade from 6.1 kg/year in 1985 to 7.7 kg/year in the year 1996. This is true, in fact, for almost all the countries of the world. World average egg consumption has been growing by almost 3% annually since 1990. Egg consumption year/person is static or in decline in several EU countries. In contrast, in many of the developing countries with large human populations, population growth, coupled with rising incomes and the fact that egg consumption is currently at a relatively low level will result in continued strong growth in the demand for eggs. Table 3 provides a picture of the global per capita consumption of eggs during the mid 1980s to mid 1990s.

Japan has bagged the top position in terms of per capita hen egg consumption among the countries of the world that consumed 19.9 kg/year followed by Lebanon, France, Hungary, Malta, China and the USA. In Bangladesh, per capita consumption of eggs is not worth mentionable but rising gradually, from 0.6 kg/year in 1985 to 0.8 kg/year in 1996 according to the world statistics.

Table 3: World hen-egg consumption (kg/person/year)

Country	1985	1990	1996
Japan	16.9	18.8	19.9
USA	14.5	13.0	13.3
China	4.7	6.4	14.6
Lebanon	13.5	16.9	16.9
France	15.0	14.7	15.9
Hungary	18.8	22.6	15.8
Germany	17.0	14.3	12.5
Malta	16.6	16.8	15.7
World Average	6.1	6.4	7.7
Bangladesh	0.6	0.6	0.8

Source: Watt Poultry Statistics Yearbook -- 2000 p. 38--40

Poultry Meat Consumption

Per capita consumption of poultry meat is rising quite a faster rate across the globe during the last decade, from 6.3 kg/year in 1985 to 9.7 kg/year in 1996. Per capita consumption of poultry meat is growing rapidly irrespective of economic status -- developed or developing since 1990. The average annual growth rate was close to 4.4%. According to the world statistics, Brunei appeared in the top of the list consuming 60.5 kg/year in 1996 followed by the USA, Hong Kong, UAE, Malaysia, Canada and Saudi Arabia respectively. Bangladesh has got a very negligible position in this respect consuming only 1.0 kg/year of poultry meat, but offered a very hopeful picture compared to the condition of mid 1980s which was only 0.6 kg/year during the year 1985. Table 4 presents a detail of the per capita global consumption of poultry meat during the last decade.

20

Table 4: World poultry meat consumption (kg/person/year)

Country	1985	1990	1996
USA	30.7	39.6	45.0
Canada	24.3	27.7	30.7
Brazil	9.3	14.3	22.3
Brunei	26.3	54.0	60.5
Hong Kong	26.0	32.3	43.4
Malaysia	15.4	20.5	31.6
UAE	35.8	30.9	33.5
Saudi Arabia	25.9	29.6	30.3
World Average	6.3	7.6	9.7
Bangladesh	0.6	0.7	1.0

Source: Watt Poultry Statistical Yearbook -- 2000 p. 42 -- 44

World Trade of Eggs

Complying with the global production and consumption, volume of world trade of eggs in terms of export and import is also expanding. Since poultry business is regarded as a very sensitive agri-business, magnitude of global trade in terms of quantity and value fluctuates time to time. World trade in eggs (including egg products) is small (between 1% - 2% of the total production) and that there are two major buyers, Japan and Hong Kong. Furthermore, if it were not for the EU subsidies, there would be only two major sellers, the USA and China.

The USA is the pioneer egg-exporting country in the world exporting 2640 million eggs in the year 1999 the figure of which were 2251 million and 3037 million respectively in the years 1994 and 1996. The other top egg exporting countries in the world are Netherlands, China, India, Canada, France, Italy and Germany. India has been seen to become increasingly active in this market in recent years. In the import list, Japan ranks the top position importing 1730 million eggs in the year 1999, a rise in the figure from 1994 which was 1696 million. The other top scorers are Hong Kong, Canada, Mexico, France, Netherlands, Poland and Germany. Global trade situation of eggs in terms of export and import is presented in Table 5 and Table 6 respectively.

Table 5: World leading hen-egg-exporting countries (in million eggs)

Country	1994	1996	1999
USA	2251	3037	2640
Netherlands	2333	988	1905
China	647	715	1000
India	117	22	400
Canada	295	393	375
France	246	129	350
Italy	111	112	185
Germany	279	219	140

Source: USDA, October - 2000 in *World Poultry* vol. 17 No. 2 March 2001 p. 12

Table 6: World leading hen-egg importing countries (in million eggs)

Country	1994	1996	1999
Japan	1696	1817	1730
Hong Kong	1691	1732	1513
Canada	551	607	730
Mexico	144	157	263
France	07	57	212
Netherlands	122	124	150
Poland	220	178	120
Germany	220	264	80

Source: USDA, October - 2000 in *World Poultry* vol. 17 No. 2 March 2001 p. 11

World Trade of Poultry Meat

Global poultry meat business has been seen to expand in terms of export and import during the last half a decade from 1994 to 1999 despite some fluctuations in import. If re-export from Hong Kong (of about 600,000 metric tonnes) and also trade between member countries of the EU (about 700,000 metric tonnes) is discounted, total poultry meat exports jumped from around 3.3 million tonnes to more than 5.0 million tonnes.

The USA has occupied the first position in export list by exporting 2389 thousand metric tonnes of poultry meat in the year 1999; the figure of which was 1472 thousand metric tonnes in the year 1994. She alone holds almost 43% share of the total export of poultry meat in the world. Other top performers in terms of poultry meat export are Brazil, France, China, Thailand, Netherlands, Hungary, and Canada.

Turning to the import, China has got the first position importing 820 thousand metric tonnes in the year 1999 which is a long way from the figure 344 thousand metric tonnes in 1994. The other top importing countries are Russian Federation, Japan, Saudi Arabia, Hong Kong, Mexico, Canada and Germany. Among the markets showing growth are Mexico, Canada, South Africa and Argentina. Global trade situation of poultry meat, export and import is presented in Table 7 and Table 8 respectively.

Table 7: World leading poultry meat exporting countries (in '000' M. tonnes)

Country	1994	1996	1999
USA	1472	2325	2389
Brazil	495	582	692
France	445	466	418
China	189	371	340
Thailand	176	169	282
Netherlands	122	188	189
Hungary	80	109	92
Canada	36	75	87
Total	3284	4626	4864

Source: USDA, October - 2000 in *World Poultry* vol. 17 No. 2 March 2001 p. 12

Table 8: World leading poultry meat importing countries (in '000' M. tones)

Country	1994	1996	1999
China	344	650	820
Russian Federation	516	1116	610
Japan	455	559	507
Saudi Arabia	275	288	271
Hong Kong	211	231	269
Mexico	190	189	253
Canada	91	115	151
Germany	123	160	133
Total	2665	3874	3624

Source: USDA, October - 2000 in *World Poultry* vol. 17 No. 2 March 2001 p. 13

Global Poultry Production: Developed versus Developing Countries

During the last 20 years, spectacular expansion in the livestock industries around the globe has been witnessed. Currently, 23% of the world's people consume four times the amount of animal protein as those in the rest of the world, reflecting the unequal distribution of wealth. Future predictions indicate a marked slowdown in livestock growth in developed countries and a rise in developing countries.

Poultry Production in Developed Countries

Per capita consumption of world poultry meat is 11 kg/year. The USA is the largest producer (14.5 million Mt./year) and the largest consumer (35 kg/head) although this has leveled off. Growth is mainly through export (3 million Mt. expected in 2002). Turkey production is 8/kg/head/year. Cheeke (1999) has been critical of the US poultry

industry, claiming that the industry thrives on poorly paid labor and political influence.

The European Union is becoming hamstrung by regulations that relate to welfare, growth promotants, feed production and quality, raw material inclusion and processing, as a result of consumer perceptions and demand for fresh, wholesome food. Consequently EU countries are becoming non-competitive. Although chicken meat consumption is slowly expanding (currently 15 kg/head); this is met largely by imports and by countries outside the EU including some Eastern European countries who are not so tightly regulated. The performance of broiler chickens continues to improve at what appears to be at a never-ending rate. Table 10 shows the impressive performance of future for broiler industry that will help to keep the industry competitive.

Egg consumption in many developed countries has declined over recent years due to changing eating habits, risk of salmonella poisoning and cholesterol (of minor importance). The US is the largest producer of the developed countries (4.8 million Mt./year) with a current consumption of 263 eggs/person per every year, and increasing slowly. In contrast, Europe has seen a decline in annual egg consumption, from 218 to 212/head in the EU countries during the past five years. A major concern is the high capital cost of introducing alternative housing systems, including free-range and barn, when conventional layer cages are banned in the EU in 2012. Prediction of growth of the poultry meat industry between 2001 and 2020 for developed countries is only 7%, while egg production to 2015 will decline (Table 9).

Poultry Production in Developing Countries

26

The human population of developing countries is now 4.81 billion, or 78% of the world's population, and dominated by China (1.3 billion), and India (1.1 billion). These two countries will influence future predictions of industry change. India and others nearby in the South Asian Association for Regional Cooperation (SAARC) countries, starting from a very slow base; with per capita annual chicken meat and egg consumption of only 750 gm and 1.8 kg respectively for India. Almost all countries of Africa raise chickens although the majority is indigenous and consumption is low (average < 4 kg versus 7 kg/head/year in Asia). Expansion in sub Sahara Africa is slow, in part due to political instability and slow economic growth.

China is experiencing high annual economic growth of 7% in 2002. Poultry meat production of 14 million Mt. includes broiler (9.5 million Mt.) duck and goose meat. Hen egg production is 23 million Mt./year (170 eggs per person). There are, in addition, 3.5 million Mt. of eggs from ducks and geese but declining. As in many developing countries, 70% to 80% of poultry and pig production in China is backyard and small scale. In Vietnam, it is 75%. In India it is higher but is on declining trend.

Brazil is a major force in the broiler industry, producing 5 million Mt./year of meat and exporting almost 1.4 million Mt. and is rising. Export of whole birds is mainly to Saudi Arabia, and parts to Japan and Hong Kong. The low cost of production, the cheap supply homegrown corn and soybean meal (SBM), and the devalued Saudi Real makes Brazil even more competitive.

In South East Asia, Thailand is the major chicken meat producer (1.1 million Mt. in 2002) and exporter (0.45 million Mt. in 2002) mainly to Japan and the EU, while Malaysia consumes 315 eggs and 35 kg/head/year of chicken meat, the same as the USA.

Major Issues Affecting the Poultry Industry

Growth of livestock in low-income countries is linked to economic growth. Poultry production has a competitive edge and is the fastest growing livestock industry. It is the affluent who drives demand and benefit: not the 840 million, who are unable to afford pay thing more than a basic diet, or the 1.1 billion who live in absolute poverty, yet who need animal protein the most.

In countries such as China and India there is a very large middle-class population seeking a diet with animal protein. The high technology, industrialized, modern poultry production process is portable and can quickly adapt to meet this need. Poultry products are widely accepted in most all third world countries. About 75% of Indians, historically vegetarians, now eat meat, and 92% prefer chicken. However industrialized poultry production depends on clean water, a stable electricity supply, and expensive inputs, not often available in these low-income countries, which are highly vulnerable.

Scarce foreign currency is required to import feed, equipment, breeding stock, vaccines and drugs. The Indonesian poultry industry, heavily reliant on foreign imports, completely collapsed with the economic downturn in 1997. Other countries in the region were also affected

28

(Farrell: 2000). There is also the threat of dumping of chicken meat, particularly dark portions, undercutting the locally produced chicken. The USA which is expected to export 3 million Mt. of chicken meat in 2002, has been guilty of dumping dark meat in the Philippines (Tan: 2000), Indonesia, South Africa, and in Russia, under the guise of 'foreign aid' (Templeman and Kerkwijk; 2001). Disease control is difficult. Avian influenza and gumbos disease, prevalent in many developing countries, is difficult to control.

Feed and Food

Feed is the key element to the expansion of industrialized production of livestock. Currently more than one third of all grain produced goes into animal feed (pigs 12%, poultry 9%) and is increasing. The major limitations on the expansion of the poultry industry is therefore, feed. Poultry demand the highest quality feed traditionally, corn and soyabean, to maintain maximum production. Feed costs are 65% to 75% of total costs in the intensive animal industries. Poultry already account for 35% of all manufactured feed (over 600 million Mt./year).

The USA uses almost 145 million Mt., and China 60 million Mt., annually. Farrell (2000) calculated additional future food and feed needs to 2010 which is shown in Table : 11. The 111 million Mt. of cereal grain for humans has been underestimated, in part due to the projected reduction in rice consumption in China over the next 10 years from 206 kg to 355 kg/head/year. The 264 million Mt. of feed grain can be compared with the forecast of Delagado *et al.* (1999) of 292 million Mt. by 2020. They however, made no provision for human food or protein foodstuffs in their calculations.

Biotechnology is one solution to reduce wastage of grain. Currently 42% of production (800 million Mt.) are from pests, disease and weeds through genetic modification (Evans: 2000). There is still consumer resistance to genetically modified (GM) feeds and foods especially in the EU. There is also the production of ethanol from maize. Lyons and Bannerman (2001) estimated that by 2005, 240 million Mt. of corn would be used to produce 20 billion litters of ethanol in the USA and likely to increase.

The EU has banned the use of the 2.9 million Mt. of meat and bone meal in animal feeds, and recently fishmeal, thus reducing the feed supply. Replacement of the protein and phosphorus in meat and bone meal will require 400000 Mt. of Dical P and 2.9 million Mt. of soyabean meal respectively.

Globalization

The effect of globalization on low-income countries is a contentious issue and more likely to be negative than positive (Gilliat: 2002). Globalization means the removal of barriers to information, capital, services and goods flow i. e. reduction or removal of barriers to trade (Annison: 2002). The G-8 countries have most to gain. Recently $331 billion was set aside to subsidize US farmers over the next 10 years. They currently derive one third of their income from export (Martin: 2001); hardly a level playing field. Several countries in South East Asia do not have the capacity to compete for market share (Templeman and Kerkwijk: 2001). In some countries there are concerned about a negative impact of trade liberalization on the poultry industry. A result, these countries have taken steps to counteract this i. e. emphasizing *Halal* meat and home grown (Helinna : 2001).

Energy Supply

Agriculture, particularly in developed countries, depends on cheap energy, mainly oil. Global grain production has increased over the past 15 years. This was achieved with high-yielding varieties with high requirements for water and chemical inputs. Leng (2002) calculated that the ratio of energy yield to energy inputs for grain production in the US was 2.9: 1, while in non-mechanized agriculture i. e. Mexico, it was only 12.5: 1. Delgado *et al.* (1999) forecast that grain and meat prices would not increase significantly by 2020 but they appear to have overlooked the diminishing supply and likely increased cost of oil. The annual per capita consumption of oil in the US is 3200 litters; or 30% of global production. Middle East Gulf countries hold 75% of world oil reserves. Industrialized poultry production needs hatcheries, brooders, transport, feed, processing and storage. All depend on cheap energy. Today, crude oil is above $32/barrel, and likely to climb much higher. The long-term predictions of industrialized meat and egg production must remain uncertain.

Small Scale Poultry Production

Poultry production systems in developed countries are located close to cities and generally meet the demand of the affluent population in low-income countries. In the East and the South East Asia, 33 million Mt. of grains are now imported each year; of this corn and soyabean meal account for 20 million Mt. However the long-term development of the poultry industry in these countries must centre on sustainability and self-sufficiency. If the nutritional needs of the very poor and the landless

31

are to be met in a practical way, then small-scale village poultry production must be promoted and nurtured. This includes among others, increasing and optimizing production, by introducing improved genotypes for both meat and eggs into small-scale systems. This requires a high level of management skills, modest inputs, training and finance.

The recent development of heat-stable Newcastle vaccine is a central part of any village chicken program where mortality is commonly 50% (Spradbrow: 1992). Village poultry not only provide additional income and animal protein but also empower the women, who traditionally manage poultry either singly or in cooperatives. Village chicken production is an enormous topic but must be considered in context of the farming system. Support from aid agencies has not been particularly effective with wastage of funds and resources (Farrell: 2000). However the industry needs protection from the multinationals. There are numerous examples of the industrialized poultry producers squeezing out village poultry keepers by undercutting prices of meat and eggs, sometimes at a loss and inflating feed prices.

Duck Production

Ducks, largely ignored in developed countries, have a role to play in village poultry (Farrell and Stapleton: 1986). They are prolific egg layers, hardy, resistant to many poultry disease including Newcastle, are excellent scavengers and offer great opportunity to provide low-cost eggs and meat, particularly in wetland rice-growing countries. They provide fertilizer, cultivate the soil, remove weeds and control insect pests in the rice fields. They can utilize rice barn better than chickens.

32

China has 70% of the world's duck population (916 million). Vietnam has 57 million ducks and Indonesia almost 28 million. Outside China, developing countries produce 0.46 million Mt. of duck meat/year. Globally, duck meat is the fastest growing of all the poultry meats. In China, Malaysia, Thailand and Vietnam many ducks are now raised in industrialized systems using high-producing genotypes and sometimes-fed on byproducts. Ducks are highly susceptible to aflatoxicosis due to feeding contaminated corn. Integrated fish-duck systems provide extra income and protein utilizing duck waste.

The Future of Poultry Industry

The growth in the poultry industry is backed largely by the demand of affluent in developing countries. Many countries in the Asia-Pacific region, where income is still less than $1000/ year and there is severe under-nutrition, simply can not afford to purchase eggs and chicken meat. Consequently in the SAARC countries in particular, consumption of these is low (Aziz and Mia: 2002).

Although poultry provide food security, employment, income and animal protein, most low-income countries do not have the resources, particularly capital, to establish a modern industrialized poultry industry. They are at the mercy of the developed countries. Future predictions indicate that with few exceptions, these low-income countries will have to import feed from the developed countries, particularly the USA. India and Thailand are the possible exceptions, at least in short term. Establishing modern poultry production has been a nightmare in many developing countries. Unstable markets and prices

33

have led to uneconomical production and dumping of produce. Sri Lanka experienced crippling import duties, high borrowing costs and increased utility charges, adding to the demise. India and Pakistan have seen sharp fluctuations in demand for eggs and meat, and escalating feed prices with some companies going bankrupt particularly those in processing. Not only is there dumping of chicken meat from developed countries but there are examples of dumping of eggs and chicks among low-income countries.

Matching livestock production with available resources seems to be the only practical long-term solution to the future of the poultry industry. Given the forecast of escalating prices in crude oil, and depleting reserves, it seems that it is only a matter of time before the entire structure of industrialized livestock production will be challenged. Small-scale poultry production must be part of the solution but only when there is a sound infrastructure in place and strong government support. In Bangladesh NGOs like BRAC, PROSHIKA have provided invaluable assistance to village poultry. Indonesia is actively promoting village chicken production. It is inevitable that in most developing countries, a modern poultry industry will flourish around cities to meet the demand for products by the growing affluent population but without necessarily benefiting the needy.

Native chickens are hardy, disease resistant and ardent scavengers. They have been used effectively in crossbreeding stock once superior birds have been identified. Modest performance on local and low-cost ingredients needs to be accepted without comparison with that of improved hybrids given high quality diets. It is better to sustain a 5% improvement in poultry output than an unsustainable short-term 25%. The role of ducks must not be overlooked; in many rice-growing

34

countries, they can help to alleviate hunger and poverty. Finally, the often-ignored topic of population growth is a key factor in alleviating world poverty and hunger. This earth was not designed to support seven billion people. Low population growth can only be achieved when per capita income rises to about $5000. This should be our ultimate aim.

Table 9: Global production of milk, meat and eggs (in million Mts.)

Product	Region	1994	1996	1998	2001	2020
Beef & Veal	World	53.2	54.6	55.1	56.2	82.0
	Developed	31.8	31.0	30.2	29.5	38.0
	Developing	21.3	23.6	24.5	26.7	44.0
Pig	World	77.5	78.4	86.7	91.4	122.0
	Developed	36.2	36.0	37.7	37.6	41.0
	Developing	41.4	42.4	49.9	53.9	81.0
Poultry	World	50.6	56.0	61.7	70.4	87.0
	Developed	27.4	29.1	30.5	33.5	36.0
	Developing	23.2	26.9	31.2	36.9	47.0
Sheep & Goat	World	10.6	10.3	10.9	11.5	NA
	Developed	3.8	3.5	3.4	3.3	NA
	Developing	6.8	6.8	7.5	8.2	NA
Milk	World	534.9	549.2	562.7	590.8	772.0
	Developed	350.0	342.0	343.0	345.5	371.0
	Developing	185.0	207.0	220.0	245.3	401.0
Eggs	World	45.0	50.0	51.7	57.0	72.0
	Developed	17.9	17.6	18.0	18.6	18.0
	Developing	27.0	32.4	33.7	38.4	54.0

Source: FAO Statistical databases: 2002

Table 10: Past & Predicated performance to 2007 for broilers

Description	1976	1987	1997	2001	2007
Live weight @ 42d (kg)	1050	1775	2425	2650	3000
Days to reach 2 kg (d)	63	45	37	35	33
Feed Conservation Ratio to 2 kg	2.50	1.90	1.65	1.50	1.25
Feed to 2.5 kg (kg)	5.0	3.8	3.3	3.0	2.5
Carcass yield (%)	66.7	67.8	69.5	70.3	71.5
Breast meat @ 2 kg (%)	12.6	14.5	16.1	17.3	19.1
Feed (kg) per kg breast meat	20	13	10	8.7	6.5

Source: Farrel (2000)

Table 11: Additional cereal grain, protein concentrate and arable land requirement by the year 2010

Particulars	Humans	Livestock	Total
Grains (million tones)	111	264	375
Protein concentrate (million tones)		150	150
Arable land (million hector)	32	135	167

Source: Farrell (2000)

36

CHAPTER-III

REVIEW OF LITERATURE

Review of related literature in any research is a necessity in the sense that it provides a scope for reviewing the stock of knowledge and information relevant to the proposed research. These knowledge and information give a guideline in designing the future research problem and validating the new findings. With this end in view, literature and research works in line with the present study were searched in the relevant libraries and research institutes. Studies on the marketing of poultry and broiler enterprises are of recent origin in Bangladesh. A good number of researches have been completed on poultry production but the number of analytical studies conducted on marketing aspects of poultry enterprises is limited.

In Bangladesh most of the studies were concerned with broiler production and nutrition in controlled experiment (Aziz 1996, Haque 1992, Biswas 1993, Islam 1993, Ali 1993, Bhuiyan 1998, Maleque 1999, Khaleque 1999, Malakar 1999, Islam 1999, Alam 1999 and Khan 1975). Some studies dealt with cost and return analysis and some were conducted on seasonal impact on broiler production under controlled environment. Some of the studies were concerned with problems and prospects of broiler industry. However, some of the studies are reviewed below.

Karim and Mainuddin (1983) conducted a study on the backyard poultry farming in Bangladesh. They found that the financial hardship, inadequate supply of vaccines, wild animal attack on improved cock,

difficulties in getting bank loans and inadequate supply of improved birds were the basic problems of backyard poultry farming in Bangladesh.

Ahmed (1985) conducted a study on prospect and problems of broiler production in Bangladesh. He noted that Bangladesh had deficiency in poultry and poultry products, which could only be overcome, if the, continue production of hybrid broiler chickens could be ensured in an organized way. He also suggested that the broiler industry, if taken on a large scale, could create employment opportunity.

Haque (1985) studied commercial poultry farming in Bangladesh. He suggested measures for boosting up the commercial poultry farming in Bangladesh, such as: supply of high quality commercial broiler and layer chicks, good quality feed, medicine and vaccine, vitamins and mineral premixes, feed additives, arrangement of disease investigation facility, withdrawal of import duly, lower rate of interest on bank loans and insurance system in commercial poultry farm.

Islam and Shahidullah (1989) conducted a study at the Boiler union in Mymensingh district. They studied the extent of poultry rearing knowledge of the farmers in respect to breeding, feeding, housing and prevention and disease control. The relationship of eleven profile characteristics of the farmers was also explored with their overall poultry rearing knowledge. The study showed that the majority of the farmers possessed 'poor' knowledge in breeding (76 per cent), housing (78 percent), prevention and disease control (61 percent); while their knowledge was 'moderate' in feeding (91 percent). Education, farm size,

income, occupation, cosmopolitans, communication exposure and attitudes towards poultry rearing had positive relationship, while fatalism had negative relationship with poultry rearing knowledge of the farmers. They also showed that prevalence of various poultry diseases were the most frequently cited problems of the farmers.

Ahmed and Howlider (1991) study the feasibility of rearing commercial broilers in Bangladesh. Six thousand six hundred and seventy straight run broilers were raised in 3 different seasons in 11 batches: 3 in winter (2140 broilers), 3 in summer (1600) and 5 in rainy season (2930) in 1990 to investigate the feasibility of commercial broiler production in Bangladesh. Daily feed intake, growth rate and feed conversion were similar in three seasons. Production cost was the highest in summer, intermediate in winter and the lowest in rainy season. However, sale per kg broiler was highest in summer, intermediate in rainy season and lowest in winter. Mortality in winter, summer and rainy seasons was 18.22 and 6.4 per cent respectively. Profit was higher in rainy season and lower in summer and there was a loss in winter.

Haque (1992) presented a paper on "Rural poultry in Bangladesh economy" in the Fourth National Conference of Bangladesh Animal Husbandry Association. He employed cost benefit analyses on 500 layers and 500 broilers. He found that the profit of layer farm was higher than broiler farms.

Ukil and Paul (1992) conducted a study on problems and prospects of broiler industry in Chittagong region. The study was undertaken to identify the problems and the facilities to be created for fast growing

broiler industry. They found that non-availability of chicks, prevention and control of diseases, predators, lack of balanced feed, housing, lighting and fluctuation of market were the basic problems of broiler poultry farming.

Islam (1993) conducted a study on "Economics of Poultry Rearing over Fish Pond". One of the most important objectives of the study was to assess the profitability of broiler production over fishpond. The profitability of broiler production was determined by employing costs and return analysis. Number of poultry birds reared were not the same in all batches. Therefore, costs and return were calculated on per bird basis. Capital cost, cost of chicks and input costs (feed and labour) were the three items in broiler raising over fish pond which contributed 8 percent, 27 percent and 62 percent of the total costs respectively in on station; but for on farm condition the corresponding percentage were 9, 28 and 61. The average per broiler cost was Tk. 61.67. Feed was the most important factor that covered the major share of the total cost of broiler production. The sample farmers sold their produced broiler at the rate of Tk. 60,00 / kg. The net return was Tk. 11,00 / bird. Mortality percentage was 3.9 per cent. The result of the study clearly indicated that small-scale broiler farming over fishpond was highly profitable.

Ahmed et al. (1994) conducted an economic study on the performance of broilers and layers under the existing farming condition. About 11,510 broilers were reared in 22 batches; 8 in summer (4060), 6 in rainy (3200) and 8 in winter season (4250 broilers). Profit per kg broiler was the highest (Tk. 15.86) in summer and the lowest (Tk. 12.41) in rainy season. Mortality of broilers was comparatively low (4.62%) in rainy season compared to other two seasons. The result obtained indicated strong feasibility of commercial broiler production in Bangladesh.

Ahmed et al. (1995) conducted an economic study on the performance of broilers round the year. He studied a total of 23 batches of broilers as reared 7 in rainy, 7 in winter and 9 in summer season of the year. Identical care and management were assigned to the birds all over the year to study the performance and profitability. Feed intake and live weight gain were the highest in the rainy season and the lowest in the summer season. Feed efficiency was the best in the summer and the poorest in rainy season. Mortality of broilers was the lowest in summer and the highest in rainy season. Profit per kg of broilers was the highest in summer and the lowest in rainy season. The highest feed cost in summer and the lowest in rainy season. The highest feed cost was observed in rainy season compared to other two seasons and the lowest feed cost was observed in summer season but the costs on chicks, labour and miscellaneous items were the highest in summer compared to other two seasons. It was observed that the lowest feed cost during summer was due to low intake of feed by the broilers, which might have been influenced by high temperature during summer season.

Ahmed (1997) studied the performance of broilers in different seasons of the year. The study was also undertaken to recommend which type of broilers would be economically viable under Bangladesh condition. It dealt with about 12,500 broilers reared in 22 batches: 8 in rainy (4700), 7 in winter (4200) and 7 in summer season (3500 broilers). All the broilers were procured from Aftab Bahumukhi Farms Ltd., Kishoreganj. The study revealed that the total cost of production per bird was the highest in rainy season for Isa-vedette while it was the lowest in summer.

Azad et al. (1998) conducted an experiment with 30 Starbo, 30 Hybro and 30 ISA vedette straight run day-old commercial broiler chicks up to

41

56 days of age to compare the performance of different strains under Bangladesh condition. The final live weight in Starbo, Hybro and ISA vedette was found to be 1935, 2258 and 3185 grams respectively. The respective feed conversion ratio were 3.28, 2.70 and 2.87. The dressing percentage was almost similar in all 3 strains. Liability was slightly higher in ISA vedette than in other two strains. Variation in feed cost among the three broiler strains was found to be non-significant. Study concluded that all the three strains appeared to perform equally and satisfactorily under Bangladesh condition.

Haque et al. (1998) conducted a feasibility study on integrated farming of fish-broiler. They studied cost and return of 275 broilers. They found housing, chicks, feed, vaccine and equipment costs as Tk. 1000, Tk. 4125, Tk. 8433, Tk. 100 and Tk. 400 respectively. Gross return was calculated as Tk. 22,100 and net return was Tk. 8042.

Ahmed (1999) conducted a study on poultry development project. The study was undertaken to compare the performance of 1 - 757, Isa-vedette and Arbor Acres broiler in different seasons of the year. He also studied marketing and profitability condition of broilers in different seasons of the year. The study revealed that in the rainy season, the total production cost per bird in Isa-vedette was the highest Tk. 74.47 compared to Tk. 73.99 per bird for 1 - 757 broilers. Analysis on cost factors indicated that the feed was the major cost amounting to 52.77 per cent in 1 - 757, 51.87 per cent in Isa-vedette and 46.61 per cent in Arbor Acres broilers. Cost of chick was 30.60 percent in 1 - 757, 33.33 per cent in Isa-vedette and 38.82 percent in Arbor Acres broilers. Labour cost was highest 11.08 per cent in 1 - 757 compared to Arbor Acres 8.95 per cent. Profit margin of Arbor Acres broilers was the highest 22.41 per compared to 1 - 757 broilers during summer season. The study also showed that mortality of broilers was the highest (16.31 percent) in

42

Arbor Acres broilers during winter season, and the lowest (1.53 per cent) compared to Isa-vedette broilers during summer season. The study concluded that 1 - 757, Isa-vedette and Arbor Acres broilers could be grown profitably under rural condition in Bangladesh.

Bhuiyan (1999) studied the socio-economic characteristics of poultry farm owners and assessed the relative profitably of broiler and layer poultry farms. He worked on a total of 60 poultry farms taking 30 broiler farms and 30 layer farms from the Kotwali thana of Mymensingh district. The study revealed that on an average, the total costs per poultry farm per year were Tk. 2,99,482 and TK. 3,14,620 for broiler and layer farm, respectively. The gross returns per year were Tk. 3,55,772 and TK. 4,37,477 for broiler and layer farm, respectively. The net returns per year were Tk. 56,290 for broiler and Tk. 1,22,826 for layer farms, respectively. The study also revealed that most of the selected input variables had some significant impacts on the production of broiler and layer poultry farms.

Uddin (1990) conducted a study on economic analysis of broiler and layer production in some selected areas of Sadar thana in Mymensingh district. The study was undertaken to analyze the socio-economic characteristics of poultry farm owners and to determine the costs and returns as well as the relative profitability of layer and broiler farms. The findings of the study revealed that on an average, the total costs per bird per day were Tk. 1.65 and 1.29 for small and large layer farms and Tk. 1.95 and Tk. 1.82 for small and large broiler farms, respectively. The gross returns and net return per bird per day stood at Tk. 2.33 and Tk. 0.68 for small layer farms and Tk. 2.15 and Tk. 0.86 for large layer farms and Tk. 2.14 and Tk. 0.19 for small broiler farms, and Tk. 2.18 and Tk. 0.36 for large broiler farms, respectively. The findings of the study also

43

revealed that the layer and broiler farm owners faced various types of problems, such as high price of feed, non-availability of day old chicks, outbreak of diseases, inadequate knowledge of poultry ration, lower price of meat, lack of market facilities, non-availability of training facilities, irregular supply of electricity and some social problems.

Benson and Witzing (1977) conducted a study on US chicken broiler industry and analyzed the changes in production, processing and marketing. They observed that the broiler industry had changed from one of small, widely scattered farms to one that was large, concentrated and efficient. More than 99 percent of all broilers produced were grown under contract and by integrated farms which varied in size of operation and complexity. Some of the other factors that contributed to these changes were costs, energy use, prices, processing, marketing and demand.

Csizmadia and Kovacs (1983) observed that the poultry processing farms in Debrecen, Hungary extended their production by using small producers. They observed that 280 small units were producing poultry for ten large farms. The small producers required only one third of the investment costs needed for large-scale production. They, however, noticed that transport difficulties emerged, because the producers were scattered.

Punia et al. (1984) reported that poultry development programme in Haryana was hardly a decade old. Majority of the big commercial farms was located in urban centers or in semi-urban areas. The authors put emphasis in popularizing this enterprise in rural areas. They opined that it was not only the government effort which might be held responsible to some extent for slower rate of growth, but there were many other retarding factors such as food habits of people, religious belief, value, education, innovations technical guidance and skill etc.

Lance (1990) conducted a study on economic evaluation of farm efficiency for integrated - broiler and contract - grower operations in Georgia, by type of housing system. The study was initiated in order to compare efficiency rates, physical and economic, for broiler production between housing systems (open curtain-sided and enclosed) for integrated operations and contract growers in Georgia. A secondary objective was to estimate the rate differences for housing efficiency between contract growers and company-owned production system in order to determine over all efficiency rates for the poultry industry. Production, financial and labour input data were obtained directly from 150 contract broiler growers and nine integrated-broiler production firms located in North Georgia. Overall, the analysis indicated only minor differences in the economic efficiency rate in terms of annual farm production costs between the two housing systems. However, significant seasonal production differences were evident between housing systems. The enclosed housing system was more efficient for both contract growers and integrated operations in the summer and autumn. The open-curtain housing system was more efficient in the winter and spring both for the contract growers and the integrated operators.

Pandey and Aggarwal (1992) conducted a study on economic analysis of broiler and feed prices. Analysis of monthly and annual broiler and feed prices in India for the period 1980-88 shows that, in general, broiler prices were relatively higher in colder months than in warmer months. By contrast, feed prices registered an increasing trend during summer and a declining trend in the winter season. Variability (28 percent) in broiler prices was the highest in August and the lowest (15 percent) in May. Feed prices observed the highest variability in March (21 percent) and the lowest in October (15 percent). Both broiler and feed prices

45

significantly increased between years and months. Broiler prices increased at the rate of 7 to 10 percent and ration prices between 6 to 7 percent per annum, in different seasons. Broiler prices increased by about 18 percent in September and feed prices by 8 percent in August. Broiler prices declined by 13 percent in June and feed prices by 5 percent in January. The partly indices for broilers and feed prices observed a mixed situation over the period and across months. To maintain price partly, the study recommended either the creation of cold storage facilities or encouragement of consumers to consume broilers in the summer.

Panda and Mohapatra (1993) examined the poultry production in India and opined that it made rapid progress in the last 3 decades. They estimated 2700 million fowl eggs produced in 1991 representing a 12-fold increase compared with 1961. Broiler production, which was only 4 million in 1971, increased to around 250 million in 1991. The retail value of poultry and poultry products was about 35000 million rupees in 1991 as compared to 8000 million rupees in 1980. The increase in poultry production also created employment for about 100,000 farm workers.

Kitsopanidis et al. (1996) studied the effects of the most important factors on the profitability of the poultry meat farming in Greece. The most important factor for poultry meat production were mortality and age of final live weight (FLW) of broilers, because they affected the total feed consumed and the total FLW of broilers achieved. Analysis of these factors showed that an increase of mortality from 2.5 to 10.0 percent and the age of FLW of broilers from 53 to 62 days led to a decrease in profitability by 96.7 and 77.1 percent respectively.

Rangareddy et al. (1997) conducted a study on economic and financial analyses of broiler production in Kamarajar district of Tamil Nadu. The study revealed that cost of feed alone accounted for more than 50 percent of the total cost followed by cost of chicks, about 25 percent. There was wide scope to reduce the total cost by substituting the least cost farm mixed rations. Amount released by sale of broilers formed the major of return (96.21 percent) in broiler enterprise. The net return per broiler and per kg of live weight of broiler produced were Rs. 5.51 and 3.01 respectively. Benefit cost ratio was found to be 1.25: 1. Break-even analyses revealed that at least 127 broilers must be reared by the farmers to cover the cost of production. The economic analysis also proved that the entire investment could be repaid in one year, which reflected the economic viability of the broiler farms located in the study area.

Kim (1998) conducted a study on economic analysis of broiler production in Korea (1980-95). The analysis concentrated on structural changes on different sizes of chicken farms and used a Markov model analysis of the farms with less than 5000 broilers.

Euiott (1931) conducted a study on consumer preference on egg. He reported that 72 percent preferred a particular shell color and 78 percent had a definite yolk color preference. Housewives in Chicago, generally, desired white eggs with light yolk, but in nearby towns the preference was for brown eggs with orange yolks.

Jensen and Stadelman (1951) reported that many eggs were sold from retail stores with low interior quality expressed as albumen index. On the basis of these reports, it was deemed advisable to investigate the problem further. The purpose of that study was to determine the appearance of eggs as viewed by Scuttle consumers both in the store and in the home.

Slocum and Swanson (1954) reported that less than ten percent on the consuming units interviewed in Scuttle had complaints regarding the eggs, they purchased. This indicates that a majority of the buyers are apparently satisfied with the quality of eggs available on this market.

Larzelere and Shaffer (1955) studied the variations in consumer egg purchases. The variation has been obtained as part of the weekly reports from 250 families for a period of 4 years. They found that the purchase frequently amounted to one half an egg per person per week. Variations in purchase among family purchases have been related to family characteristics and consumption of other products.

Coles (1989) reported that in Britain, at the period of prewar about 71% of all her eggs consumed were home-produced: today it is virtually 100%.

Sanborn (1958) reported that the reaction of 5000 consumers in California had a higher tolerance for blood spot eggs than expected and 1200 contacted consumers preferred albumen of higher thickness.

Baker (1959) conducted a study on consumer preference for poultry meat quality. He showed that consumer had less opportunity to accept or reject a particular product, because it either has or does not have particular attributes. Most reported research on consumer preferences and demand for poultry meat has involved either direct questioning or market tests. Greater emphasis on the relationships between consumer value and product attributes might assist the industry in developing better merchandising programs, such emphasis could also be helpful to the technological research programs.

Bender and Voss (1959) surveyed visual preferences for interior quality of eggs. Twenty nine percent of consumers in St. Louise Columbia commended on albumen and yolk, 18 percent on albumen only, 13 percent on yolk only, 22 percent on chalaza and 18 percent had no comments on any of these criteria. The chalaza comment quality is the only criteria now included in present grade standards for egg. Consumers are using criteria to evaluate eggs that are not now included in standards for determining egg grades.

Patil (1961) surveyed in seven districts of Maharashtra, India and found that 60% villagers preferred male chicken for meat purpose.

Richard et al. (1963) collected information on consumer attitude towards fresh and frozen chicken. One hundred sixty seven consumers indicated that they would purchase fresh poultry if price and quality were the same. Price did not appear to be the most important factor. Since 32% indicated that they would not use frozen, regardless of price. The average length of home refrigerator storage of fresh chicken was three days with holding. If longer than four about 53 percent of the respondents indicated that they did not know how often frozen fryers available, while only one per cent did not know of fresh.

Hinners and Rowland (1963) surveyed 226 households in 16 cities in St. Couis, Missouri, Carbondale. They observed that consumers accepted eggs bearing small specks of dirt (dirty eggs) in preference of moderately stained eggs. Difference in egg quality in the homes was noted to be associated with different cities, types of stores, economic status and price. In selecting eggs to buy size, cleanliness, freshness, grade, color of shell, appearance and brand name were considered importantly.

49

Stubbs (1963) reported that the egg consumption in Israel has increased very rapidly in recent years so that now this small country has one of the highest rates of consumption in the world.

Anon (1966) observed that after a temporary leveling off in 1963, broiler consumption in West Germany is again increasing. In 1964, per capita consumption of poultry meat measured by about 11 percent reaching 12.8 pounds. Also consumption in the Netherlands, which is still the lowest in the community, showed a substantial increase during most of 1964 as per capita consumption reached a high of 8.8 pounds. Consumption of poultry meat was also up in Belgium, Italy, Switzerland, Denmark, Austria, Greece, Japan and the United Kingdom.

Islam (1966) studied consumer demand for farm and non-farm goods and services in Bangladesh. He failed to analyze the consumer behaviour in relation to the price of the consumption items due to non-availability of adequate market.

Coxand and Noles (1967) studied two consumer panels to determine the level of yolk mottling objectionable to consumers. One panel was held in Detroit, Michigan and the other in Athens, Georgia. Each panel member evaluated five pairs of eggs presented on coded plates. One referred to no visible mottling and six referred to extreme mottling covering 60 to 100 percent of exposed yolk surface.

Miller et al. (1967) reported that consumer reactions to the flavor of eggs stored from 2 to 49 days at 55.60°F. Those consumers did not distinguish among eggs of different ages, even though several criteria of reaction were used. A consistently higher rating was given the second eggs,

50

regardless of whether it was of the same. Different age group preferred cooking methods were surveyed and found to be in the following order, frying, scrambling soft cooking poaching and hard cooking.

Chowdhury (1972) revealed that in Bangladesh per capita per year consumption of meat and egg were approximately 1.85 kg and 0.57 kg and 46.2 kg and 10.65 kg respectively, while those in Japan and Sweden were 9.15 kg and 7.73 kg and 46.2 kg and 10.65 kg respectively.

Kabir (1974) observed that understanding of the pattern of consumption is one of the most important aspects in the analysis of the whole economic structure of a particular commodity or commodity group in an area with special reference to poultry products.
Khan (1975) analyzed consumer behaviour in relation to income and aggregate expenditure. He reported that the meat and eggs of local chicken and ducks are more attractive to the consumers of both urban and rural area in Bangladesh.

Jabbar and Geen (1983) reported that in Bangladesh poultry meat has a great demand as compared to other varieties of meat simply because of the limitations and religious taboos on pork and beef.

Ramakrishnan (1983) reported that duck broiler with dark plumage was not preferred because they produce black stub feathers which stained the carcass and reduced consumer acceptability.

Robert (1985) observed that consumers did not use to see a thicker milk-colored egg white because they did not used to having such fresh eggs.

51

Sreenivasaiah (1986) observed that during summer, the food consumption reduces and hence it is advisable to consume eggs to meet the requirements of various nutrients. Two eggs can meet only 6% of the daily nutritional requirement of an average adult.

Forssido (1986) reported that in Ethiopia, village chicken provides 12.5 kg of poultry meat per capita per year, whereas cattle provide only 5.34 kg.

Alemu (1987) conducted a study on small-scale poultry production. He reported that the per capita egg and meat consumption in Ethiopia is among lowest in the world.

Yasmin et al. (1987) reported that consumption of eggs and meat is less among the poor farmers in village because most of the farmers sell them for additional income.

Dahlgram (1988) conducted a study for beef, pig meat and chicken meat demand of consumer behaviour in the United States to flexibility system. He suggested that red meat demand has become more variable and cross-price flexibility for beef pig meat. Chicken has become a closer substitute for pig meat and beef meat in post 1973 period.

Lasley and Jones (1988) showed that Americans were eating more broilers than other meat because of low real price and preferences for lean meat. The per capita broiler consumption recorded as high as of 27.41 kg in 1987 compared with 18.64 kg in 1977.

Moen and Capps (1989) used non-parametric statistical methods to analyze consumer preferences for fresh meat products (chicken, beef, steak beef, roast, fish ground beef, pig meat, turkey and lamb). Significant differences in ratings were evident for the majority of the fresh meat products in term of frequency of purchase as well as taste and quality. In particular, chicken was not only the most frequently purchased fresh meat product, but also compared favorable to all meat items for taste and quality.

Panda (1989) reported that in southern Asia poultry production would continue to grow in response to an increasing demand for eggs and poultry meat.

According to BARC (1999), at present the poultry population in the Bangladesh is about 102.4, million producing 1.66 million eggs against the demand of 12.66 million, resulting to a deficiency of 87 percent.
Greuez (1990) reported that poultry industry must continue to responds to the changes in consumer demand, if it is continue to be proper in market.

Haque (1991) reported that poultry were supplying about 22 per capita meat consumption of 27 percent animal protein in Bangladesh.

According to BBS (1999) in the Bangladesh per capita meat consumption was 2.31 kg in the year 1991-92. But in developing countries per capita meat consumption is about 6.59 kg.

Baharmuhah and Mohamed (1993) is estimating almost ideal demand system (AIDS) in Malaysia reported positive cross price elasticity and an expenditure related elasticity for pig meat, chicken, sheep and fish meat.

Wu (1995) applied the most ideal demands (AIDS) to estimate consumption parameters for grains and livestock products in 33 cities of China in 1990. He reported relatively low expenditure elasticity for livestock products and grain products and consumers incomes change had little impact on consumption pattern.

Alam (1994) reported that poultry meat production in Bangladesh is about 2.75 crore tons per year and per capita protein consumption was 6.9 g per day against the demand of 14.9 g resulting a deficiency of 8 g.

Islam (1995) in Bangladesh observed that 14.28 percent did not eat poultry meat mainly because they did not like the tastes. Ninety five percent of the sample families preferred meat to either of fish, pulses, vegetables of eggs for varied reasons of taste, health and family demand. They also preferred meat when they were to entertain guests and also for changing taste. But, majority of them could not purchase meat when they wanted mainly because of economic hardship. Fifty-percent of the sample families preferred meat for reasons of taste and health. He also observed that the consumers determined the quality of meat by checking through eye estimation of color and freshness of meat. A large number of consumers supported government intervention in meat marketing through price control measures. Ninety five percent of the sample was in favor of meatless days. They advocated meatless days for it might help to save the livestock population.

Mulder (1995) reported that poultry meat has excellent organoleptic characters (low fat and high protein content) and a relatively low retail price. The consumer's judgement of overall quality is strongly

dependent on the relationship between perceptible attributes at the moment of purchase and sensory characteristics of the meat at consumption.

Raha (1995) conducted a study on consumer preference on broiler and farm supplied egg in the employees of Bangladesh Agricultural University. He observed that per capita monthly consumption of chicken was higher than other animal meat but only about 22% of the consuming households used broiler. Similarly, the consumption of egg was also higher than the national average. But local hen egg was preferred by about 47% of the respondents. The criteria of their preference for local chicken and egg was not based on scientific argument. Marketing promotional measures would be helpful to change the consumers' attitudes towards broiler and farm supplied eggs.

Shanmugam and Kumer (1995) analysed the supply response of egg and poultry meat in Salem distributes India. They showed that layer production was found to be more profitable than broiler production. Egg and broiler meat supplies were found to be price elastic and so efforts to fix remunerative price would assist the development of the poultry sector.

Das (1995) showed that 80% poultry products (broiler, layer and egg) were purchased by institutional buyers and 20 percent by ultimate consumers in Sylhet Sadar Thana. Egg price was fully dependent on market demand. Broiler price depended equally on production cost and market demand. Owing to religious belief and social tradition, live poultry birds are purchased by consumers from the market in Sylhet. The processing or dressing as marketing operation is uncommon in Sylhet town market. He also observed that in summer season consumption of eggs was decreased because of heat. The consumer considered the local chicken as more tasty than of that of the farm

55

produced poultry. Broiler meat is considered to be softer than local chicken meat and people are habituated to have local chicken.

Sales (1996) reported that physical properties of ostrich eggs make them attractive to consumers while the high shell strength provides resistance to break age during handling and transportation. They revealed that the compositions of ostrich eggs are similar of other avian species.

Khanum (1997) reported that meat and eggs from local chicken were mostly preferred and consumed by majority of the consumers than those of the meat of broiler, quail and egg form exotic chicken due to lack of knowledge. Almost all the respondents showed poor to medium choice towards poultry and poultry products, the causes of which are variable. Farm size of consumers has a significant effect on poultry consumption. Family size and level of education of consumers were not related with their attitude.

Gueys (1998) studied on village egg and fowl meat production in Africa. He described that the meat and eggs are much preferred by the consumers and fetch premium prices compared with commercial birds.

Alam (1999) reported that most of the consumers had medium choice on broiler. Consumer expected market price for live and dressed broiler was Tk. 67.33 and Tk. 89.67 respectively, but the actual market price was Tk. 69.33 and Tk. 97.50 respectively. He recorded the highest price of broiler in the month of March and April and the lowest in August to October. Broiler has become popular from 1997. Most of the consumers (80 percent) prefer live broiler due to religious faiths.

Cooper (1999) conducted a study on ostrich meat, an important product of the ostrich industry; and Southern African perspective. He stated that ostrich meat may be consumed as a health alternative to beef. The establishment of ostrich farming system is not sufficiently to satisfy

consumer demand without the use of successfully production and marketing strategy.

Billah (2001) reported that regarding poultry consumption most of the village producers (74%) were in low consumption category compared to 10% being medium consumption category and 16% did not consume at all. Consumption pattern of the farmers was not related with their family size and poultry knowledge.

Kabir (1974) studied on poultry marketing in Mymensingh town with particular emphasis on consumer demand analysis. He used panel data for consumers and also selected 25 traders of poultry marketing in Mymensingh town. He observed that in the rural markets no grading and weighting system were adopted but those were practiced in town markets. The author concluded that poultry market was reasonably competitive. He also reported that poultry had a shorter trade channel consisting of final beparies and retailers.

Sikder (1976) studied poultry marketing taking Dhaka city market as the focal point and 5 markets in Mymensingh town as the supply hinterlands. He observed that price of poultry was determined by bargaining but buyers dominated the markets at the primary level.

Wu et al. (1987) presented an aggregate level supply and demand model for eggs. The model considered feed and eggs price changes, population size, proportion of produced eggs marketed, age structure and size of chickens, and anticipated technological improvements. The model is employed to calculate market equilibrium feed and egg prices in the suburb of Jilin City, Changchum, China.

Barman (1988) observed that in the whole channel of poultry marketing in Mymensingh district no efficient grading, standardizing, transportation and organizational structure were found. He concluded that the marketing efficiency could be enhanced by reducing marketing cost or by increasing marketing services or both. He also concluded that for the long marketing channel the consumers had to pay high price and the producer was deprived of fair return.

Sugiyama (1989) examined the structure of the Japanese egg industry and trends in production, costs, prices, imports and consumption, cooperative and private marketing channels were then compared. Under the traditional trading system, eggs move through a 6 - stage marketing channel where the margin was two to three times the producer's price. In the cooperative marketing system eggs were assembled in predetermined centers and shipped to auction markets enabling the producers' share to increase from 75 percent to 80 percent. Shumba (1990) observed that the poultry do not get institutional and credit support. He further observed that lack of a proper marketing opportunity is the major obstacle in the promotion of poultry production in rural area.

Miah (1992) conducted a study on "An economic analysis of poultry marketing in Mymensingh district ". He observed that price was determined by bargaining and marketing information was collected by personal visit to markets.

Alam et al. (1998) conducted a study entitled "An economic study on poultry farm in Bangladesh". The study showed the marketing costs and margins for poultry and eggs under intensive and scavenging system. The marketing cost of eggs produced in traditional farms was 21.07

percent and that of intensive farms was 20 percent of consumers' price. The net marketing margin for eggs was 15.92 per cent and 13.24 percent of consumers' price for traditional and intensive farms, respectively. The rate of return on capital varied from 19 percent to 15 percent for eggs.

Mulder (1995) conducted a study on 'Marketing' dimension of poultry products with special reference to India. He showed that the Indian poultry sector is important in terms of income and employment generation, particularly for the rural poor, land-less laborers and small and marginal farmers. Growth in consumption of eggs and chicken meat will be achieved by improving marketing and the distribution network.

Singh (1995) reported that the most important broiler marketing channels operating in Delhi market and the local markets of Amboala and Gurgaon is : Producer → wholesaler → retailer → consumer. Price spread is found to decrease with the elimination of intermediaries.

Sharma et al. (1995) conducted a study on marketable surplus of eggs in Punjab. The researchers identified in this study the marketable surplus of eggs in India according to farm size. They collected data for 1989-90 from a total sample of 181 poultry farms in Ludhiana and Faridkot districts, Punjab. In this study the farms were categorized into three groups according to size such as small (less than 3000 layers), medium (3000 - 10000 layers) and large (able 10000 layers). The result of this study showed that breakage and home consumption were the highest for large poultry farms and the lowest for the small farms. This report also gave an idea that about 65 percent of total egg production took place in the period of October to March.

Pandey et al. (1996) reported that bulk of eggs produced was sold in all the three seasons and on all types of farms. A very small percentage was consumed on the farm or spoiled in transit and storage. Winter was the highest egg-producing season for all farmers. Marketing of eggs was the greatest constraint faced by the farmers. After the formation of National Egg Coordination Committee the prices of egg had stabilized but relative increase in egg prices was lower ad compared to the prices of milk, food articles and over all prices for all commodities.

Saha (1997) reported that the average gross margins for 100 egg of Aratdar-cum-wholesalers, retailers and suppliers were Tk. 42.50, Tk. 42.50 and Tk. 43.75 respectively. Net margins were also calculated per 100 eggs at Tk. 33.09, Tk. 34.99 and Tk. 33.01 for Aradar-cum-wholesalers, retailers and suppliers respectively. Some recommendations were also made on the basis of the present study.

Hossain (2000) conducted a study on "An agri-business study on poultry and poultry meat products in Dhaka city". He attempted to examine the existing poultry and poultry meat products marketing system to estimate the cost and margin to calculate the profitability of poultry meat products and to identify problems and also to provide some suggestions for improving the present marketing system in the study area. He estimated the average marketing cost for one bird of farm owners, wholesaler-cum-retailers, retailers, hotel owners and fast food traders at Tk. 49, Tk. 8, Tk. 3, Tk. 68 and Tk. 181 respectively. The corresponding net margin or profits were Tk. 11, Tk. 3, Tk. 4, Tk. 42 and Tk. 109 respectively. He concluded that the agri-business of poultry and poultry meat products was profitable.

Miah (1990) studied small-scale poultry farms in Savar area. He found that the average number of birds in small and medium farms were 589 and 3139 respectively. The average annual costs per small and medium farm were Tk. 136788 and Tk. 567304 respectively. The average income

of small and medium farms stood at Tk. 308779 and Tk. 1480302 respectively. The researcher also found that the profitability of poultry farming depends on the size of individual farms.

Ruchira (1994) studied on how the women beneficiaries of empowerment programmes perceive interventions and what according to them are the outcomes of such interventions. Women hold that many important and positive changes took place at individual, family and social levels. They feel that they have gained greater access and control over resources. Further, the relationships of women with others have improved. To a lesser extent, they have become able to change the external environment. Women are valued more in the family for their contribution in family's income. Verbal and physical abuse and violence against women have been reduced. Women's mobility has increased tremendously. Women have developed linkages with various services providing institutions and social organizations. Women have learned to defend their own interests through group actions. All of these have ultimately translated into better living conditions for children.

Onwuka (1997) studied methods for the retrieval of poultry waste (PW) and its utilization as feed for livestock. PW contains as much as 25 percent cp. although this and other nutrients could be lost gradually when stored over a period of time. Nutrient digestibility of PW may be as much as 80 percent. To enhance its feeding value, PW may be processed, by ensiling, stacking, extruding, drying or chemical treatment, especially formalin. Utilization of poultry waste in animal feeding poses minimal harm and could be used to reduce the cost of animal protein production and reduce environmental pollution at the same time.

Teeter (1996) studied factors affecting poultry nutrition in the 21st century are discussed under the headings; energy requirement schemes and carcass composition; environmental effects on carcass composition; gain optimization following stress and minimizing waste production.

Westenbarger (1995) studied animal waste, which is increasingly viewed as a pollutant disposal problem by US farms. Manure disposal regulations are being introduced into agricultural and environmental policy, and this study examines the costs of improved manure management, which sectors would be most affected and how this might cange their financial outlook. It begins by outlining the regulatory background to manure disposal, before going on to discuss waste control methods. Costs of proposed manure management practices are estimated. Economics and politics limit the stringency of environmental status. Estimates indicate small national compliance costs for confined livestock production, but costs may be burdensome to the broiler sector in particular and to livestock producers in any sector in areas vulnerable to pollution.

Williams (1995) studied agricultural practices and methods, which cause environmental pollution and discusses ways in which their pollution can be reduced. Two of the main sources of pollution of agricultural origin are nitrogen and phosphorus in animal excreta. Ammonia, originating from the N in slurry, is a volatile component, which adversely affects the health of stock people and the productivity of stock occuing the buildings. the pathological effects of atmospheric ammonia and recommended limits for waste disposal are discussed.

Zebunnesa (1998) conducted a study on the performance of selected rural development programmes organized by BRAC in a selected area of Mymensinghdistrict. She worked in three BRAC programmes namely

poultry, daily and sericulture. On poultry programmes of the BRAC, she found that the average annual income per household was Tk. 23399.40 and poultry rearing constituted the major source of income representing 36.47 percent of total income.

Zhai (1995) conducted a potential utilization of poultry waste in the reclamation of surface mine soil. A laboratory study was used to determine faccal bacterial mortality during an 8 - week incubation in topsoil and sub-soil representative of reclaimed surface mines in western Kentucky, USA. Manure loading rates had no effect on mortality rates. Mortality rates were adequately described by a 2 - stage exponential decay model. Manure application to this sub-soil was not a greater threat to environmental quality, due to faccal bacteria survival in reclaimed mine soil, than surface application in the same environment.

It is clear from the above discussion that only a few studies were conducted on poultry marketing. But little or no systematic and comprehensive study was conducted on poultry marketing in Bangladesh. This inspires the researcher to conduct a study on the marketing and economic aspects of poultry farming in Bangladesh.

CHAPTER -IV

METHODS, MATERIALS USED AND DESCRIPTION OF THE STUDY AREA

The term "Poultry" is used to designate those species of birds which render and economic service reproduce freely under proper care. It includes chickens, turkey, ducks, geese, swans, pigeons, and ostriches and refers to them whether alive or dressed. The poultry industry is thus made up of three segments: eggs, chickens, and turkeys (Kohls and Uhl, 1985). But here, for the study purpose, the term "Poultry' means broiler, layer, local chicken, pegeon, and duck with commercially produced broiler and layer predominating. This study, however, describes the economic aspects of poultry farming – marketing patterns, performance and prospects of farm produced eggs and chickens in Bangladesh.

The Definition of Marketing Research

The Board of Directors of the American Marketing Association has approved the following as the new definition of marketing research:

"Marketing research is the function that links the consumer, customer, and public to the marketer through information- information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process" (Malhotra 2002).

Above definition suggests that marketing research can be of two types: problem identification research and problem solving research. Problem identification research is undertaken to help identify problems and opportunities that are not necessarily apparent on the surface. Problem solving research is undertaken to solve specific marketing problems. The present study is basically a problem identification research in nature as it explores the production and marketing characteristics of poultry products in Bangladesh.

The Definition of the Problem

Problem definition involves stating the general marketing research problem and identifying its components. Among the various process of defining the problem (such as interviews with experts, secondary data analysis etc.), this study applies the secondary data analysis technique in defining the problem. Secondary data on agricultural sector of Bangladesh indicates that the contribution of live stocks and poultry- a sub-sector of agriculture has been increasing in Bangladesh over the last decade, while the contribution of main agriculture to the GDP has been declining. This has motivated the researcher to pick up the research issue and therefore, a study has been conducted to investigate the marketing performance, problems and prospect of the poultry sub-sector in Bangladesh.

Approach to the Problem

Development of an approach to the problem includes formulating an objectives or theoretical framework, analytical models, research questions, hypotheses, and identifying characteristics or factors that can influence the research design (Malhotra 2002). In this study these have been developed as under:

65

Objective Evidence/Theoretical Framework

Objective evidence (evidence that is unbiased and supported by empirical findings) has been gathered by compiling relevant findings from secondary sources (discussed in literature review chapter (Chapter-III). Objective evidence obtained from secondary sources indicates a secular-increasing trend of poultry sector in Bangladesh. Variables selection which, formed the theoretical framework of the study, were identified from the past studies conducted mainly by the researchers of the BAU (Chapter-VII).

Analytical Model

An analytical model is a set of variables and their relationships designed to represent in whole or in part, some real system or process. Basically three types of models are used in marketing research. These are verbal model, graphical model, and mathematical model. Present study applies both verbal and mathematical model to describe the relationships of the variables. Mathematical model applied in this study has been the Cobb-Douglas production function. Calculating the coefficient of determination (R-square) and F-value has tested goodness of the fit of the model.

Research Questions

The research questions were developed on the basis of problem definition and theoretical framework. Five research questions were formulated for the study. These are:

(i)   What are the socio-economic characteristics of broiler and layer growers?

(ii) What is the marketing pattern of poultry farms?

(iii) How well poultry growers are performing their marketing activities?

(iv) What are the costs, returns and profitability of broiler and layer production?

(v) What factors contribute to the production processes of poultry products.

(vi) What are the major socio-economic and marketing problems facing by the broiler and layer farm owners?

Hypotheses of the Study

An important element in the methodology of a study is the development of a set of hypotheses describing the underlying aspects of the problem. The following null hypotheses were formulated and tested in the study:

a) The broiler and layer farming in the study areas are not profitable.

b) There is no significant difference in profit between the broiler poultry farm and layer poultry farm.

c) The contribution of the key variables to the production processes of broiler and layer poultry farms is negligible.

d) The marketing performance of poultry products is extremely inefficient

Research Design

Formulating the research design involves the following steps:

1. Sources of data analysis
2. Methods of data collection
3. Measurement and scaling
4. Questionnaire design
5. Sampling process and sample size and
6. Plan of data analysis (Malhotra 2002).

Sources, Methods, and Instruments of Data Collection

The study utilizes both primary and secondary data. Secondary data have been collected from such sources as Bangladesh Bureau of Statistics (BBS), economic survey of Bangladesh, world poultry statistics, published theses and research reports, conference reports of the poultry association of Bangladesh etc.

The quality and accuracy of the secondary data may raise some questions. Firstly, an inconsistency in data from different sources is observed. Secondly, within the same source a discrepancy is also witnessed. Thirdly, a wide gap is found between the Bangladeshi sources and international sources of data. And finally but not least, methodology used by the above sources is not free from criticisms. The findings of the study should therefore, be interpreted with due cautions.

Farm marketing management research by its very nature essentially involves primary data collected from the farmers. The type of primary data to be collected depends upon the nature of the study and its objectives. The present study was based on a field survey where primary data were collected from individual farmers. Survey method was chosen because it was thought to be more advantageous. But the investigator has to depend upon the memory of the respondents. To overcome this, repetitive visits were made in the study area and the questions were asked in such a manner that the farmers could answer from memory.

The steps followed in the present study were: selection of the study area, selection of the samples, periods of data collection, preparation of the survey schedule, collection of data, analytical techniques and methods of measuring cost items. These are discussed below.

Selection of the Study Area

For farm management study first of all researchers have to choose a study area. Selection of the study area is highly related with objective of the study. The selection of an area for farm management investigation depends on some factors: (i) what kind and quality of data is required; and (ii) overall environments of the area of which the expected respondents belonged to.

Selection of the Samples

In a farm marketing management study, information may be collected from every elements of population, but in this case a complete survey becomes costly and time consuming. For this reason, this researcher selected some representative samples from the population, which gave a representative picture of that population. In a sample survey, required information is collected from selected elements only. On the other hand, administration of field research, processing and analysis of data should be manageable within the limits imposed by physical, human and financial resources.

Considering these factors a sample size of 100 farms of which 57 broiler and 43 layer was chosen for the present study. Farms were categorized according to their farm sizes as below:

i. small farms raising around 1000 birds.

ii. medium farms raising 1001-1500 birds; and

iii. large farms raising above 1500 birds.

A stratified proportionate random sampling technique was followed in this study. In total 100 poultry farms were selected taking 33 from each of the selected categories. Of the total 100 poultry farms, 25 farms are

69

operating under the contract grower system with Aftab Bahumukhi Farm Limited (ABFL) situated on the village Bhagolpur. Distribution of sample farms is presented in the table below :

Table 1 : Distribution of Selected Sample Farms

Selected villages	Small farms		Medium farms		Large farms		Total No. of farms
	Broiler	Layer	Broiler	Layer	Broiler	Layer	
1. Agorpur	2	2	2	2	2	2	12
2. Baki Chandragram	2	2	2	2	2	2	12
3. Kamalpur	2	2	2	2	2	2	12
4. Bhagolpur	5	2	5	3	5	5	25
5. Purba Chandragram	3	2	3	1	2	2	13
6. Mirasbon	2	1	2	1	2	2	10
7. Madarshati	2	1	2	1	1	1	08
8. Maddha Bhagolpur	2	1	2	1	1	1	08
Total	20	13	20	13	17	17	100
Total	33		33		34		100

Period of Investigation

The period of investigation of this study covered a one-year beginning from January to December 2003. Formal data were collected during January to March 2003 through direct interviews with sample farmers.

Preparation of the Survey Questionnaire

To achieve the ultimate goal of a farm marketing study it is very significant to prepare an appropriate questionnaire related with the objectives of the study. To make an appropriate questionnaire a draft

questionnaire was prepared keeping in view that all-economic and socio-economic aspects could be included in the questionnaire. Before making it final the draft questionnaire was pre-tested by interviewing a few farmers in the non-study area. After pre-testing, a set of final questionnaire was developed with necessary corrections and modifications. The final questionnaire included the following items of information:

a)   Identification of the owners of the poultry farms.

b)   General information of the owners of the contract poultry farmers.

c)   Sources of income of farm families.

d)   Family size, education and occupation of the contract farmers.

e)   Cost of day - old chicks.

f)   Cost of feeds.

g)   Cost of human labour

h)   Veterinary services and medicine costs.

i)   Cost of equipment.

j)   Housing costs.

k)   Income from broilers.

l)   Marketing system

m)   Information about diseases; and

n)   Problems associated with the marketing of poultry farms faced by the owner of the farms.

Collection of Data

After preparing the final survey questionnaire, the primary data were collected from the selected poultry owners at farm level in a face to face interview by the researcher himself. Before asking the individual questions, each owner of poultry farm was explained in brief the aims and objectives of the present study. They were then convinced that the study was not harmful to them and it was purely academic exercise. At

71

the time of interview the researcher asked the questions systematically and explained the questions whenever it was found necessary. The questionnaires were filled in by the researcher himself according to the answer given by the owner of the poultry farms.

Problems Faced in Data Collection

During the period of data collection the following problems were encountered:

a) In most cases, the farmers thought that the objective of the researcher was not good. They were afraid of crop acreage restriction and land acquisition by the government. So, they initially hesitated to answer the questions about income and expenses. So, it was, necessary to convince the owners of the farm that the survey was not harmful to them.

b) To collect data through face to face interview a farmer answered most of the questions from their memory, because the farmers did not maintain any written record.

c) The owners of farms, on many occasions were not available for interview and in this case researcher had to give extra time to collect data.

This section presents a brief description of the study area. A knowledge of the study area is quite essential to understand the location, physical features and topography, soil, climate, temperature, rainfall, population, agricultural activities, education, economic condition, communication system, marketing facilities and other infrastructural activities available in the study area. These aspects are important as these have important

impact on farmers' level of living, socioeconomic environment in which they live and the nature and extent of their participation in national development programs. An effort has been made to focus briefly on some important features of the study area.

Bajitpur Thana (The Study Area): A Brief Account

Bajitpur thana, the fifth largest thana of Kishoregong district in respect of population, came in to existence in 1935. It is said that there lived a Royal Employee in this area during the Mughal period named Bajid Khan and is generally believed that the name of the thana might have originated from the name of that gentleman.

Area and Location

The thana occupies an area of 193.76 sq. km. including 10.83 sq.km. river area. Bajitpur thana under Kishoregong district is situated 20 km. to the east of the district town. It is located between 24 and 23-degree north latitudes and between 90 and 91-degree east longitudes. The thana is bounded on the north by Nikli thana, on the east by Austagram thana and Nasirnagar thana of Brahmanbaria district, on the south by Sarail, Kuliarchar and Bhairab thanas, on the west by Katiadi thana. The selected sample farmers were located in eight villages under Bajitpur Municipality and adjoining villages. These villages are situated around 0 to 6 km. south-west of the thana headquarters.

Physical Features and Topography

The study area belongs to old Brahmaputra alluvial soil and soil texture is clay and loam. The soil of the selected villages is fertile. The pH of the soil varies from 5.5-6.5. The land characteristics of the study area vary from medium high to low land.

Population Characteristics

The total population of the Bajitpur thana was 197081 persons out of which 99500 were males and 897581 were females (Bangladesh Population census 2001). Rural population was 174126 and urban population was 22955. The population density of the thana was 1017 persons per sq. km as against 729 persons for the district and 755 persons for the nation. About 33% of the total population belonged to ages less than 15 years, whereas 54% of the total population were eligible voters or above 18 years of age. The sex ratio was 102 males per 100 females. The population growth rate was 2.04%.

In the thana, there were 35051 households of which 30 were tribal households. Distribution of households by type shows that there were 98% dwelling units, .010% institutional units and the rest percentage other units. The average family size was slightly bigger i.e. 5.7 persons and for the urban area, the size was slightly smaller i.e. 5.3 persons.

The thana literacy rate was found to be 22.1 percent for both sexes: 27.8% for male and 16.4% for female. In urban area, it was 41.4% for both the sexes; 48.7% for male and 33.9% for female, which was higher as compared to the corresponding rates in rural area, which were 19.4% for the both sexes; 24.8% for male and 13.9% for female.

Climate, Temperature and Rainfall

There was no meteorological station in the Kishoregong district. As a result, the exact climate data were not known. It was expected that its climatic condition was similar to that of Mymensingh district. The Bangladesh Agricultural University (BAU) meteorological office keeps records of temperature, rainfall and humidity. The climate in the study area is more or less the same as that of the other parts of the district. It is learnt from the BAU study that maximum and minimum temperature in the study area ranged between 33.29 degree to 12.31 degree Celsius. Cold weather persisted from November to February and hot temperature prevailed during March to October. The average maximum temperature was the highest in June, which was 29 degree Celsius and average minimum temperature was recorded in January, which was 19 degree Celsius. The rainy season was generally found to begin from mid April and continued upto October. The average annual rainfall was about 2103 mm. The highest rainfall was observed in the month of July, which was 392 mm. and the lowest in January, February and December, which was 00 mm. The average humidity percentage of this area was 80.72 percent. The highest humidity percentage was recorded as 87.90 percent and the lowest was 68.55 in the month of August and March respectively.

Economic Condition

In Bajitpur thana, 53 percent households owned agricultural land but 47 percent did not own any agricultural land. It was found that 38 percent of the owners of agricultural land lived in the urban or semi-urban area. Agriculture was the main occupation of almost all the people of the

75

selected area. The farmers operated on a small-scale agriculture having access to modern inputs. In the thana 42 percent of the dwelling households depended on cultivation/ sharecropping as the main source of household income, 3 percent lived on livestock rearing, forestry and fishery, less than one percent on psiciculture and 19 percent on selling labour. Other subsidiary household income reportedly accrues from non-agricultural labour (4%), business (12%)and government and semi-government employees (5%). In urban area, main sources of income were business (24%), government and semi-government employees (21%), non-agricultural labour (3%), and agriculture (31%).

Road, communication, and Transports

These facilities play an important rule in agriculture as well as economic development of a country because communication facilities ensure easy supply of inputs and marketing of outputs. Feeder road development has therefore been a recognized strategy of development. The villages in the study area were found to have good communication facilities with the district town and the capital city. The thana town was connected with the district headquarters and the capital city. The thana town was connected with the district headquarters and the capital city by rail and bus road. The transport system was also good for the thana town. The main transport means were train, trucks, rickshaws, buses and boats.

Educational Institutions, Religion, Culture and Tradition

The majority of the villagers in the study area were Muslims (88%) and rest was Hindus (12%). The study area was found to have a good number of primary schools, high schools, madrasas, and colleges and

blessed with the Jaharul Islam Medical College and Hospital. Female education was generally confined up to the primary level. The villagers were found cooperative among themselves particularly in matters of social and religious functions.

In consideration of the above - mentioned factors 8 villages of Bajitpur Upazila of Kishoreganj district were selected considering concentration of broiler farms. It may be noted that broiler poultry rearing under contract farming system was firstly introduced by ABFL of Bajitpur Upazila in February 1994. Selected villages are : (i) Agorpur, (ii) Baki Chandragram, (iii) Kamalpur, (iv) Bhagolpur, (v) Purba Chandragram, (vi) Mirasbon, (vii) Madarshati, and (viii) Madda Bhagolpur.

Selection Criteria of the Study Area

The main criteria behind the selection of this area were:

i.   selected area is highly appropriate according to the objectives of the study.

ii.   concentration of different categories of contract growing broiler farms in these villages.

iii.   communication system to the selected area is good; and

i.   expected better co-operation from the owners of poultry farms, since the area is well known to the researcher.

CHAPTER- V

POULTRY MARKETING PATTERNS IN STUDY AREA

Socioeconomic Characteristics of the Sample Respondents

Introduction

This chapter presents a brief description of the socio-economic characteristics of the poultry farmers. Decision making behavior of an individual is determined to a large extent by the individual's socio-economic settings. Therefore, socio-economic characteristics of the poultry farmers affect their enterprise combination, consumption pattern and pattern of technology use (Alam, 1999). Socio-economic aspects of the poultry farmers can be looked upon from different angles depending upon a number of variables related to their pattern of living, physical environment in which they live, the nature and extent of their participation in the national development programme (Ali, 1993). The socio-economic characteristics of the owners of the selected poultry farms considered in this study are the composition of their age, literacy level, farm size, family size, income level etc. A brief discussion of some of the socio-economic characteristics of the sample farmers are presented below in this chapter.

Age

Age of the consumers ranged from 16 to 75 years. The consumers were grouped into 3 ages viz. young, middle age and old age which are presented in Table 1. It is evident from the Table that 21 percent of the respondent were young. Most of the respondents (49%) were found to be middle aged. The rest 30% was old aged.

Table 1: Distribution of consumers according to age groups

Age groups/year	Consumers		Mean
	No	Percent	
Young (up to 25)	21	21	
Middle (26 - 50)	49	49	40.12
Old (51 and above)	30	30	
Total	100	100	

Literacy status of consumers

Level of education is an important indicator for consumption. It makes a man more conscious about nutrition. The selected consumers were grouped into four categories according to their level of education such as illiterate, S.S.C. H.S.C. and graduate and above. The level of education of the sample consumers is shown in the Table 2.

Table 2: Distribution of the consumers by level of education

Education Level	Consumers		Mean (Literacy)
	No	Percent	
Illiterate	31	31	
S.S.C.	28	28	
H.S.C.	12	12	69
Graduated & above	29	29	
Total:	100	100	

It is evident from Table 2 that out of 100 consumers, 31 percent were illiterate. About 28%, 12% and 29% of the consumer were in the level of S.S.C., H.S.C. and graduate and above level respectively. The mean literacy rate in the study area was 69%.

Farm size

The farm size of the consumer ranged from 0 to 12 acres with an average of 2.27 acres of land. Analysis of the data reveal that 24% of the consumers were land-less, 18% marginal, 33% small, 17% medium and 8% of consumers large farmers (Table 3). The average farm size (2.27) of the farmers were more than national average farm size (1.5) (BBS, 1998).

Table 3: Distribution of consumers according to farm size

Particulars/acres	Consumers		Mean
	No	Percent	
Land less (upto 0.5)	24	24	
Marginal (0.5-.99)	18	18	
Small (1.00 - 2.4)	33	3	2.27
Medium (2.50 - 7.49)	17	17	
Large (7.5 acre and above)	8	8	
Total:	100	100	

Family size

Family size of the consumers in the study area ranged 2 - 10 with an average of 4.42 persons. On the basis of family size, the consumers were classified in to 4 categories such as small, medium, large-medium and big families (Table 4). As shown in the table 4, majority (50%) of the consumers belong to small size family, 31% medium sized family, 17% medium-large sized family and only 2% was big sized family. The result reveals that about half of the family was small size family. The average family size(4.42) of the respondents was lower than the national average of 5.5 (BBS, 1998). This may be due to the impact of family planning activities by the government.

80

Table 4: Distribution of farmers according to their family size

Particulars/Persons	Consumers		Mean
	No.	Percent	
Small (2 to 4)	50	50	
Medium (5 - 6)	31	31	4.42
Large-medium (7 - 8)	17	17	
Big (9 to 10)	2	2	
Total:	100	100	

Income Level

The income level of the consumers is an important factor of poultry consumption The income of the consumers was calculated on the basis of his / her including his / her family members' income earned from different sources annually. It was expressed in Taka. It was ranged from Tk. 5,000 to TK. 1,95,000 with an average of TK. 65,500 which is presented in Table 5.

Table 5: Distribution of the consumers by annual income level

Particulars/TK.	Respondents		Mean	Per capita annual income
Low income (upto 50,000)	37	37		
Medium income (50,000 - 1,00,000)	51	51	65,500	14,819.00
High income (1,00,000 and above)	12	12		
Total:	100	100		

The consumers were classified in to 3 categories according to their annual income. The consumers were categorized as low, medium and high-income level. The numbers of consumers under different categories are 37%, 51% and 12% respectively. Analysis of data indicates that the average per capita annual income of the consumers was Tk. 14,819.00. It was higher than the national average of Tk. 13,655 (BBS, 2002).

Effect of Consumer's Characteristics on Consumption

Relationship between consumption of poultry products and age of the consumers

Table 6 shows the relationship between age group with the consumption pattern of the consumers. According to the table, young consumed 0.64 kg of poultry meat and 4.9 no. of eggs per month and medium aged consumers ate 0.39 kg of poultry meat and 5.3 no. of eggs per month. The old group consumed 0.44 kg of poultry meat and 4.2 no.

of eggs per month. The result indicates that consumption of poultry and poultry products were not related with the age. Khanum (1997) also obtained the similar results.

Table 6 : Relationship between consumption of poultry products and age groups

Age group/year	Consumers		Average consumption of poultry/kg/month	Average consumption of egg/no. /month
	No.	Percent		
Young	21	21	0.64	4.9
Middle	49	49	0.39	5.3
Old age	30	30	0.44	4.2
Total	100	100		

Relationship between consumption of poultry products and level of education

Table 7 describes the Relationship between consumption of poultry products with level of education of the sample farmers or consumers. It shows that illiterate consumers consumed 0.42 kg of poultry meat and 4 pcs of eggs per month. The highest quantity (0.63 kg per month) of poultry meat and number of eggs (5 pcs per month) were consumed by the consumers of graduate and above level The result indicates that consumers' level of education is not directly related to the consumption of poultry products as was explained by Khanum (1997) in her works.

Table 7:   Relationship between consumption of poultry product and education level

Level of education	Average consumption of poultry (kg/ month)	Average consumption of egg (no. / month)
Illiterate	0.42	4.0
S.S.C.	0.54	4.2
H.S.C.	0.47	3.4
Graduate & above	0.63	5.0

Relationship between consumption of poultry products and family size

Table 8 shows the relationship of consumption of poultry products with the size of the family. Small sized family consumed 0.67 kg of poultry meat and 4.0 no. of egg per month. Medium sized family consumed 0.71 kg of poultry meat and 3.5 no. of eggs per month and big family consumed 0.80 kg of poultry and 6.6 no. of eggs per month. The data indicates that the consumption of poultry and poultry product did not relate with family size. Khanum (1997) also got the similar results. She stated that there was no relation between consumption of poultry products with family size.

Table 8: Relationship between consumption of poultry product and family size.

Category/persons	Average consumption of poultry (kg/ month)	Average consumption of egg (no. / month)
Small (2 - 4)	0.67	4.0
Medium (5-6)	0.40	3.1
Large-medium (7-6)	0.71	3.5
Big (9-10)	0.80	6.6

Relationship between consumption of poultry products and farm size

Table 9 depicts the relation of farm size with poultry products consumption. The consumers belonging land-less group ate 0.32 kg poultry and 3.0 no. of eggs per month followed by marginal (0.43 kg of poultry and 4.2 no. of egg. Per month small (0.53 kg of poultry and 5.3 no. of eggs per month) and large (0.71 kg of poultry and 7.0 no. of eggs per month). The data indicates that consumption of poultry increased with enlargement of farm size. This result agreed well with the observation of Khanum (1997). She reported that farm size of consumers had a significant effect in favour of the attitude towards the consumption of poultry products.

85

Table 9:   Relationship between consumption of poultry products and farm size

Category/acres	Average consumption of poultry (kg / month)	Average consumption of egg (no. / month)
Land-less (up to 0.5)	0.32	3.0
Marginal (0.51 - 99)	0.43	4.2
Small (1.00 – 2.4)	0.53	5.3
Medium (2.50 – 7.49)	0.70	6.4
Large (7.5 and above)	0.71	7.0

Relationship between consumption of poultry products and consumer's income level

The relationships between poultry consumption and consumers income level are presented in the Table 10. The consumer with income level up to Tk. 50,000 consumed 0.40 kg of poultry and 3.3 no. of eggs per month, those whose income level Tk. 50,000 to Tk. 1,00,000 consumed 0.55 kg of poultry and 5.5 no. of eggs per month and consumers with of income level of Tk. 1,00,000 and above consumed 0.72 kg of poultry and 6.7 no. of egg per month. The table 10 indicated that level of consumption of poultry and its products increased with the increased level of income. Alam (1999) obtained the similar results. He reported that income and consumption of broiler are positively related.

Table 10: Relationship between consumption of poultry products and consumer's income level

Income level of consumers (Tk.)	Average consumption of poultry (kg / month)	Average consumption of egg (no. / month)
Low income (upto 50,000)	0.40	3.3
Medium income (50,000 – 1,000.00)	0.55	5.5
High income (1,00,000 and above)	0.72	6.7

Extent of consumption of poultry meat and egg

Attempt was made to find out the extent of consumption of poultry and poultry products by the respondents. The table 11 indicates the extent of consumption of poultry and poultry products. It shows that 20.52% of the respondents ate meat forth times in a year. About 18.54%, 15.89%, 12.25%, and 8.27% of the consumers ate poultry meat once in a month, twice in a year, once in a year, once in a week respectively in the study area. Equal percent (11.25%) of the consumers ate poultry meat twice in a week and once in every fortnight. Very few (1.98%) of the consumers ate poultry meat in every alternative day. There was none that ate poultry meat every day.

Among the types, majority (28.47%) of the respondents consumed local chicken followed by broiler (25.40%), duck (23.50%) and pigeon (22.51%). Results revealed that that local chicken meat was preferred by the majority of the consumer than that of duck, broiler and quail. Regarding consumption of egg it was found that majority (26.01%) of the respondents ate egg every day followed by twice in a week (22.76%), every alternative day (22.35%) once in a every fortnight (8.53), once in a month (7.31%), twice in a year (3.25%), once in every 3 months (3.25%) and once in a year (2.8%).

Table 11 : Extent of consumption of poultry products

Unit of Consumption Time	Percentage of Consumers for Broiler	Percentage of Consumers for eggs
1. Everyday	00.00	26.01
2. Every alternative day	00.00	22.75
3. Every week	8.27	22.76
4. Every fortnight	16.53	11.87
5. Every month	20.54	7.31
6. Every three months	26.52	3.25
7. Every six months	15.89	3.25
8. Every year	12.25	2.80

For average type of egg, it is found that majority (35.77%) of the consumers ate local chicken eggs followed by farm chicken egg (34.14%) and duck egg (30.08%). It is also revealed that local chicken eggs and farm chicken eggs consumption is almost same. This may be due to recent growth of layer farms as well as the high availability of farm chicken eggs across the country (Hossain, 1999).

Consumers choice indices

The consumers' choice indices (CCI) of poultry meat indicate that 34.25 percent of the consumers showed most choice and 28.50 percent medium choice on poultry meat. Among the rest of the consumers 14.75 percent showed low choice and 18.75 percent no choice. Only 3.75% consumers opined in favour of unknown about the consumption of the poultry meat. The table 12 depicts the CCI of poultry meat.

Among the meat of different poultry birds the CCI indicates that local chicken meat were chosen mostly by highest number (18.75%) of the consumers, followed by pegion (11.25%), broiler (2.50%) and duck (1.75%). Table 12 also shows that amongst the poultry meat, duck meat

was disliked by the highest proportion (8.75) of consumers. Broiler meat, pigeon meat and local chicken meat were disliked by 8.75%, 1.3% and 1.5% of the selected consumers respectively. The table showed that only 3.75 percent of the consumers were unknown about the meat of broiler as food.

As regards consumers' choice indices on poultry egg, it was found that 37.33 percent of the consumers had high choice and 25.33 percent had medium choice. Among the rest 23.66% and 16% of the consumers had no choice and low choice on poultry egg. Only 1% of the consumers was unknown about the poultry egg. Amongst the egg of different poultry birds the CCI indicate that local chicken egg were chosen by highest number (31.93%) of the consumers followed by duck (24.33%) and farm chicken (22.33%). The CCI also indicate that 1-% consumers were unknown about the eggs of farm chicken. Regarding high choice on different poultry egg local chicken eggs were chosen by highest percent (24.06%) of the consumers. 7.33% and 5.33% of the consumers chose farm chicken eggs and duck eggs respectively. 12.33% of the consumers showed no choice on duck eggs followed by 10% and 1.33% on farm chicken eggs and local chicken eggs.

Table 12: Distribution of the consumers according to their choice indices of poultry and poultry products

Products	Extent of choice					Total
	High	Medium	Low	No	Unknown	
a) Meat :						
local chicken	75 (18.75)	11 (2.75)	8 (2.0)	6 (1.5)	--	100
Broiler	10 (2.50)	35 (8.75)	12 (3.0)	28 (7.0)	15 (3.75)	100
Duck	7 (1.75)	34 (8.50)	24 (6.0)	35 (8.75)	--	100
Total :	**137 (34.25)**	**114 (28.50)**	**59 (14.75)**	**75 (18.75)**	**15 (3.75)**	**400**
b) Egg :						
local chicken	76 (24.66)	13 (4.33)	9 (3.0)	4 (1.33)	--	100
Farm chicken	22 (7.33)	24 (8.0)	21 (7.0)	30 (10.00)	3 (1.00)	100
Duck	16 (5.33)	39 (13.00)	18 (6.0)	37 (12.33)	--	100
Total :	**112 (37.33)**	**76 (25.33)**	**48 (16.0)**	**71 (23.66)**	**3 (1.00)**	**300**

Note: Parentheses indicate percentages

The above findings indicate that the meat and eggs of local chicken have been chosen by most of the consumers than those of improved ones. This might be due to the lack of knowledge of the consumers about nutritive value of meat and eggs of other poultry birds. Khanum (1997) obtained the similar results.

Causes of liking and disliking of poultry products

Causes of choice of poultry meat

The reasons of choosing different poultry meat by the consumers are different. Consumers choose the local chicken meat for its better test followed by better nutrition, prolong habit, etc. Moen (1989) reported that local chicken was not only the most frequently purchased fresh meat product but also compared favorable to all meat items (beef, steak beef, roast, ground beef, pig meat turkey and lamb) for test and quality.

Table 13:   Causes of choice of poultry meat

Cause of choice	Desi chicken	Farm chicken	Duck	Pegion	Total
Big size	--	--	16	--	16
Non-allergic	6	--	--	2	8
Prolong habit	55	--	31	35	93
Better nutrition	63	21	23	64	181
Low cost	16.	41	60	--	117
Present of more protein than vegetable origin	27	4	18	52	101
Better test	80	10	33	87	220
Availability	85	44	--	24	153
Fatty	3	--	20	41	64
Adult bird	4	--	37	--	41
Young bird	--	16	--	53	69
Fatless	6	--	--	--	6
Softness	--	19	--	21	40

Due to availability of broiler in the urban area most of the consumers consume broiler and farm chicken egg and in the rural area local chicken are consumed by the most of the consumers as they produced and also available in those area. So, availability is a factor for consumption of poultry products. Price is an important factor in this case. Because of low price most of the respondent choice farm chicken. Lasely and Jones (1988) found the similar result. They reported that Americans were eating more broilers than other meat because of low real price and preference for lean meat.

Causes of choice of egg

Most of the consumers prefer local chicken egg for it's better test. In the urban area most of the respondents consume farm egg due to availability. In the rural area most of the respondent consume local chicken eggs and duck eggs. Its reason is that they produced them and available in the local market. About half of the respondent choose eggs from local chicken due to yellow yolk; though there is no nutritional difference between yellow and white yolk. Raha (1995) reported that local chicken egg was preferred by the 47% of the respondent.

92

Table 14:   Causes of choice of egg

Causes	Desi chicken	Farm chicken	Duck	Total
Big size	--	51	32	83
Non-allergic	18	14	--	32
Less spoiled	1	--	31	32
Prolong habit	40	21	--	61
Better nutrition	70	17	27	114
Low cost	44	12	31	87
Present of more animal protein than plant origin	6	8	7	17
Better test	83	29	19	131
Availability	48	44	31	123
Yellow yolk	53	--	23	76

From the table 14 it can be concluded that the criteria for preference of local chicken and egg was not based on scientific argument. Raha (1995) found the similar result. He showed that the criteria for preference of local chicken and egg were not based on scientific argument.

Causes of disliking of meat   401371

Table 15 identifies the reasons for disliking of poultry and poultry products. Consumer did not like poultry and poultry product for unavailability followed by higher cost, cannot eat, medical reasons etc. Islam (1995) reported that 14.28 percent did not eat poultry meat mainly because they did not like the tastes and 50% of the respondents preferred poultry meat for regions of taste and health.

93
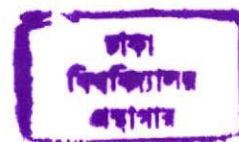
Table 15: Causes of disliking of poultry meat

Causes	Desi chicken	Farm chicken	Duck	Pegion	Total
Small size	--	--	--	7	7
Allergic creation	--	--	49	--	49
Religious sensation	4	16	13	--	33
More cholesterol	--	--	50	28	78
Offensive smell	2	39	41	--	82
Cannot eat	21	64	38	4	127
Higher cost	39	35	--	67	141
Aesthetic sense	8	2	30	8	48
Medical reason	2	29	65	--	108
Not available	33	27	41	58	159
Not test	4	64	7	2	77
Difficult to cook	--	20	60	--	80
Unknown	--	51	--	--	51

Causes of disliking of egg

The Table 16 presents data regarding the causes of disliking for eggs. From this table it was understood that availability is an important factor. Most of the respondent did not like farm egg because they cannot eat. In case of duck egg, about half of the respondent reported that they did not like it because it creates allergic reaction. Information of table 16 shows that some respondents had poor choice on poultry products. Islam (1995) observed that 14.28 percent did not eat poultry egg mainly because they did not like the taste.

94

Table 16: Causes of disliking of egg

Causes	Desi chicken	Farm chicken	Duck	Total
Small size	53	--	--	53
Allergic creation	--	--	51	51
Spoiled	44	13	--	57
More cholesterol	3	--	12	15
Offensive smell	2	41	12	54
Cannot eat	13	26	7	80
Medical reason	2	18	51	73
Not available	41	30	47	118
White albumen	--	30	2	32
Not test	3	44	4	51
Yolk color	--	33	--	33
Watery	--	48	--	48
Unknown	--	73	--	73

Consumer's Expected Market Price

Consumer's expected market price for each kg of live broiler

The consumer's expected market price for each kg of live broiler ranged from Tk. 41 to Tk. 75 with an average of Tk. 53.8 (Table 17). The information of the table indicates that the highest portion (33 percent) of the consumers expected the price of each kg of broiler Tk. 51 to Tk. 55.

95

And lowest portion (3 percent) of the consumers expected the price of each kg of broiler between Tk. 71 to Tk. 75.

Table 17: Consumer's expected market price for live broiler

Price (Tk. / kg)	Consumer's		Mean
	Number	Percent	
41 - 45	13	13	
46 - 50	21	21	
51 - 55	33	33	
56 - 60	15	15	53.8
61 - 65	9	9	
66 - 70	6	6	
71 - 75	3	3	
Total:	100	100	

Consumer's expected market price for local chicken

Table 18 indicates the consumer's expected market price for each kg of local chicken. It was ranged from Tk. 61 to Tk. 95. The average price was Tk. 80 for each kg of local chicken. The lowest portion (4 percent) of consumer expected the price of local chicken from Tk. 91 to Tk. 95 and the highest portion (31 percent) of the consumers expected the price of each kg of local chicken between Tk. 81 to Tk. 85.

96

Table 18: Consumer's expected market price for local chicken

Price (Tk. / kg)	Consumer's		Mean
	Number	Percent	
61 - 65	4	4	
66 - 70	7	7	
71 - 75	12	12	
76 - 80	24	24	
81 - 85	31	31	80.00
86 - 90	19	19	
91 - 95	3	3	
Total:	· 100	100	

Consumers expected market price for duck

Table 19 shows the information of consumer's expected market price for each kg of duck, which is ranged, from Tk. 36 to Tk. 65 with an average of Tk. 48.70. It was observed that highest portion (35%) of consumers expected market price for duck ranged from Tk. 46 to Tk. 50.

Table 19: Consumers expected market price for duck

Price (Tk. / kg)	Consumer's		Mean
	Number	Percent	
36 - 40	6	6	
41 - 45	24	24	
46 - 50	35	35	48.70
51 - 55	23	23	
56 - 60	9	9	
61 - 65	3	3	
Total :	100	100	

Consumer's expected market price for pigeon

Table 20 depicts the consumer expected market price for pigeon. The market price for each kg of pigeon was ranged from Tk. 66 to Tk. 100. The average price for each kg of pigeon was Tk. 84.60. The highest portion (22 percent) of the consumers expected the market price of pigeon between Tk. 86 to Tk. 90 and lowest portion (7 percent) expected that between Tk. 66 to Tk. 70.

Table 20: Consumer's expected market price for pigeon

Price (Tk. / kg)	Consumer's		Mean
	Number	Percent	
66 – 70	7	7	
71 - 75	12	12	
76 - 80	14	14	
81 - 85	17	17	84.60
86 - 90	22	22	
91 - 95	15	15	
96 - 100	13	13	
Total :	100	100	

Consumer's expected market price for egg

The consumer's expected market price for each hali (4 no.) of eggs ranged from Tk. 7 to Tk. 12 with an average of Tk. 8.78. The table shows that 56 percent of the consumers expected the price of egg Tk. 7 - 8, 24% consumers expected the price of egg between Tk. 9 to 10 and 20 percent consumers expected the price of egg from Tk. 11 to 12. The highest percent (56%) of the consumers expected the market price of each hali (4-no.) eggs between Tk. 7 to Tk. 8. Table 21 vividly presents the fact regarding consumer's expected market price of eggs.

98

Table 21: Consumers expected market price for egg

Price (Tk. / kg)	Consumer's		Mean
	Number	Percent	
7 - 8	56	56	
9 - 10	24	24	8.78
11 - 12	20	20	
Total :	100	100	

Starting period of consumption of commercial poultry products

Starting period of consumption of broilers

The information on the period of starting consumption of broilers is presented in the table 22. The table shows that only 2 percent consumers started eating broilers before 1991 in the study area. The consumers of broiler accounted for 81 percent in 2003. The data indicate that consumption of broilers is increasing in a linear fashion with the advancement of time. It was however also observed that 19 percent of the selected consumer did not eat broilers.

Table 22: Period of starting consumption of broilers

Year	Consumers		Cumulative Frequency
	Number	Percent	
Before 1991	2	2	2
1991 - 1993	3	3	5
1993 - 1995	12	12	17
1995 - 1997	18	18	35
1997 - 1999	21	21	56
1999 - 2003	25	25	81
Not consuming	19	19	
Total :	100	100	

Starting period of consumption of farm chicken egg

The starting periods of consumption of farm chicken egg are shown in the table 23. The table depicts that before 1991 only 3 percent consumers ate farm chicken egg whereas in 2003, it raised to 85 percent, indicating the demand for farm chicken egg is increasing day by day. There were also 15 percent consumers who did not eat farm chicken egg.

Table 23: Period of starting consumption of farm chicken egg

Year	Consumers Number	Cumulative Frequency
Before 1991	3	3
1991 - 1993	4	7
1993 - 1995	13	20
1995 - 1997	17	37
1997 - 1999	22	59
1999 - 2003	26	85
Not consuming	15	
Total :	**100**	**100**

Consumer's preference to live and dressed broiler

According to preference to live and dressed broilers, the consumers were classified into 3 categories. These were live, dressed and both preference groups. The data of the table 24 depicts that 81 percent of the consumers preferred live broiler followed by 2 percent both and 1

percent dressed. 16 percent of the consumers did not give any comment on broiler choice. Most of the consumers preferred live broilers due to religious sensation (e.g. proper slaughtering, freshness, environment in the period of dressing etc.). Alam (1999) supported this finding. He reported that most of the consumers (80 percent) preferred live broiler due to religious reasons.

Table 24: Consumer's preference to live and dressed broiler

Category	Consumers	
	Number	Percent
Live broilers	81	81
Dressed broilers	1	1
Both	2	2
No comments	16	16
Total :	100	100

Overall Broiler Marketing System

A marketing system includes all the activities involved in the flow of goods from the point of identifying customers' needs and wants to reach them to the consumers. It also includes the exchange activities associated with transferring properly right to commodities, physically purchasing and allocating, disseminating information to facilitating these activities.

Marketing channels of broilers

Marketing channels may be defined as the chain of some middlemen through which the transaction of commodity takes place from production to the ultimate consumer. The marketing channels of broilers as found in the study area are shown below.

Figure 1:   Marketing channels of live broiler.

Channel I: Farmer →wholesaler-cum-retailer → Retailer → Consumer

Channel II: Farmer → Wholesaler-cum-retailer → Consumer

Channel III: Farmer → Retailer → Consumer

Channel IV: Farmer → Consumer

During the study period, it was found that most of the retailers buy broilers directly from producers and sells to the consumers. They purchase both on cash payment or credit. Very few retailers were found who sell their own produced broilers.

Transportation of broilers

Adequate and efficient transportation is a corner stone of modern marketing system (Kohls and Uhl, 1985). In order to conduct a profitable business a good transportation system is essential.

In the study area, different kinds of transportation are used. Use of particular kind of transport mainly depends on the location of the supply centre and the availability of the transport. In this area the

102

broiler traders mainly used van to carry their broilers. Other vehicle such as pick-up, tempo, rickshaw are used for broiler transport. It was found that the retailers used to buy broiler through the use of van (96%), tempo (3%) and rickshaw (1%). The wholesaler-cum-retailers used contract system with the Dhaka market. The wholesaler of Dhaka used truck or pickup to carry their broiler.

Monthly average price of the live broiler

Table 26 shows the extent of price changes of broiler in different months of the year 2003. It varied between Tk. 54 to Tk. 68 with an average of Tk. 62.67. The price of broiler was highest (Tk. 68 kg) between April to June and the lowest price (Tk. 54 / kg) was in the month of October.

Table 25: Monthly market price for each kg of live broiler in Mymensingh town

Month	Retail price (Tk. /kg)	Mean
January	62	14.87
February	62	
March	64	
April	68	
May	68	
June	68	
July	64	62.67
August	60	
September	58	
October	56	
November	60	
December	62	

Marketing cost and margins

Marketing cost and margin are essential for people (farmers, traders and consumers) involve in performing marketing functions. Again a study of marketing cost and margin has a great significance because, by referring to the marketing cost and margin, one can judge whether or not the services of the intermediaries are provided at rates (Shidhu 1990). The study shows that the total marketing cost for 100 birds estimated at Tk. 419.23. They incurred some cost on items like transportation cost, shop rent, damages, wages and salaries. Feed cost was the highest (27.54%) among the cost items of the retailers. The lowest cost item was the cost on cage.

Marketing of local poultry products

Native poultry are those which are raised in this country for long time usually in scavenging or backyard farming system. They are raised either in small households or in farms either for eggs and meat. Cocks, cockerels and spent hens (hens after laying) are used for meat purpose. Farmers sold them in village market. The middlemen usually collect them from various points in villages. Eggs are collected by small vendors in the villages by going door to door and then brought them to town for sale. They used basket to carry their eggs. About 80% of all eggs produced in the country are brought in the urban markets (Latif, 2001).

Marketing Problems of Poultry Products in the study area

In the existing socio-economic conditions of Bangladesh there are various problems of poultry marketing, which are faced by poultry farmers. These include:

High transportation cost

A good transport system is essential for trading agricultural product. Due to poor transport system the transport cost is high in the study area. About 80%-selected traders reported that it is a great problem for marketing poultry.

Inadequate marketing facilities

The marketing facilities such as specific market place in the study area were not sufficient. Again the rent of the shop was comparatively high and the shops were not wide enough. About 82% traders reported this problem.

Lack of market information

Market information help the traders to make their decision regarding the purchase sales and the price of product. The sample traders could not collect information about poultry marketing from reliable sources. About 75% traders reported it's as a problem.

Lower market price

In the study area about 85% of the selected traders complained that the price of broiler was low due to less taste of broiler meat. Sometimes unfavorable weather reduced price of poultry.

Unfavorable condition

During the strike period the traders could not transport their poultry and due to this the price fall immediately.

Shortage of birds

About 66% of the selected traders reported that sometimes the market demand is high but the availability of poultry bird is low. Then they had to pay higherprice to the produce.

CHAPTER-VI

COSTS, RETURNS AND MARGINS OF RAISING POULTRY

The aim of this chapter is to estimate the costs, returns and profitability of raising broiler and layer poultry. Because cost, return and profitability will justify the performance and viability of poultry farming. Therefore, attempts have been made to estimate poultry raising cost as well as return and thereby finding out profitability of poultry business. The item of costs involved day-old-chicks, feed, labor, veterinary services and medicine, electricity, tools and equipment, housing, interest on operating capital. The total costs of the enterprise were categorised into two broad heads - variable costs and fixed costs. Variable costs are those costs which vary with regard to the level of output but fixed costs do not change with the level of output or production particularly for the short run. Variables costs items included feed cost, DOC cost, veterinary services and medicine cost, electricity cost etc. On the other hand, fixed costs were housing cost, tools and equipment cost, interest on capital cost etc. On the return side, gross return, net return, return per bird, return per layer and broiler farm were calculated.

Estimation Procedure of Costs and Returns

The procedure used to estimate the cost of production, returns of the different types of poultry farms and marketing cost and margins of live birds and eggs is given below.

The total cost of poultry enterprises is categorised into two broad heads : variable cost and fixed cost.

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i. **Variable Cost:** It included cost of bird, feed, hired labour, medicine, transportation and marketing, electricity and miscellaneous items;

ii. **Fixed Cost:** It included family labour, depreciation of tools and equipment, interest on land value and interest on working capital.

iii. **Cost Per Bird:** Total cost of production (VC+FC) was divided by the total number of birds in a batch to determine the cost per bird in the flock.

iv. **Cost Per Egg:** Cost of egg production included cost of feed, labour, medicine, transportation, electricity, depreciation of fixed assets, rent on land and interest on working capital incurred for rearing layer. The total of the above costs was divided by the number of eggs produced to determine the cost per egg in the flock.

v. **Returns:** Gross return of poultry farms included sale of eggs and birds, value of consumption of eggs and bird etc. in the reference year. Net return was determined by the margin over the variable and fixed costs.

Cost of Raising Poultry

The details regarding the annual cost of operating the three types of broiler and layer poultry farms during the year 2003 are presented in Tables 1, 2, 3, 4, 5, 6, 7 and 8. The cost consisted of variable costs and fixed costs. Total costs of raising broiler per farm per year were estimated at Tk. 2,38,501.00 for small farms, Tk. 5,25,095.00 for medium farms, Tk. 14,20,630.00 for large farms, and Tk. 6,63,943.00 for all farms (Tables 1, 2, 3 and 4). Total cost per 100 birds per year for the broiler farms was estimated at Tk. 57,639.00, Tk. 60565.00, Tk. 64,574.00 and Tk. 62,401.00 respectively for small, medium, large and all farms. Total costs per bird per year for small, medium, large and all broiler farms were Tk 576, Tk 606, Tk 646 and Tk 624 respectively (Tables 1, 2, 3 and 4). Large broiler farmers obviously used higher total cost than small and medium broiler farmers. For layer farms, total costs per farm per year were Tk 215255 for small farms, Tk 432179 for medium farms, Tk 1192688 for large farms and Tk 535129 for all farms (Tables 5, 6, 7 and 8). Total costs per 100 birds per year for small, medium, large and all layer farms were Tk 62033, Tk 53028, Tk 47918 and Tk 51604 respectively. Total costs of raising layer per bird per year were estimated at Tk 620 for small farms, Tk 530 for medium farms, Tk 479 for large farms and Tk 516 for all farms (Tables 5, 6, 7 and 8). Small layer farmers incurred much higher total cost than medium and large layer farmers. It was observed that per farm per year total cost was comparatively higher for broiler than for layer farms.

It was found that the variable cost accounted for the major part of the total cost. Variable costs per farm per year for small, medium, large and all broiler farms were Tk 200970, Tk 453660, Tk 1224077 and Tk 570207

109

respectively. For layer farms, the corresponding costs were Tk 1822-57, Tk 368269, Tk 1041835 and Tk 460998 respectively. Total fixed costs per farm per year amounted to Tk 37081, Tk 71435, Tk 196553 and Tk 93736 for small, medium, large and all broiler farms respectively. For layer farms, total fixed costs per farm per year amounted to Tk 32998, Tk 63910, Tk 150853 and Tk 74131 respectively for small, medium, large and all farms (Tables 1, 2, 3, 4, 5, 6, 7 and 8). The item wise costs of raising broiler and layer are presented below.

Feed Cost

Feed cost was the largest cost item for both broiler and layer farms. Cost of feed 'included ready made feed (which included rice bran, wheat bran, fish meal, oil cake, oyster shell, soybean, salt, vitamins, D.L. Methonin, mineral, premix etc.). Little home supplied feeds were used. The purchased feeds were valued according to the average prices actually paid by the broiler and layer farmers.

In this study, total feed costs per farm per year for the broiler farms were estimated at Tk 106996, Tk 229057, Tk. 682242 and Tk 306530 respectively for small, medium, large and all farms; representing 44.95, 43.62, 48.02 and 46.17 percent respectively of the total costs (Tables 1, 2, 3 and 4). Large broiler farmers obviously incurred much higher feed cost than small and medium broiler farmers. On the other hand, total feed costs per farm per year for small, medium, large and all layer farms were estimated at Tk 167025, Tk 332301, Tk 941031 and Tk 417406 respectively, accounting for 77.59, 76.89, 78.90 and 78.00 percent respectively of the total costs (Tables 5, 6, 7 and 8). It is clear that per farm per year feed cost was comparatively higher for layer than for broiler farms.

Labour Cost

In order of importance, labour cost came next to feed cost. Labour was mainly used for feeding, cleaning of house, collecting eggs, medical care, purchasing and selling birds and eggs, etc. In calculating labour cost, both hired and family labour was taken into consideration. Family labour included the farm operator himself and other family members of the farm family for which no cash payment was made; and hired labour was casual labour employed on daily, monthly or yearly contract basis, for which the owner had to pay wages in cash and/or in kind. It may be noted here that one man-day was considered equivalent to 8 hours.

Total labour costs per farm per year for the broiler farms were estimated at Tk 23340, Tk 51330, Tk 97020 and Tk 54780 respectively for small, medium, large and all farms; representing 9.80, 9.78, 6.83 and 8.25 percent respectively of the total costs (Tables 1, 2, 3 and 4). Small and medium broiler farmers obviously incurred much higher labour cost than large broiler farmers did. Total labour costs per farm per year for small, medium, large and, all layer farms were estimated at Tk 13862, Tk 26160, Tk 74989, and Tk 32981 respectively, accounting for 6.44, 6.05, 6.29 and 6.17 percent respectively for the total costs (Tables 5, 6, 7 and 8). Small layer farmers incurred much higher labour cost than medium and large layer farmers. The cash expenses per farm per year for small, medium, large and all broiler farms, were Tk 9720, Tk 31978. Tk 72240 and Tk 35640 respectively; representing 4.08, 6.09, 5.09 and 537 percent respectively of the total costs (Tables 1, 2, 3.and 4). The cash expenses per farm per year for small, medium, large and all layer farms were Tk 6148, Tk 13140, Tk 46020 and Tk 18172 respectively, representing 2.86,

111

3.04, 3.86 and 3.40 percent respectively of the total costs (Tables 5, 6, 7 and 8). It is clear that per farm per year labour cost was comparatively much higher for broiler than for layer farms.

Day-old Chicks Cost

Cost of day-old chick was also estimated at the prevailing market rate in the study areas. Per farm per year costs of day-old chicks were estimated at Tk 69347, Tk 157405, Tk, 389620 and Tk 187721 for small, medium, large and all broiler farms respectively (Tables 1, 2, 3 and 4). Their respective shares of total cost were 29.13, 29.98, 27.43 and 28.27 percent respectively. It is clear from Tables 1, 2, 3 and 4 that cost of day-old chick was relatively much higher for medium broiler farms than for small and large broiler farms. The annual expenditure on day-old chicks were estimated at Tk 23.42, Tk 23.67, Tk 23.00 and Tk 23.43 per poultry birds for small, medium, large and all broiler farms respectively (Tables 1, 2, 3 and 4),

Veterinary Expenses

Vaccine, medicine and veterinary services were the major components of the veterinary expenses (Tables 1, 2, 3, 4, 5, 6, 7 and 8). It may be noted that cost of vitamins was considered as feed cost component. Total veterinary expenses per farm per year were estimated at Tk 9463, Tk 21183, Tk 54650 and Tk 26032 for small, medium, large and all broiler farms respectively. Total veterinary expenses per farm per year were estimated at Tk 5271, Tk 14598, Tk 35475 and Tk 16172 for small, medium, large and all layer farms respectively (Tables 5, 6, 7 and 8). Medium broiler and layer farmers incurred much higher veterinary expenses than small and large broiler and layer farmers.

112

Electricity Cost

Electricity was another cost item of broiler and layer farms. The annual electricity costs per farm were estimated at Tk 2825, Tk 7794, Tk 12730 and Tk 7538 for small, medium, large and all broiler farms respectively (Tables 1, 2, 3 and 4). On the other hand, the electricity costs per farm per year were estimated at Tk 2254, Tk 4905, Tk 13388 and Tk 5935 for small, medium, large and all layer farms respectively (Tables 5, 6, 7 and 8). It is evident that cost of electricity was much higher for medium broiler and layer farms than for small and large broiler and layer farms.

Transportation Cost

In the present study cost of transportation included expenses on transportation for purchasing day-old chicks, feed, etc., and for selling chicken and eggs. Transportation costs per farm per year stood at Tk 2619, Tk 6247, Tk 12595 and Tk 6746 for small, medium, and large and all broiler farms respectively (Tables 1, 2, 3 and 4). Tables 5, 6, 7 and 8 show that transportation costs per farm per year were estimated at Tk 1559, Tk 3325, Tk 5921 and Tk 33 13 for small, medium, large and all layer farms respectively. Thus the cost of transportation was relatively higher for broiler farms than for layer farms.

Housing Cost

The cost of housing was calculated by taking into account the depreciation cost interest on housing value and repairing cost. It is evident from Tables 1, 2, 3 and 4 that housing costs were Tk 2408, Tk 6438, Tk 13673 and Tk, 70338 for small, medium, large and all broiler

113

farms respectively; representing 1.01, 1.23, 0.96 and 1.06 percent of the total costs in the respective categories of farms. Tables 5, 6, 7 and 8 show that housing costs were Tk 3432, Tk 8 133 8, Tk 11805 and Tk 7781 for small, medium, large and all layer farms respectively; representing 1.59, 1.88, 0.99 and 1.45 percent of the total costs of the respective categories of farms. Thus it is clear that per farm per year housing cost was comparatively higher for layer than for broiler farms.

Tools and Equipment Costs

Tools and equipment are necessary for successful broiler and layer farming. Broiler and layer farmers generally used feeder, water jar, cages, egg-cage, mixture machine, balance, fan, litter, detol, bulb, spade, van, syringe, tagari, etc. The costs of tools and equipment were determined by applying straight-line depreciation method for one year.

The costs of tools and equipment per farm per year covered about 1.13, 0.86, 0.64, and 0.77 percent of the total costs for small, medium, large, and all broiler farms respectively (Tables 1, 2, 3 and 4). The cost of tools and equipment per farm per year covered about 1.43, 1.60, 1.17 and 1.46 percent of the total costs for small, medium, large and all layer farms respectively (Tables 5, 6, 7 and 8). In general, layer farmers incurred higher tools and equipment costs than broiler farmers.

Interest on Operating Capital

Interest on operating capital was computed by taking all cash expenses incurred for various operations in broiler and layer fanning, such as expenses on chicks, feed, hired labour, vaccine and medicine,

114

transportation, electricity etc. Interest rate (IR) was assumed to be 10 percent per annum. It was assumed that if the owner of a poultry farm deposited money in a bank, he would have received interest at the above rate.

Tables 1, 2, 3 and 4 show that interests on operating capital per farm per year were Tk 17048, Tk 38492, Tk 144465 and Tk 59614 for small, medium, large and all broiler farms respectively.

On the other hand, interests on operating capital per farm per year were Tk 16866, Tk 31303, Tk 89654 and Tk 39435 for small, medium, large and all layer farms respectively. It was also observed that the interest on operating capital was the third and fourth largest cost items of layer and broiler poultry farms. Interest on operating capital of large broiler farms was much higher than that of small and medium broiler farms (Tables 1, 2, 3 and 4). Interest on operating capital of small layer farms was much higher than that of medium and large layer farms (Tables 5, 6, 7 and 8). So, it is clear that per farm per year interest on operation capital was comparatively much higher for broiler than for layer farms.

Interest on Land Value

Interests on land value per farm per year were Tk 1320, Tk 2637, Tk 4550 and Tk 2835 for small, medium, large and all broiler farms respectively (Tables 1, 2, 3 and 4). Interests on land value per farm per year were Tk 1900, Tk 4528, Tk 6502 and Tk 4286 for small, medium, large and all layer farms respectively (Tables 5, 6, 7 and 8). So, it is clear that per farm per year interest on land value was comparatively higher for layer than for broiler farms.

Inventory Change

Inventory change was defined as the difference between the total value of farm's layer birds at the beginning of the year plus birds bought, and the total value of farm's birds at the end of the year plus birds sold, gifted and consumed. Thus, inventory change = (Closing stock + birds Sold + Gift + Consumption) - (Opening stock + birds Purchased). Table 9 shows annual average inventory change of poultry farms in the study period. The values of the change in inventory were estimated at Tk 50140, Tk 128031, Tk 446878 and Tk 174206 for small, medium, large and all layer farms respectively (Table 9).

Returns from Raising Poultry

The prime objective of the commercial broiler and layer poultry farms, like all other businesses, is to earn profit by selling eggs and meat. The subsidiary goal of these farms is to meet the demand for home consumption of eggs and meat. To determine the gross returns from poultry birds, it was necessary to calculate all the returns earned from selling eggs, chicks/poultry/pullet etc. All these products were included in computing the gross returns from poultry birds. The average prices of 'meat per kg was Tk 64, Tk 65, Tk 63 and Tk 64 for small, medium, large and all broiler farms respectively. The average prices of egg per piece were Tk 2.86, Tk 2.84, Tk 2.85 and Tk 2.85 for small, medium, large and all layer farms respectively. Gross return was the money value of total output and net return was calculated by subtracting total cost from gross return. It was observed in the study that return varied among the farmers of the different categories due to different management practices.

116

Gross Margin/Return of Different Categories of Poultry Farms

Gross margin is defined as the difference between total return and variable costs. For short term farm planning the gross margin analysisis widely used (Karim, 2000). Farmers generally want to maximize return over variable cost of production. The plausible reason is that apportionment of fixed costs for different disaggregated units of output is difficult to make for comparing the ultimate profitability. So the gross margin analysis is applied to look into the comparative profitability of different categories of poultry farms. The gross returns for different categories of poultry farms were calculated and their respective variable costs were deducted from the total returns to obtain a margin, which was called "gross margin".

Tables 10, 11, 12 and 13 show that gross return per farm per year stood at Tk 289920, Tk 700375, Tk 1843632 and Tk 856320 for small, medium, large and all broiler farms respectively. Gross return of raising broiler per 100 birds per year stood at Tk 70199 for small farms, Tk 80781 for medium farms, Tk 83801 for large farms and Tk 80481 for all farms. Gross return per bird per year for the broiler farms stood at Tk 702, Tk 808, Tk 838 and Tk 805 respectively for small, medium, large and all farms. It was evident from the study that farmers producing broiler at relatively large scale earned higher gross return than those producing at smaller scale (Tables 10, 11, 12 and 13).

For layer farms, gross return per farm per year stood at Tk 286170 for small farms, Tk 587685 for medium farms, Tk 1730265 for large farms and Tk 745882 for all layer farms (Tables 14, 15, 16 and 17). Gross return per 100 birds per year stood at Tk 82470, Tk 72109, Tk 69516 and Tk

117

71927 for small, medium, large and all layer farms respectively. Gross return per bird per year for small, medium, large and all layer farms was Tk 825, Tk 72 1, Tk 695 and Tk 719 respectively. It was evident from the study that farmers producing layer at relatively small scale earned higher gross return than those producing at larger scales were (Tables 14, 15, 16 and 17).

Net Returns of Different Categories of Poultry Farms

Net return is defined as the difference between gross returns and total costs. Net return was determined by deducting all costs from the gross returns. Table 18 shows that per farm net returns for the broiler farms stood at Tk 51869, Tk 175280, Tk 423002 and Tk 192377 respectively for small, medium, large and all farms. For layer farms, per farm net returns were Tk 70915 for small farms, Tk 155506 for medium farms, Tk 537577 for large farms and Tk 210753 for all farms (Table 19).

Net returns per 100 birds per year were estimated at Tk 12560, Tk 20216, Tk 19227 and Tk 18080 for small, medium, large and all broiler farms respectively (Table 20). In the case of layer farms, net returns per 100 birds per year were estimated at Tk 20437, Tk 19081, and TK, 21598 and Tk 20323 for small, medium, large and all farms respectively (Table 21).

Net returns per bird per year were estimated at Tk 126, Tk 202, Tk 192 and Tk 181 for small, medium, large and all broiler farms respectively (Table 20). Net returns per bird per year stood at Tk 205, Tk 191, Tk 216 and Tk 203 for small, medium, large and all layer farms respectively (Table 21). The average prices of eggs per piece were estimated at Tk 2.86 for small farms, Tk 2.84 for medium farms, Tk 2.85 for large farms

118

and Tk 2.85 for all layer farms (Table 22). Returns per piece of egg were estimated at Tk 0.86, Tk 0.96, and Tk 1. 19 and Tk 1.05 for small, medium, large and all layers farm respectively (Table 22). The study revealed that profitability or net return per bird of three types of broiler firms was significantly different. The highest net return (Tk. 202) was found in medium farms which was followed by Tk 192 in large farms and the lowest net return of Tk. 126 was found in small farms (Table 20). Per egg net return of large layer farms was significantly higher than that of small and medium layer farms (Table 22)

Benefit Cost Ratio (BCR)

Benefit cost ratio (BCR) is a relative measure which is used to compare benefits per unit of cost. It helps to analyze the financial efficiency of the farms. The BCR of three types of broiler and layer farms were highly significant. The BCR was the highest (1.33) for medium poultry broiler farms and was significantly higher than that for large and small broiler farms (Tables 18 and 20).

In the case of layer farms, the BCI was the highest (1.45) for large farms and was significantly higher than that for medium farms and small farms (Tables 19 and 21). On the other hand, for egg production the BCR was the highest (1.72) for large layer farms and was significantly higher than that for medium and small layer farms (Table 22).

Finally, the BCR of the two types of poultry farms differed substantially. The BCR of 1.58 for layer farms was significantly higher than the BCR of 1.29 for broiler farms. The results showed that broiler and layer fanning in Bangladesh was profitable for all size groups of farms (Tables 20 and 22).

The above analysis has clearly shown that the medium broiler farms were more profit earners compared to the small and large broiler farms (Table 18). On the other hand, the results have shown that the large layer farms were more profit earners compared to the small and medium layer farms (Table 19).

Return from egg production was the main source of income for layer farms and return from sale of bird was the by-product income. But return from meat production was the only source of income for a broiler farm. The findings confirmed that layer rearing was more profitable than to broiler rearing.

It was also evident from Tables 18, 19, 20, 21 and 22 that the layer poultry farms were earning more profit on per Taka invested than the broiler poultry farms. This implied that a farmer could earn more profit by investing on rearing of layer poultry birds.

Test of Significance of the Difference in the Values of the Variables

The preceding analyses have revealed that estimated values of the variables such as feed cost, labour cost, veterinary expenses, electricity cost, transportation cost, housing cost, tools and equipment cost, total

120

cost, gross return, gross margin and net return of layer and broiler farms varied substantially. To assess the difference in the values of the variables more accurately and convincingly, test of equality of means of the variables in the framework of normal test was performed. The null hypothesis was that there was no significant difference 'in the mean values of the variables.

It is evident from Table 23 that feed cost per 100 birds per year for layer farms was Tk 40251 while it was Tk 28809 for broiler farms. The feed cost per 100 bird per year for layer farms was higher by Tk 11442 and the difference was found to be statistically significant at 1 percent level.

The labour costs per 100 birds per year were Tk 2503 for layer farms and Tk 5148 for broiler farms. The labour cost per 100 bird per year for broiler farms was higher by Tk 2645 and the difference was found to be statistically significant at 1 percent level (Table 23).

It was found that the veterinary expenses per 100 birds per year for layer farms was Tk 1559, while it was Tk 2447 for broiler farms (Table 23). The veterinary expenses per 100 bird per year for broiler farms were higher by Tk 888 and the difference was found to be statistically significant at 1 percent level.

The electricity cost per 100 birds per year for broiler farms was higher than that for layer farms by Tk 136 and this difference was found to be statistically significant at 1 percent level (Table 23). The transportation cost per 100 birds per year was higher for broiler than for layer farms by Tk 315 and this difference was found to be statistically significant at 1 percent level (Table 23). It was found that the housing cost per 100 birds

121

per year for layer farms was Tk 750 while it was Tk 661 for broiler farms (Table .23). The higher housing cost of the layer farms was statistically significant at 5 percent level. The tools and equipment cost per 100 birds per year for layer farms was higher than that for broiler farms by Tk 274 and the difference was statistically significant at 1 percent level (Table 23).

Total costs of layer and broiler farms were Tk 51604 and Tk 62401 respectively. Total cost of broiler farms was higher than that of layer farms by Tk 10797 and the difference was found to be statistically significant at 1 percent level (Table 23).

It is evident from Table 23 that gross return per 100 birds per year of layer and broiler farms was Tk 71927 and Tk 80481 respectively. Total gross return was higher for broiler farms by Tk 8554 in absolute term and the difference was found to be statistically significant at 1 percent level.

The net return of layer farms was higher than that of broiler farms by Tk 2243 and the difference was also found to be statistically significant at 1 percent level (Table 23).

It has been evident from the above analysis that all the differences in costs and returns were highly statistically significant. The results reject the null hypothesis that there is no significant difference in the performance of the layer and the broiler farms. Finally, significantly higher net returns of layer farms confirmed that layer farming was more profitable than broiler farming.

Table 1: Annual Costs of Raising Broiler by Small Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of total cost
		.	Quantity	Value (Tk)	
A. Variable Cost				200970	84.42
a. Feed Cost	Kg	13.29	8050.83	106996	44.95
b. Purchases day-old chick	No.	23.42	2961.00	69347	29.13
c. Hired labour	Man-day	60	162	9720	4.08
d. Veterinary expenses	Tk.			9463	3.97
e. Electricity	Tk.			2825	1.19
f. Transportation	Tk.			2619	1.10
B. Fixed Cost				37081	15.58
a. Family labor	Man-day	60	227	13620	5.72
b. Housing cost	Tk.			2408	1.01
c. Depreciation (tools & equipment)	Tk.			2685	1.13
d. Interest on operating capital	Tk.			17048	7.16
e. Interest on land value	Tk.			1320	0.55
Total Cost (A+B)	Tk.			238051	100.00
Total Cost Per 100 birds	Tk.			57639	
Total Cost per bird	Tk.			576	

123

Table 2: Annual Costs of Raising Broiler by Medium Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of total cost
			Quantity	Value (Tk)	
A. Variable Cost				453660	86.40
a. Feed Cost	Kg	13.17	17392.33	229057	43.62
b. Purchases day-old chick	No.	23.67	6650.00	157405	29.98
c. Hired labour	Man-day	59	542.00	31978	6.09
d. Veterinary expenses	Tk.			21183	4.03
e. Electricity	Tk.			7794	1.48
f. Transportation	Tk.			6247	1.19
B. Fixed Cost				71435	13.60
a. Family labor	Man-day	59	328	19352	3.69
b. Housing cost	Tk.			6438	1.23
c. Depreciation (tools & equipment)	Tk.			4516	0.86
d. Interest on operating capital	Tk.			38492	7.33
e. Interest on land value	Tk.			2637	0.50
Total Cost (A+B)	Tk.			525095	100.00
Total Cost Per 100 birds	Tk.			60565	
Total Cost per bird	Tk.			606	

124

Table 3: Annual Costs of Raising Broiler by Large Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm Quantity	No. of batch=8 per farm Value (Tk)	Percent of total cost
A. Variable Cost				1224077	**86.16**
a. Feed Cost	Kg	13.14	51921	682242	48.02
b. Purchases day-old chick	No.	23	16940	389620	27.43
c. Hired labour	Man-day	60	1204	72240	5.09
d. Veterinary expenses	Tk.			54650	3.85
e. Electricity	Tk.			12730	0.90
f. Transportation	Tk.			12595	0.89
B. Fixed Cost				196553	**13.84**
a. Family labor	Man-day	60	413	24780	1.74
b. Housing cost	Tk.			13673	0.96
c. Depreciation (tools & equipment)	Tk.			9085	0.64
d. Interest on operating capital	Tk.			144465	10.17
e. Interest on land value	Tk.			4550	0.32
Total Cost (A+B)	Tk.			1420630	100.00
Total Cost Per 100 birds	Tk.			64574	
Total Cost per bird	Tk.			646	

125

Table 4: Annual Costs of Raising Broiler by All Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of total cost
			Quantity	Value (Tk)	
A. Variable Cost				570207	85.88
a. Feed Cost	Kg	13.20	23222	306530	46.17
b. Purchases day-old chick	No.	23.43	8012	187721	28.27
c. Hired labour	Man-day	60	594	35640	5.37
d. Veterinary expenses	Tk.			26032	3.92
e. Electricity	Tk.			7538	1.34
f. Transportation	Tk.			6746	1.02
B. Fixed Cost				93736	14.12
a. Family labor	Man-day			19140	2.88
b. Housing cost	Tk.			7038	1.06
c. Depreciation (tools & equipment)	Tk.			5109	0.77
d. Interest on operating capital	Tk.			59614	8.98
e. Interest on land value	Tk.			2835	0.43
Total Cost (A+B)	Tk.			663943	100.00
Total Cost Per 100 birds	Tk.			62401	
Total Cost per bird	Tk.			624	

Table 5: Annual Costs of Raising Layer by Small Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
A. Variable Cost				**182257**	**84.67**
a. Feed cost	Kg	11.17	14953	167025	77.59
b. Hired labour	Man-day	58	106	6148	2.86
c. Veterinary expenses	Tk.			5271	2.45
d. Electricity	Tk.			2254	1.05
e. Transportation	Tk.			1559	0.72
B. Fixed Cost				**32998**	**15.33**
a. Family labor	Man-day	58	133	7714	3.58
b. Housing cost	Tk.			3432	1.59
c. Depreciation (tools & equipment)	Tk.			3086	1.43
d. Interest on operating capital	Tk.			16866	7.84
e. Interest on land value	Tk.			1900	0.88
Total Cost (A+B)	Tk.			**215255**	**100**
Total Cost Per 100 birds	Tk.			**62033**	
Total Cost per bird	Tk.			**620**	

Table 6: Annual Costs of Raising Layer by Medium Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
A. Variable Cost				**368269**	**85.21**
a. Feed Cost	Kg	11.10	29937	332301	76.89
b. Hired labour	Man-day	60	219	13140	3.04
c. Veterinary expenses	Tk.			14598	3.38
d. Electricity	Tk.			4905	1.13
e. Transportation	Tk.			3325	0.77
B. Fixed Cost				**63910**	**14.79**
a. Family labor	Man-day			13020	3.01
b. Housing cost	Tk.			8138	1.88
c. Depreciation (tools & equipment)	Tk.			6921	1.60
d. Interest on operating capital	Tk.			31303	7.24
e. Interest on land value	Tk.			4528	1.05
Total cost (A+B)	TK.			432179	100
Total Cost Per 100 birds	Tk.			53028	
Total Cost per bird	Tk.			530	

Table 7: Annual Costs of Raising Layer by Large Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
A. Variable Cost				1041835	87.35
a. Feed Cost	Kg	10.91	86254	941031	78.90
b. Hired labour	Man-day	59	780	46020	3.86
c. Veterinary expenses	Tk.			35475	2.97
d. Electricity	Tk.			13388	1.12
e. Transportation	Tk.			5921	0.50
B. Fixed Cost				150853	12.65
a. Family labor	Man-day			28969	2.43
b. Housing cost	Tk.	59	491	11805	0.99
c. Depreciation (tools & equipment)	Tk.			13923	1.17
d. Interest on operating capital	Tk.			89654	7.52
e. Interest on land value	Tk.			6502	0.55
Total Cost (A+B)	Tk.			1192688	100
Total Cost Per 100 birds	Tk.			47918	
Total Cost per bird	Tk.			479	

Table 8: Annual Costs of Raising Layer by All Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
A. Variable Cost				**460998**	**86.15**
a. Feed Cost	Kg	11.08	37672	417406	78.00
b. Hired labour	Man-day	59	308	18172	3.40
c. Veterinary expenses	Tk.			16172	3.02
d. Electricity	Tk.			5935	1.11
e. Transportation	Tk.			3313	0.62
B. Fixed Cost				**74131**	**13.85**
a. Family labor	Man-day	59	251	14809	2.77
b. Housing cost	Tk.			7781	1.45
c. Depreciation (tools & equipment)	Tk.			7820	1.46
d. Interest on operating capital	Tk.			39435	7.37
e. Interest on land value	Tk.			4286	0.80
Total Cost (A+B)	Tk.			**535129**	100
Total Cost Per 100 birds	Tk.			51604	
Total Cost per bird	Tk.			516	

Table 9: Inventory Changes of Layer Farms

Types of layer farms	Number and values of layer inventory												
	Opening stock 1		Purchases 2		Sold 3		Gift 4		Consumption 5		Closing stock 6		Net change in inventory 7=(6+5+4+3)-1(1+2)
	No.	Value (TK)	No.	Value (TK)	No.	Value (TK)	No.	Value (TK)	No.	Value (TK)	No.	Value (TK)	
Small farms	448	37539	133	3146	169	19109	-	-	6	1183	347	70633	50140
Medium farms	856	41498	190	4570	143	13249	27	800	14	2467	815	157583	128031
Large farms	1725	116050	1713	42588	760	66625	8	1688	45	8313	2489	528890	446878
All farms	915	57181	519	12806	293	27459	14	729	18	3363	1037	212642	174206

131

Table 10: Annual Gross Returns for Small Broiler Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of total cost
			Quantity	Value (Tk)	
Meat:					
a. Sold	Kg	64	4303	275392	94.99
b. Consumed	Kg	64	227	14528	5.01
c. Gift to others	-	-	-	-	-
Gross return				289920	100.00
Gross return per 100 birds	-	-	-	70199	-
Gross return per bird	-	-	-	702	-

Table 11: Annual Gross Return for Medium Broiler Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of gross value
			Quantity	Value (Tk)	
Meat:					
a. Sold	Kg	65	10237	665405	95.01
b. Consumed	Kg	65	538	34970	4.99
c. Gift to others	-	65	-	-	-
Gross return				700375	100.00
Gross return per 100 birds	-	-	-	80781	-
Gross return per bird	-	-	-	808	-

132

Table 12: Annual Gross Return for Large Broiler Farms

Particulars	Unit	Price (Tk/kg)	No. of batch=8 per farm		Percent of gross value
			Quantity	Value (Tk)	
Meat:					
a. Sold	Kg	63	28386	1788318	97.00
b. Consumed	Kg	63	678	42714	2.32
c. Gift to others	-	63	200	12600	0.68
Gross return				1843632	100
Gross return per 100 birds	-	-	-	83801	
Gross return per bird	-	-	-	838	

Table 13: Annual Gross Returns for All Broiler Farms

Particulars	Unit	Price (Tk/unit)	No. of batch=8 per farm		Percent of gross value
			Quantity	Value (Tk)	
Meat:					
a. Sold	Kg	64	12887	824768	96.32
b. Consumed	Kg	64	433	27712	3.24
c. Gift to others	Kg	64	60	3840	0.44
Gross return				856320	100.00
Gross return per 100 birds	-	-	-	80481	
Gross return per bird	-	-	-	805	

Table 14: Annual Gross Returns for Small Layer Farmers

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
Egg:					
a. Sold	No.	2.86	74248	212349	74.20
b. Consumed	No.	2.86	7530	21536	7.53
c. Gift to others	No.	2.86	750	2145	0.75
A. Total egg (a+b+c)	No.	2.86	82528	236030	82.48
b. Inventory change	-			50140	17.52
Gross return (A+B)	-			286170	100
Gross return per 100 birds	-			82470	
Gross return per bird	-			825	

Table 15: Annual Gross Returns for Medium Layer Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
Egg:					
a. Sold	No.	2.84	142846	405683	69.03
b. Consumed	No.	2.84	17804	50563	8.60
c. Gift to others	No.	2.84	1200	3408	0.58
A. Total egg (a+b+c)	No.	2.84	161850	459654	78.21
B. Inventory change				128031	21.79
Gross return (A+B)				587685	100
Gross return per 100 birds	-			72109	
Gross return per bird	-			721	

134

Table 16: Annual Gross Returns for Large Layer Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of gross value
Egg:					
a. Sold	No.	2.85	436602	1244316	71.91
b. Consumed	No.	2.85	10509	29951	1.73
c. Gift to others	No.	2.85	3200	9120	0.53
A. Total egg (a+b+c)	No.	2.85	450311	1283387	74.17
B. Inventory change				446878	25.83
Gross return (A+B)				1730265	100
Gross return per 100 birds	-			69516	
Gross return per bird	-			695	

Table 17: Annual Gross Returns for All Layer Farms

Particulars	Unit	Price (Tk/unit)	Per farm Quantity	Per farm Value (Tk)	Percent of total cost
Egg:					
a. Sold	No.	2.85	188775	538009	72.13
b. Consumed	No.	2.85	10116	28831	3.87
c. Gift to others	No.	2.85	1697	4836	0.65
A. Total egg (a+b+c)	No.	2.85	200588	571676	76.17
B. Inventory change	-			174206	23.36
Gross return	-			745882	100
Gross return per 100 birds	-			71927	
Gross return per bird	-			719	

135

Table 18: Annual Net Returns from Different Categories of Broiler Farms

Particulars	Categories of farms			
	Small	Medium	Large	All
Gross return	289920	700375	1843632	856320
Variable cost	200970	453660	1224077	570207
Total cost	238051	525095	1420630	663943
Gross margin	88950	246715	619555	286113
Net return	51869	175280	423002	192377
BCR (variable costs basis)	1.44	1.54	1.51	1.50
BCR (Total costs basis)	1.22	1.33	1.30	1.29

Table 19: Annual Net Returns form Different Categories of Layer Farms.

Particulars	Categories of farms			
	Small	Medium	Large	All
Gross return	286170	587685	1730265	745882
Variable cost	182257	368269	1041835	460998
Total cost	215255	432179	1192688	535129
Gross margin	103913	2194116	688430	284884
Net return	70915	155506	537577	210753
BCR (variable costs basis)	1.57	1.60	1.66	1.62
BCR (Total costs basis)	1.33	1.36	1.45	1.39

Table 20: Costs and Returns Per 100 Birds and Per Bird for Broiler Farms

Particulars	Categories of farms			
	Small	Medium	Large	All
Gross return per 100 birds	70199	80781	83801	80481
Gross return per bird	702	808	838	805
Total cost per 100 birds	57639	60565	64574	62401
Total cost per bird	576	606	646	624
Net return per 100 birds	12560	20216	19227	18080
Net return per bird	126	202	192	181
BCR (per 100 birds)	1.22	1.33	1.30	1.29

Table 21: Costs and Returns Per 100 Birds and Per Bird for Layer Farms

Particulars	Categories of farms			
	Small	Medium	Large	All
Gross return per 100 birds	82470	72109	69516	71927
Gross return per bird	825	721	695	719
Total cost per 100 birds	62033	53028	47918	51604
Total cost per bird	620	530	479	516
Net return per 100 birds	20437	19081	21598	20323
Net return per bird	205	191	216	203
BCR (per 100 birds)	1.33	1.36	1.45	1.39

137

Table 22: Costs and Returns Per Egg Layer Farms

Particulars	Categories of farms			
	Small	Medium	Large	All
Total cost of eggs per farm	215255	432179	1192686	835129
Net change in inventory	50140	128031	446878	174206
Net costs of eggs per farm	165115	304148	745810	360923
Number of eggs per farm	82528	161850	450311	200588
Cost per egg	2.00	1.88	1.66	1.80
Price per egg	2.86	2.84	2.85	2.85
Return per egg	0.86	0.96	1.19	1.05
BCR (Per egg)	1.43	1.51	1.72	1.58

Table 23: Difference of Mean Values of Costs and Returns of Layer and Broiler Farm

Parameters	Mean costs and return per 100. birds (Taka)		Absolute mean difference	Z-value
	Layer farms	Broiler farms		
Feed cost	40251	28809	11442***	25.49
Labour cost	2503	5148	2645***	8.76
Veterinary expenses	1559	2447	888***	12.70
Electricity cost	572	708	136***	3.71
Transportation cost	319	634	315***	8.92
Housing cost	750	661	89**	2.26
Tools and equipment cost	754	480	274***	9.36
Total cost	51604	62401	10797***	3.36
Gross return	71927	80481	8554***	5.92
Gross margin	27472	26890	582***	4.32
Net return	20323	18080	2243***	7.97

Note:
*** Significant at 1% level
** Significant at 5% level
N= stands for number of farms.

CHAPTER- VII

PRODUCTION FUNCTION ANALYSIS OF POULTRY FARMS

In this chapter, attempt has been made to identify and estimate the quantitative impacts of the relevant factors on production on economic returns of poultry firms within the framework of functional analysis. Poultry rearing has been considered to be explained by a number of input factors namely feed, human labour, veterinary expense, purchase of day-old chicks and electricity. Considering the effect of variable factors on gross return, two forms of production function models were estimated to determine the effects of independent variables. They were linear and Cobb-Douglas forms. Finally, linear model of production function was chosen on the basis of the best fit.

Factors Affecting Returns

The inputs used for producing layer and broiler products were mainly human labour, feed, veterinary expenses, day-old chicks, electricity and transportation. Apart from these inputs there were some other factors, such as quality of housing, tools and equipment, time of feeding and treatment also affected net return of the enterprise. The effects of human labour, feed, veterinary expenses, day-old chick and electricity used per 100 birds per farm on net returns have been analysed. The variation in net return among the sample farmers would indicate the possibilities of improving net returns from the enterprises. The farmers who received comparatively lower net return could improve their performance by ensuring effective management of the existing resources.

Relation of Feed use to Net Return per 100 Birds

Feed cost was one of the most important factors causing variation in net return. The effects of feed cost on net return of small, medium and large categories of layer and broiler farms were determined and are presented in Tables 1 and 2. In the case of medium broiler farms, 72.22 percent farmers who used feed cost of Tk. 30000 to Tk. 35000 obtained the highest average net return. Small broiler farmers who used feed cost below Tk. 30000 per 100 birds (Table1) received the lowest net return.

In case of small layer farms, 50 percent farmers who used feed cost above Tk. 45000 per 100 birds received the highest net return, while small layer farmers who used feed cost below Tk. 35000 per 100 birds obtained the lowest net return (Table 2).

Relation of human labour use to Net Return per 100 Birds

Human labour was another important factor, which affected production and net return of poultry rearing. The influence of human labour on net return of broiler and layer can be observed in Tables 3 and 4. Table 3 shows that in the case of medium broiler farms, about 27.78 percent farmers spent on human labour above Tk. 6500 per 100 broiler birds and received the highest level of net return of Tk. 2396.40. These returns were higher than those of farmers who spent less than Tk. 5500 and Tk.- 5000 - 6500 on human labour per 100 birds . About 40 percent large broiler farmers spent below Tk. 5500 on human labour per 100 birds and got the lowest net return of Tk. 1196.76.

140

About 75 percent of small farmers applied human labour worth above Tk. 3500 per 100 birds and received the highest level of net return of Tk. 1640.83. These returns were higher than those of farmers who spent less than Tk. 3000 and in the range of Tk.-3000 - 3500 on human labour per 100 layer birds were. About 33.33 percent medium layer growers spent below Tk. 3000 on human labour per 100 birds and got the lowest net return of Tk. 857.23 (Table 4).

Relation of Purchase of Day-old Chicks to Net Return per 100 Birds

Purchase of day-old chicks affected the production of meat and net return of different categories of broiler farms. Table 5 shows that purchase of day old chicks of medium broiler farmers spending above TK. 6000 per 100 broilers received more returns than that of small and large broiler farmers did.

Relation of Veterinary Expenses to Net Return per 100 Birds

Veterinary expenses were an important factor influencing meat and egg production of different categories of broiler and layer farmers. Veterinary cost included the cost of vaccine, veterinary charge and cost of medicine. According to Table 6, about 22.22 percent medium category of broiler farmers spent above Tk. 2700 per 100 broiler birds on veterinary expenses and received the highest net return 0f TK. 952.52 while farmers incurring veterinary expenses of Tk. 2500 - Tk. 2700 per 100 birds obtained the lowest net return of TK. 571.78

On the other hand, about 33.33 percent small farms spent above TK. 1500 per 100 layer birds on veterinary expense and got the highest net return of TK. 770.41; while, 25 percent small farms spending below TK. 1300 on veterinary expense got the lowest net return of TK. 389.08 (Table 7).

Relation of Electricity use to Net Return per 100 Birds

The relation of electricity use on net return of broiler and layer farms is presented in Tables 8 and 9. About 72.22 percent of medium category of broiler farmers who used electricity worth above Tk. 800 per 100 birds obtained the highest net return, while the small category of broiler farmers who spent Tk. 600 - Tk. 800 on electricity obtained the lowest net return (Table 8). About 41.67 percent of small layer farmers who used electricity costing above Tk. 600 per 100 birds obtained the highest net return of TK. 352.05. Similarly, about 50 percent of large layer farmers who used electricity worth Tk. 500 - Tk. 600 per 100 birds got the lowest net return (Table 9).

Quantitative Impacts of the Factors of Production

Rearing of poultry has been considered to be explained by a number of input factors namely feed, human labour, veterinary expenses, purchase of day-old chicks, electricity and farm size. In this study Cobb-Douglas production function has been applied to explore the quantitative relationship between the production and returns from broiler and layer poultry and the inputs used.

Selection of the Model

The generalized specification of the Cobb-Douglas production function for broiler and layer farms was:

$$Y = ax_1^{b1}x_2^{b2}x_3^{b3}x_4^{b4}x_5^{b5}D_1^{b6}D_2^{b7}e^{\mu}$$

which was linearised in the logarithmic form as under :

In Y = In a b_1 In x_1 + b_2 In x_2 + b_3 In x_3 + b_4 In x_4 + b_5 In x_5 + b_6 D_1 + b_7 D_2 + u.

Where,

Y　　=　　Returns from eggs and poultry birds (Tk./100 birds/year).

a　　=　　Constant or intercept of the function.

x_1　　=　　Cost of feed (Tk./100 birds / year).

x_2　　=　　Cost of human labour (Tk./100 birds / year).

x_3　　=　　Veterinary expenses (Tk./100 birds / year).

x_4　　=　　Cost of electricity (Tk./100 birds / year).

x_5　　=　　Cost of purchase of day-old chicks (Tk./100 birds/year).

D_1　　=　　Intercept dummy for farm size effect

　　　　　　D_1 = 1 for medium poultry farms and 0 otherwise.

D_2　　=　　Intercept dummy for farm size effect

　　　　　　D_2 = 1 for large poultry farms and 0 otherwise.

u　　=　　error terms.

b_1-- b_7 =　Parameters to be estimated.

143

Interpretation of the Estimated Results

The estimated values of the coefficients and related statistics of the Cobb-Douglas production function of broiler poultry farms, layer poultry farms and all poultry farms are shown separately in Tables 10, 11 and 12. The interpretations of the values are described below:

Feed (x_1): The regression coefficients of feed for broiler and layer poultry farms were positive and significant at 1 percent level. The estimated coefficient of feed cost for all poultry farms was also significant at 5 percent level. This indicates that 1 percent increase in feed cost, keeping other factors constant, would result in increase in the gross returns by 0.31 percent for broiler farms, 1.37 percent for layer farms and finally 0.27 percent for all poultry farms (Tables 10, 11 and 12).

Labour (x_2): The regression coefficients of human labour cost were significant and positive. for all farm categories. The coefficients were significant at 1 percent level for broiler farms, 5 percent level for layer farms and 1 percent level for all poultry farms. This means 1 percent increase in labour cost, keeping other factors constant, would result in increase in the gross returns by 0.41 percent for broiler farms, 0.32 percent for layer farms, and finally 0.62 percent for all poultry farms (Tables 10, 11 and 12).

Veterinary expenses (x_3): The value of coefficient x_3 was negative for broiler and layer poultry farms and positive for all poultry farms. For broiler farms the coefficient was significant at 5 percent level. The coefficient was significant at 10 percent level for layer farms and the

144

estimated coefficient of veterinary expenses for all poultry farms was insignificant. The absolute magnitude of the coefficient was also very small indicating lesser impact of veterinary expenses on net returns. An increase of the cost of the veterinary expenses by 1 percent, keeping other factors constant, would result in reduction of gross returns by 0.19 percent for broiler farms and 0.41 percent for layer farms. In view of the magnitude of the coefficients and level of significance, the negative sign of the coefficient of the x_3 variable may be taken as the plausible sign (Tables 10, 11 and 12).

Electricity (x_4): The coefficients of electricity were positive for broiler farms, negative for layer farms and again positive for all poultry farms. In case of layer farms, the negative coefficient of electricity was significant at 5 percent level, indicating the excessive use of this input. An increase of the cost of electricity by 1 percent, keeping other factors constant, would result in reduction of gross returns by 0.39 percent for layer farms. In case of broiler poultry farms, the positive coefficient of electricity was significant at 1 percent level, indicating that 1 percent increase in the cost of electricity, keeping other factors constant, would result in an increase of gross returns by 0.11 percent. In case of all poultry farms, the positive coefficient of electricity was significant at 10 percent level, indicating that 1 percent increase in the cost of electricity keeping other factors constant, would result in an increase of gross returns by 0.12 percent (Tables 10, 11 and 12).

Purchase of day-old chicks (x_5): The regression coefficient of expenditure on day-old chicks was positive. The coefficient was significant at 1 percent level for broiler farms, indicating that 1 percent

increase in this cost, keeping other factors constant, would result in increase in the gross returns by 0.46 percent for broiler farms (Table 10).

Dummy variables: The purpose of introducing dummy variable was to consider the role of qualitative explanatory variables in regression analysis. Introduction of qualitative variables often called dummy variables, makes the linear and non-linear regression model an extremely flexible tool that is capable of handling many interesting problems encountered in empirical studies (Gujarati 1995).

To distinguish amongst three categories, large farm, medium farm, small farm, we introduced two dummy variables, D_1 and D_2 representing medium and large farms respectively, with small farm as the base class. Hence, two dummy variables suffice to distinguish the three categories of farms.

The coefficients of all these variables were statistically significant at 1 percent level (Table 10). The results indicate that the coefficients of the broiler farms were structurally different across size groups of farms. The coefficients of the dummy variables of the layer farms were statistically significant at 5 percent level (Table 11). The results indicated that farm size significantly affected gross returns of the farmers.

The coefficient of dummy for layer farms was positive, implying the expansion of layer farms would be contributing positively to gross returns (Table 12). Besides the coefficient of dummy for layer farms was statistically significant at 1 percent level, implying that the extent of contribution of layer farms could be taken with a high degree of confidence.

146

The above findings suggest that most of the selected variables had significant impact on the production of poultry farms. So, the results reject the null hypothesis that the contributions of the key variables to the production processes of poultry farms are negligible.

Overall Performance of the Model

To find out how 'well' the Cobb-Douglas model fits the data the coefficient of determination (R^2) was also computed. The values of the coefficient of determination R^2 were 0.79 for broiler farms, 0.83 for layer farms and 0.76 for all poultry farms which indicates that around 79.83 and 76 percent of the variation in gross returns were explained by the independent variables included in the model respectively.

F-values: The F-values of all the equations were significant at 1 percent level of confidence, implying good fit of the model.

The overall performance of the Cobb-Douglas model for all categories of poultry farms was satisfactory as indicated by the estimated R^2 and F-values. The estimated values of the model, however, confirm that most of the selected variables had some impacts on the production of broiler and layer poultry farms.

Returns to Scale

This concept is applied to the production function to determine the stages of production in which farmers were allocating their resources. Returns to scale of broiler, layer and all poultry farms were computed by adding coefficients of regression of broiler, layer and all poultry farms (Tables 10, 11 and 12).

The sum of the elasticity of different inputs stood at 1.29 for broiler, 1.23 for layer and 1.38 for all poultry farms. This implied that if all the inputs specified in the production function were increased simultaneously by 1 percent, the gross returns increase by 1.29 percent for broiler farms, 1.23 percent for layer farms and finally, 1.38 percent for all poultry farms. This indicated that the production function exhibited increasing return to scale, implying that opportunities remain to use more of the resources to maximize returns from rearing broiler and layer poultry birds.

Efficiency of Resource Use

To attain the goal of profit maximization, one would use more of the variable resource so long as the value of the added product is greater than the cost of added amount of the resource used in producing it. The resources are considered efficiently used when the ratio of Marginal Value Products (MVP) to Marginal Factor Cost (MFC) approaches one. In other words MVP and MFC for each input are equal, when the marginal physical product (MPP) is multiplied by the product price, it is called marginal value product (MVP). Marginal factor cost (MFC) is the price of one unit of input.

The standard way to examine such efficiency is to compare marginal value product (MVP) with the marginal factor cost (MFC). The optimum use of a particular input would be indicated by the condition of equality of MVP and MFC.

$$\text{i.e.} \quad \frac{\text{MVP}}{\text{MFC}} = 1 \quad .$$

148

The marginal productivity represents the addition to gross returns in value term caused by an additional one unit of that resource, keeping other inputs constant. The most variable, perhaps the most useful estimate of MVP is obtained by taking resources (x_i), as well as gross return (Y) at their geometric means (Dhawan and Bansal 1977).

$$\therefore \quad \frac{dy}{dx_1} = bi \ \frac{\overline{y}}{\overline{x}_1}$$

Therefore, $\quad MVP(x_i) = b_i = \dfrac{\overline{y}(G.M)}{\overline{x}(G.M)}$

The criteria of resource use efficiency is that a ratio equal to unity indicates the optimum use of that factor, a ratio more than unity indicates that the gross return could be increased by using more of the resource and a value of less than unity indicates the excess use of the resource which should be decreased to minimize the loss. The estimated MVP of different inputs is presented in Tables 13, 14 and 15.

Table 13 shows that the ratios of MVP_{xi} and MFV_{xi} of labour (x_2), electricity (x_4) and expenditure of day-old chick (x_5) in broiler farms were positive and more than one which indicated that more profit could be obtained by increasing labour, electricity and purchase on day-old chick respectively. For feed (x_1) the ratio of MVP_{xi} and MFC_{xi} was positive but less than one, indicating too much use of the resources, hence need to be adjusted to bring it closer to unity. On the other hand, for veterinary expense (x_3) the ratio of MVP_{xi} and MFC_{xi} was negative,

indicating that less profit could be obtained by increasing on veterinary expenses.

Table 14 shows that the ratios of MVP_{xi} and MFC_{xi} of feed (x_1) and labour (x_2) in layer farms were positive and more than one, implying that more profit could be obtained by increasing these inputs. For veterinary expense (x_3) and electricity (x_4) the ratios of MVP_{xi} and MFC_{xi} were negative, indicating that less profit could be earned by increasing these inputs.

Finally, for all categories of poultry farms in the study area, it was observed that for labour (x_2), veterinary expense (x_3) and electricity (x_4), the ratios of MVP_{xi} and MFC_{xi} of the inputs were positive and more than one (Table 15) which indicated that more profit could be obtained by increasing each input included in production function. For feed, the ratio of MVP_{xi} and MFC_{xi} was positive but less than one, indicating too much use of the resources which needed to be adjusted to bring the ratio closer to unity (Table 15).

Suggestions

To overcome the difficulties of poultry farming and to make the poultry farming more profitable, the farmers of the study areas were asked to suggest solutions to the problems identified above. The following suggestions were made by the owners of the poultry farms:

i.   The government and non-government organizations should play a vital role in making poultry feed easily available in the country.

ii.   In order to provide necessary veterinary services to the owners of poultry farms, the government should establish new veterinary

care centers with adequate veterinary technicians, field assistants and modern logistic supports.

iii. For the greater interest of the poultry industry, the government should give incentives to the private pharmaceutical companies to come forward to supply necessary medicines and vaccines and vitamines for poultry raising at reasonable prices.

iv. To get rid of the problem of credit, the provision of short term loan on easy terms for poultry farming should be made with immediate effect.

v. Since most of the poultry farmers did not have formal training on farm management, poultry husbandry and poultry diseases and its control, short term training courses on those topics may be arranged by the Department of Livestock Services (DLS) of the government and NFOs. If these training programmes become effective, the profitability of poultry farming is expected to improve.

vi. Availability of day-old chick was a big problem in running poultry farms. Most of the respondents suggested that necessary arrangements should be made for easy availability of day-old chicks.

vii. Poultry farm owners suggested that regular supply of electricity should be ensured.

viii. Low prices of meat and eggs and price fluctuation did not provide adequate incentives to the owners of the poultry farms. Price stabilization and / or floor price schemes should be introduced to ensure relatively stable income for meat and egg producers. Besides, smuggling of eggs from India must be stopped to safeguard the interest of poultry farms in the country.

151

Table 1: Relation of Feed Cost to Net Return from Broiler Per 100 Birds.

Feed Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-30000	33.33	6079.08	27.78	9469.75	30	8621.25
30000-35000	50.00	6982.47	72.22	10510.74	70	9645.95
Above 35000	16.67	8615.60	-	-	-	-
All categories	100	7225.72	100	9990.25	100	9133.60

Table 2: Relation of Feed Cost to Net Return from Layer Per 100 Birds.

Feed Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-35000	16.67	10871.73	2.0	11953.65	37.5	14764.17
35000-45000	33.33	13477.57	66.67	14978.88	62.5	18578.35
Above 45000	50.00	22782.82	13.33	17239.80	-	-
All categories	100	15710.71	100	14724.11	100	16671.26

Table 3: Relation of Labour Cost to Net Return from Broiler Per 100 Birds.

Labour Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-5500	-	-	5.56	1810.23	40	1196.76
5500-6500	33.33	1340.73	66.67	2012.85	20	1788.03
Above 6500	66.67	1639.57	27.78	2396.40	40	2120.25
All categories	100	1490.15	100	2073.16	100	170.68

Table 4:   Relation of Labour Cost to Net Return from Layer Per 100 Birds.

Labour Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-3000		-	33.33	857.23	37.5	1140.34
3000-3500	25	1055.55	13.33	1192.98	25	1464.19
Above 3500	75	1640.83	53.33	1355.30	37.50	1628.33
All categories	100	1348.03	100	1135.17	100	1410.95

153

Table 5: Relation of Purchase of Day-old Chicks to Net Return from Broiler per 100 Birds

Day-old-Chicks Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-5500	41.67	3834.87	22.22	5874.99	30	5240.52
5500-6500	8.33	4009.18	27.78	6142.04	50	5478.72
Above 6500	50	4299.70	50	6616.78	20	5836.04
All categories	100	4047.92	100	6211.27	100	5518.42

Table 6: Relation of Veterinary Expenses to Net Return from Broiler per 100 Birds.

Veterinary Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-2500	8.33	796.82	11.11	691.48	20	721.02
2500-2700	50.00	571.78	66.67	864.00	60	751.74
Above 2700	41.67	664.78	22.22	952.52	20	819.28
All categories	100	677.79	100	836.00	100	764.01

154

Table 7: Relation of Veterinary Expenses to Net Return from Layer per 100 Birds.

Veterinary Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-1300	25	389.08	66.67	394.07	25	505.49
1300-1500	41.67	470.38	13.33	491.69	37.50	624.86
Above 1500	33.33	770.41	20.00	620.21	37.50	749.71
All categories	100	543.29	100	501.99	100	626.69

on the other hand about 33.33 percent small farms spent above Tk. 1500 per 100 broiler birds on veterinary expenses and got the higher net return of Tk. 770.41 while, firms regarding below Tk. 1300 on veterinary expanse got lower net return Tk. 389.08 , 25 percent small firms (Table: 7).

155

Table 8: Relation of Electricity Expenses to Net Return from Broiler per 100 Birds.

Electricity Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below- 600	-	-	5.56	154.55	10	172.65
600-800	50	149.62	22.22	234.08	50	206.23
Above 800	50	238.26	72.22	359.54	40	249.89
All categories	100	193.94	100	249.39	100	209.59

Table 9: Relation of Electricity Expenses to Net Return from Layer Per 100 Birds.

Electricity Cost (Tk.)	Small farms		Medium farms		Large farms	
	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)	% of total farm	Net return (Tk/100 birds)
Below-500	8.33	155.85	6.67	157.36	25	192.01
500-600	50.00	177.24	46.67	200.16	50	154.89
Above 600	41.67	352.05	46.67	244.78	25	293.65
All categories	100	228.38	100	200.77	100	213.52

156

Table 10: Estimated Value of Coefficients and Related Statistics of Cobb–Douglas Production Function for Broiler Farms.

Variables/Parameters	Broiler farms	
	Coefficient	T-value
Intercept	0.73	0.423
Feed (x_1)	0.31***	3.034
Labour (x_2)	0.41***	7.872
Veterinary Expenses (x_3)	-0.19**	-2.066
Electricity (x_4)	0.11***	3.33
Day-old chick (x_5)	0.46***	3.142
D_1	0.13***	5.041
D_2	0.06***	2.922
R_2	0.79	-
Adjusted R_2	0.75	-
F	17.56***	-
Returns to scale	1.29	-

Note: *** Significant at 1% level

** Significant at 5% level

157

Table 11: Estimated Value of Coefficients and Related Statistics of Cobb –Douglas Production Function for Layer Farms.

Variables/Parameters	Layer farms	
	Coefficient	T-value
Intercept	-0.59	-0.485
Feed (x_1)	1.37***	6.713
Labour (x_2)	0.32**	2.017
Veterinary Expenses (x_3)	-0.41*	-1.81
Electricity (x_4)	-0.39**	-2.172
D_1	0.22**	2.543
D_2	0.28**	2.08
R_2	0.83	-
Adjusted R_2	0.79	-
F	22.22***	-
Returns to scale	1.23	-

Note: *** Significant at 1% level

** Significant at 5% level

* Significant at 10% level

158

Table 12: **Estimated Value of Coefficients and Related Statistics of Cobb –Douglas Production Function for All Poultry Firm.**

Variables/Parameters	All Poultry farms	
	Coefficient	T-value
Intercept	1.64	1.868
Feed (x_1)	0.27**	2.117
Labour (x_2)	0.62***	7.082
Veterinary Expenses (x_3)	0.09	0.752
Electricity (x_4)	0.12*	1.867
D_3	0.10***	2.810
R_2	0.76	-
Adjusted R_2	0.74	-
F	38.42	-
Returns to scale	1.38	-

Note: *** Significant at 1% level

** Significant at 5% level

* Significant at 10% level

Table 13: Marginal Value Products (MVPxi) and Marginal Factor Costs MFCxi) of Different Inputs Included in the Production Function.

Input Variables	Broiler farms		
	Geometric mean	Coefficient	Ratio of MVPxi to MFCxi
Feed (x_1)	30986.29	0.310	0.84
Labour (x_2)	5281.82	0.410	6.54
Veterinary expenses (x_3)	2692.70	-0.194	-6.06
Electricity (x_4)	820.98	0.109	11.17
Purchases of day-old chicks (x_5)	18911.02	0.460	2.05

Table 14: Marginal Value Products (MVPxi) and Marginal Factor Costs MFCxi) of Different Inputs Included in Production Function

Input Variables	Layer farms		
	Geometric mean	Coefficient	Ratio of MVPxi to MFCxi
Feed (x_1)	42608.10	1.370	2.39
Labour (x_2)	2635.82	0.319	8.99
Veterinary expenses (x_3)	1489.80	-0.409	-20.39
Electricity (x_4)	627.47	-0.390	-46.17

160

Table 15: Marginal Value Products (MVPxi) and Marginal Factor Costs MFCxi) of Different Inputs Included in Production Function

Input Variables	All Poultry farms		
	Geometric mean	Coefficient	Ratio of MVPxi to MFCxi
Feed (x_1)	35796.31	0.268	0.59
Labour (x_2)	4044.62	0.616	11.93
Veterinary expenses (x_3)	2042.85	0.089	3.41
Electricity (x_4)	729.65	0.124	13.32

CHAPTER- VIII

MARKETING PROBLEMS OF POULTRY PRODUCTS

In Bangladesh, poultry farming have gradually been developing almost all over the rural areas. But farmers are now facing a number of chronic problems. The aim of this chapter is to identify the problems faced by the farmers in the study area. For the sake of analytical conveniences, the problems were categorized into three general groups: economic and technical, marketing, social and natural problems. Different problems of farming as faced by farmers are presented in Table1.

a) Economic and technical problems

Lack of Capital

Lack of capital was a major problem in the way of improving the poultry business. About 60 percent of broiler and 49 percent of layer farmers mentioned this problem. This problem was acute because the farmers required substantial amount of money to run the poultry business.

Higher prices of feed

A higher price of feed was one of the most important constraints of poultry farming. In the present study high prices of feed were identified by the broiler and layer farmers as a severe constraint to the improvement of broiler and layer farming. It may be recalled that feed cost accounted for 46.17 percent of total cost for broiler farms and 78 percent of total cost for layer farms. Most of the farmers reported that the price of feed were very high. About 88 percent of broiler farm owners and 68 percent of layer farm owners reported this problem.

Lack of institutional credit facilities

The paucity of credit for poultry farming was another major problem in the study areas. A poultry farming is a very capital intensive farm business. Many people of the study areas were interested to establish poultry farms, because both eggs and chickens had a great demand in the home market. But due to lack of capital, they were not coming forward. About 34.88 percent of layer farm owners and 32 percent of broiler farm owners could not expand their poultry enterprise due to non-availability of adequate amount of credit.

Higher interest rate

High interest rate is one of the major causes retarding improvement of the poultry business. The bank interest rate for poultry farming is 14 percent. 58.13 percent of the layer and about 44 percent of the broiler farm owners reported this problem.

Poor Conception about Poultry Housing

Proper housing is essential for the growth, sound health and production of meat and egg. On an average 45 to 68.6 percent of broiler and layer farmers felt that they had poor conception about poultry housing and they considered lack of training facilities as one of the constraints to the development of their poultry farming. 42.1 percent of broiler farmers and 34.88 percent of layer farmers reported this problem.

Inadequate knowledge about poultry diets

Balance diet is essential for the growth of broiler and production of eggs. About 56 percent of layer and 47.36 percent of broiler farmers reported that they had insufficient knowledge about the proper combination of balanced diets of poultry birds. They also reported that they did not know how to prepare balanced diet of poultry birds.

Non-availability of day-old chicks

On an average about 73.0 percent of layer and broiler farmers faced the problem of non-availability of day-old chicks. Although ABFL provides quality day-old chicks to the broiler farmers. These farmers did not get day-old chick in proper time.

Lack of lighting facilities

Lighting and heating were important factors of poultry farming. But the electricity was not always available due to frequent disruptions of power supply in the study areas. 21.05 percent of broiler and about 14 percent of layer farmers mentioned this problem.

Inadequate health care and veterinary services

There is a popular English proverb that prevention is better than cure. To prevent certain disease a number of medicines and vaccines are required, some of which are not easily available. Supply of preventive and curative medicines is inadequate for the poultry industry. So inadequate health care and veterinary services were another important problem in raising poultry birds in the study areas. Most of the poultry farm owners' felt that the availability of the veterinary services was inadequate with respect to the demand for individual owner. Moreover,

164

supply of vaccines and medicines were quite insufficient. Some of the respondents reported that when the medicines were available in the market, they could not buy those because prices were too high. About 56 percent of layer farm owners and 50.87 percent of broiler farm owners felt this problem.

B) Marketing problems

Lower price of eggs

The price of egg remained low in the study area. It was alleged that illegal import of eggs from India by smugglers was responsible for the low price of egg particularly in winter season. About 80 percent of the layer farm owners mentioned low price of egg as a problem.

Lower price of meat

Another problem faced by the poultry farm owners is the lower price of meat. About 70 percent and 65.11 percent of the owners of broiler and layer farms respectively reported it as a problem.

Higher price of DOCs and pullets

High price of day-old chicks and pullet was another crucial problem reported by the respondents. About 67 percent of broiler farmers and 83.72 percent of layer farmers faced this problem.

C) Social and natural problems

Outbreak of diseases

Outbreak of poultry diseases is a common problem for the development of poultry industry in Bangladesh. Akbar (1991) estimated that around 30 percent of poultry birds had to die every year due to various diseases. As a result, the loss was estimated at Taka 800 crores.

Rainikhet, Fowl Pox, Fowl Cholera, Coccidiosis and Gumboro were common diseases in the study areas. In this study, about 70 percent of broiler farm owners and 68 percent of layer farm owners reported this problem.

Pollution of Environment

In the study areas, on an average 20 percent of broiler and layer farmers complained about this problem. This indicates that farmers have poor knowledge about consciousness on environment.

Lowering of social status

On the other hand, 32 percent and 23.25 percent of broiler and layer farm owners respectively reported that poultry rearing entailed low status in the society. Theft of poultry birds was also identified as a social problem in the study areas. About 20 and 8.6 percent of broiler and layer farm owners respectively reported it as a constraint.

8.5 Solutions as Conceived by contract growers

In order to overcome the problems of broiler farming and making the broiler farming more profitable, the farmers of the study area were

asked to suggest solutions to the problems identified above. Following solutions were made by the contract growers :

i. Since disease infestation appeared to be a major problem causing mortality of broiler, the broiler farmers felt taking more intensive preventive management practices.

ii. The government should give incentive to the private pharmaceuticals to come forward to supply necessary medicine and vaccines for broiler raising at reasonable prices.

iii. To get rid of the problem of credit, the provision of loans on easy terms for broiler housing / shed should be made by the financial institutes.

iv. Availability of day-old chicks is a big problem in broiler farming. ABFL should therefore, make necessary arrangements for timely supply of day-old chicks.

Table 8.1 shows that among all the broiler farmers 80 percent contract growers though that broiler farming polluted the environment. Theft of broiler was also identified as a social problem in the study area. Among all the broiler farmers 46.6 percent broiler farmers identified it as a problem.

Table 1 : Distribution of farmers according to the problems faced

Problems faced	Layer farm N = 43		Broiler farm N = 57		Total farm N = 100	
	No.	Percent	No.	Percent	No.	Percent
A) Economic and Technical Problem						
1. Lack of capital	21	48.83	34	59.64	55	55.0
2. Higher prices of feed	29	67.44	50	87.71	79	79.0
3. Lack of institutional credit facilities	15	34.88	18	31.57	33	33.0
4. Higher interest rate	25	58.13	25	43.85	50	50.0
5. Poor conception about poultry housing	15	34.88	24	42.10	39	39.0
6. Inadequate knowledge about poultry diet	24	55.81	27	47.36	51	51.0
7. Non-availability of day-old-chicks	38	88.37	35	61.40	73	73.0
8. Lack of lighting facilities	6	13.95	12	21.05	18	18.0
9. Inadequate health care and veterinary services	24	55.81	29	50.87	53	53.0
B) Marketing Problems						
1. Lower price of eggs	34	79.06	---	---	34	34.0
2. Lower price of meat	28	65.11	40	70.17	68	68.0
3. Higher prices of DOC and pullets	36	83.72	38	66.66	74	74.0
C) Social and Natural Problems						
1. Outbreak of disease	29	67.44	40	70.17	69	69.0
2. Pollution of environment	8	18.60	12	21.05	20	20.0
3. Lower social status	10	23.25	18	31.57	28	28.0
4. Theft and pilferage of poultry products	4	9.30	12	21.05	16	16.0

CHAPTER-IX

PROSPECT OF THE POULTRY INDUSTRY IN BANGLADESH

Bangladesh has got a traditionally rural and agro-based economy. Agriculture is still contributing the largest share in her economy. Subsistence mode of production is prominent in this sector. Such mode of production and disproportionate population growth, the food production could never meet the demand of the population (Khan and Husain: 2002).

A shift from subsistence mood of production to capital intensive, commercially viable mode of production is essential to meet and sustain the demand for food. Traditionally fish and crop are the most important contributors in the agriculture sector. However, a paradigm shift is on the way. Fish is the highest source of protein in Bangladesh. But the production of fish is neither adequate, nor it is growing proportionately with the ever growing human population. Therefore, to meet the demand for protein deficit, commercial poultry production has exposed as an alternative source and gradually taking over the place of fish (Khan and Husain : 2002). The objective of this chapter is to analyze the prospect of the poultry industry in Bangladesh. Prospect has been assessed by examining the demand and supply situation of poultry products. Forecasting of the future demand and supply of the poultry products has been made on the basis of exponential function.

Estimation Procedure

Demand for proteins by human population has been estimated from per capita average protein consumption rate as per WHO estimation. Future supply for protein from traditional sources has been estimated from trend analyzes of secondary sources of data. Supply gap of protein from traditional sources has been estimated form protein requirement by human population and traditional sources of protein. Commercial sources of protein have been estimated from the pattern of supply gap. Demand for layer and broiler has been related to demand for protein by human population to arrive at the estimate of future requirement.

Future supply from commercial sources has been estimated using third degree poly-nominal regression model over the past supply of commercial sources. Finally, demand for commercial feed has been calculated from the requirement of feed by each of the layer parent and DOC, and broiler parent and DOC.

Indicators Used for Estimation
- Population growth rate - 1.90%
- GDP growth rate - 5.5%
- Size of GDP - US $ 41 billion ($ 1 = TK. 58.55)
- Size of population according to 2001 census - 123.4 million
- Per capita income - US $ 350
- Gross protein requirement - 125 gm/person/day
- Daily average calorie intake - 1600 k. cal.

Theoretical Framework

Human population requires taking food including protein for their survival. Protein can be received from many sources, traditional sources include vegetable, pulses, fish, indigenous chicken and duck eggs and meat, beef, mutton, milk; and commercial sources include broiler meat, layer egg and meat, cockerel and power milk.

Demand for **DOC** in the commercial production line depends on the requirement of protein by the human population, availability of substitute protein products such as fish, other sources of meat, income, religious belief, individual taste etc. In the agricultural mode of production, feed are converted to meat (i.e. DOCs converting to consumable broilers) and egg (i.e. DOCs converting to layer which lay eggs for consumption). Feed is thus required by DOCs only to form into consumable broiler or layer for laying eggs. Extent of demand for commercial feed depends on the growth of the commercial broiler and layer farming and shifting to self-mixing feed to the use of industrial feed.

Demand and Supply Situation of Protein

Demand for Protein: Demand for protein is in consistent increase as the population is increasing over time. Under this circumstances one can consider demand for protein as a function of time. Table 1 shows aggregately yearly demand for protein by the total Bangladeshi human population. The yearly protein requirement increased from 5.31 million metric tons in 1993-94 to 7 million metric tons in 2000.

171

Supply of Protein: Supply of protein includes meat, fish, eggs, pulses, milk and milk products (both domestically produced and imported) etc. Of these, in 1997-98 fish contributed 1.5 million metric tons (i.e. 33 percent), milk and milk products contributed 1.7 million metric tons (i.e. 36 percent), meat and egg combine contributed 0.8 million metric tons (i.e. 17 percent) and pulse contributed 0.6 million metric tons (i.e. 13 percent). The table 2 shows the quantum of the availability of protein of the recent past.

Per capita supply of protein: Per capita availability of protein increased along with population increases. However, the increase is not significant enough to commensurate with the requirement of protein by the population. In the year 1998, per capita availability of protein is 103 gm approximately as against a requirement of 125 gm. The table 3 shows the year-wise per capita availability of different types of protein.

Projected Demand of Protein: The yearly protein requirement is expected to increase from 7 million metric tons in 2001 to 7.21 million metric tons by the year 2005-06. The table 4 shows the projected aggregate yearly demand for protein by the total population for the next five years from 2001-02 to 2005-06.

Per Capita Availability of Meat and Eggs from All Sources: Per capita availability of meat and eggs has increased significantly since 1993. This is largely due to the fast growth in commercial poultry production in the 1990s. As a result, availability of meat which was dropped to 3.59 kg per capita in 1994-95 from 4.28 kg per capita in 1993-94, has actually bounced back to reach 5.05 kg per capita in 1997-98 off setting the fast

growth of human population. Under similar conditions, per capita availability of eggs has increased from 16 in 1993-94 to 23 in 1997-98. The table 5 shows per capita availability of meat and eggs from all sources from 1993 to 1998.

Per Capita Availability of Meat and Eggs from Commercial poultry Sources: The following table shows how the commercial poultry meat and egg production has grown since 1993-94. If the table 5 is compared to the table 6, it can be noticed that commercial eggs contributed major share of the total eggs produced in the recent years. It is also noticeable that commercial poultry meat production has increased by nine folds since 1993 to 2000.

Projected Supply of Protein: It is expected that the supply of protein will increase from 5.4 million metric tons in 2000-2001 to 7.14 million metric tons in 2005-06. Considering the current economic conditions and that the population will grow with time, there will be increased demand for protein in the time to come. The table 7 shows the future projection of the supply of protein for the next five years.

Projected Supply Gap of Protein from all Sources: Supply gap of protein from all sources amounted to 2.03 million metric tons in 1993-94 which has been reduced to 1.2 million metric tons in the year 2000. It is expected that if the current growth rate in investment in this sector continues, the gap can be surpassed by the year 2006 provided all other factors remaining constant. This has been shown in Table 8 based on the following assumptions.

- Growth of fish production can not keep pace with the growing demand of protein for the augmented population.

- Indigenous chicken is on a decline due to scarcity of natural supply of feed including insects and worms affected by the uncontrolled use of pesticides.

- Beef and milk production has drastically diminished due to acute shortage of grazing land and disproportionate increase in cost of production.

- Pulse production is either stagnant or declining since 1991

- Shrimp production is largely meant for export market and not for domestic consumption.

- Consumers of tomorrow would require high value added products including broiler meat and eggs.

- Poultry market is 100 percent dependent on internal consumption.

- Scope of potential alternative source of protein is very limited.

It is clear from the above calculation that there will be a supply gap of protein in coming years. This supply gap will be resulted from the faster growth rate of population over the growth of traditional and other sources of protein. The supply gap is expected to be 0.92 million metric tons in 2000-01 and 0.70 metric tons in 2002. In a dynamic economic environment where market forces are very much active, there will be continuous new investment and improved management processes to minimize the gap and at the same time new demand is likely to be created due to economic progress and population growth which will in turn widen the supply gap.

The Future of Poultry Industry

Under the situation described above, one of the areas where there is plenty of scope still remains to meet the ever-increasing protein requirement economically within very short term. This has already made an impact in the local food market. This is feasible even at a low degree of investment and helps generate employment especially for the young. The Tables 9 and 10 show the future of poultry industry in terms of poultry market, feed market and employment generation. Tables were prepared based on the following assumptions:

- Ideal weight for slaughtering : 1.5 kg
- Average egg production per bird per year : 275
- Average weight of an egg : 60 gm
- Feed conservation ratio for normal broiler : 2.2 kg of feed per 1 kg of meat

* Feed conservation ratio for cockrail: 2.5 kg of feed per 1 kg of meat
- of the total bird population, brown to white ratio : 50 : 50
- feed intake per layer brown bird per year : 55 kg, 52/74 weeks
- feed intake per layer white bird per year : 50 kg, 52/74 weeks
- parent stock feed consumption : Layer = 55 kg, Broiler = 65 kg
- Mortality rate considered to be 10% for parent stock, DOC (broiler and layer)

The tables clearly show that during the last decade a drastic transformation has been taken place in the commercial poultry market. Layer parent stock has grown almost 6.5 fold from 22.5 thousand in 1991 to 145 thousand in 1999-2000. Layer DOC has grown almost 5.9 fold from 2 million in 1991 to 11.8 million in 1999-2000. The broiler market has increased even faster specially in second half of the past decade. Broiler parent stock has grown almost 25 times from 30

175

thousand in 1991 to 215 thousand in 1995-96 to 750 thousand in 1999-2000. Broiler DOC has grown almost 30 times from 3.5 million in 1991-92 to 104 million in 1999-2000.

The industrial feed market has also increased from 18.5 thousand metric tons in 1995-96 to 277 thousand metric tons in 1999-2000. Keeping life cycle of this market and other factors in mind, layer parent stock is expected to grow from present level to 425 thousand by the year 2005. Layer DOC is expected to grow 38.25 million per year by 2005.

Broiler market is expected to grow at a faster rate. Broiler parent stock is expected to grow 3.8 million in number by the year 2005. Broiler DOC is expected to grow at 456 million per year by 2005. The industrial feed market will also grow to 2.27 million metric tons a year by 2005 from 277 thousand metric tons a year in 1999-2000. Therefore, in the time to come, there lies a vast scope to expand this industry to bridge the demand and supply gap of protein likely to get from this sector. This industry can therefore, expect to attract huge investment in both public and private sector. In terms of employment generation, this sector offers ample opportunity particularly, in the private initiatives.

Each year almost 1.5 million fresh young men and women await for employment, and since scope of new employment generation by the government is extremely limited, many of this young are coming forward to get their employment through poultry business (Rahman: 2003). The full time employment in poultry sector in 1999-2000 was estimated to be 1500000 persons, which has been projected to be some 2500000 by the year 2005. This figure has been estimated based on the persons directly involved in poultry production; persons involved in

feed mill, vaccine industry, marketing, and other allied activities revolving poultry business has been kept aside from this estimation (Table 11).

Table 1: Aggregate yearly demand for protein of the recent past.

Year	Size of population (in million)	Protein requirement (person/day/gm)	Yearly protein requirement (in million tons)
1993-94	116.30	125	5.31
1994-95	119.90	125	5.47
1996-96	122.10	125	5.57
1996-97	124.30	125	5.67
1997-98	126.50	125	5.77
1998-99	134.03	125	6.12
1999-2000	136.98	125	7.00

Source: BBS 2002

Table 2: Availability of protein per year of the recent past

Year	Pulse: Production	Pulse: Import	Pulse: Total	Meat (from all sources)	Milk & milk products	Eggs: (million no.s)	Eggs	Fish	Total Protein	Total Protein (million metric tons)
1993	524	48	572	398	941	1903	104.7	967	2982	3.0
1994	537	98	6635	498	944	1906	104.8	1094	3275	3.3
1995	535	19	554	430.4	1084	2204	121.2	1173	3362	3.4
1996	524	23	547	449	1238	2314	127.3	1266	3627	3.6
1997	524	91	615	624	1656	2776	152.7	1373	4420	4.4
1998	518	96	614	639	1657	2953	162.4	1492	4564	4.6
1999	522	102	641	658	1702	3032	166.2	1512	1589	4.7
2000	531	104	52	666	1721	3112	167.4	1554	1596	4.9

Source: BBS 2002, Figures in '000' metric tons.

178

Table 3: Per capita availability of protein per year

Year	Population (in million)	Pulses	Meat	Milk & milk products	Eggs	Fish	Total	Per capita per day Availability (gm)
1993	113.8	5.10	3.52	8.30	0.88	8.50	26.30	72.05
1994	116.3	5.40	4.20	8.00	0.88	9.00	27.48	75.29
1995	119.9	4.60	3.59	9.00	1.05	9.50	27.74	75.99
1996	122.1	4.50	3.68	10.10	1.16	10.00	29.44	80.64
1997	124.3	4.90	5.00	13.30	1.21	12.70	37.11	101.67
1998	126.5	4.90	5.10	13.10	1.27	13.10	37.47	102.64
1999	126.66	5.12	5.32	14.00	1.29	13.26	38.24	103.02
2000	128.00	5.22	5.63	14.12	1.31	13.56	38.29	103.32

Source: BBS 2002

Figures in 'kg' per capita availability

Source: Compile from the previous Tables

179

Table 4: Projected aggregate demand for protein per year up to 2005- 06

Year	Population growth rate (%)	Total population (in million)	Protein requirement Person/day (gm)	Yearly protein requirement (in million tons)
1998-99	2.20	134.03	125	6.12
1999-00	2.20	136.98	125	6.25
2000-01	2.1	138.57	125	6.32
2001-02	2.0	141.48	125	6.45
2002-03	2.0	144.45	125	6.59
2003-04	1.9	147.48	125	6.73
2004-05	1.9	150.58	125	6.87
2005-06	1.9	153.74	125	7.01

Table 5: Per capita availability of meat and eggs from all sources from 1993 to 1998

Year	Population (in million)	Meat (in '000' metric tons)	Per capita meat (in kg)	Egg (in million)	Per capita egg (in no.s)
1993-94	116.3	498.0	4.20	1906	16.39
1994-95	119.9	430.4	3.59	2204	18.38
1995-96	122.1	449.0	3.68	2314	18.95
1996-97	124.3	624.0	5.00	2776	22.33
1997-98	126.5	639.0	5.10	2953	23.34
1998-99	126.9	648.1	5.21	3124	25.12
1999-2000	126.9	648.3	5.22	3198	25.33

Source: BBS 2002

Table 6: Per capita availability of meat and eggs from commercial poultry sources

Year	Population (in million)	Meat (in '000' metric tons)	Per capita meat (in kg)	Egg (in million)	Per capita egg (in no.s)
1993-94	116.3	17.3	0.15	898	7.72
1994-95	119.9	33.6	0.28	1855	15.47
1995-96	122.1	43.3	0.35	2215	18.14
1996-97	124.3	53.7	0.43	2555	20.56
1997-98	126.5	66.0	0.52	2750	21.74
1989-99	134.0	96.8	0.72	2915	21.75
1999-2000	136.9	156.3	1.14	3266	23.86

Table 7: Projected supply of protein from all sources

Year	Supply of protein (in million tons)
1998-99	4.70
1999-00	5.05
2000- 01	5.40
2001-02	5.75
2002-03	6.10
2003-04	6.45
2004-05	6.79
2005-06	7.21

Table 8: Projection of supply of protein gap from all sources (in million tons)

Year	Population (in million)	Yearly protein requirement	Yearly protein available	Yearly supply gap
1997-98	126.50	5.77	4.55	1.210
1998-99	134.03	6.12	4.70	1.420
1999-00	136.98	6.25	5.05	1.200
2000-01	138.57	6.32	5.40	0.920
2001-02	141.48	6.45	5.75	0.700
2002-03	144.45	6.59	6.10	0.490
2003-04	147.48	6.73	6.45	0.280
2004-05	150.58 ·	6.87	6.79	0.080
2005-06	153.74	7.01	7.14	-0.130

Table 9: Commercial poultry market: Recent past and Future trends (in '000')

Poultry products	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Layer:										
Parent Stock	90	95	115	145	220	225	290	335	385	425
DOC (per year)	8100	8550	10300	11800	19800	22950	26100	30150	34650	38250
Egg production (per year)	2555000	2750000	2915000	3266000	3430350	3976088	4521825	5223488	6003113	6626813
Total egg production (in tons)	153	165	175	196	206	238	271	313	366	398
Broiler :										
Parent Stock	285	365	425	750	1050	1400	1800	2500	3200	3800
DOC (per year)	32500	40250	61800	104000	126000	168000	216000	300000	384000	456000
Meat production (in tons)	42	53	83	140	170	227	292	405	518	616
Cockrail production	8900	9500	10300	11800	19800	22950	26100	30150	34650	38250
Total meat production (in tons)	54	66	97	156	197	258	327	446	565	667

Source: Bangladesh Poultry Industries Association (BPIA) - June 2002

183

Table 10: Commercial poultry Feed market: Recent past and Future trends (in '000')

Particulars	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Feed Requirement :										
Layer Feed (Total/kg)	430200	454100	547075	627475	1051600	1218900	1386200	1601300	1840300	2031500
Brown	222750	235125	283250	324500	544500	631125	717750	829125	952875	1051875
White	202500	213570	257500	295000	495000	573750	652500	753750	866250	956250
Parent	4950	5225	6325	7975	12100	14025	15950	18425	21175	23375
Broiler Feed (kg)	125775	156550	231565	391950	484050	645400	829800	1152500	1475200	1751800
Commercial	107250	132825	203940	343200	415800	554400	712800	990000	1267200	1504800
Parent	18525	23725	27625	48750	68250	91000	117000	162500	208000	247000
Cockrail Feed (kg)	33375	35625	38625	44250	74250	86063	97875	113063	129938	143438
Total Feed Required (tons)	589	646	817	1064	1610	1950	2314	2867	3445	3927
Industrial Feed Production (tons)	48	82	162	277	472	685	953	1346	1808	2272
Industrial Feed as % of Total Feed requirement	8.06	12.63	19.87	26.03	29.34	35.12	41.18	46.95	52.48	57.87
Self-mixed Feed (tons)	541	564	655	787	1138	1265	1361	1521	1637	1654

Source: Bangladesh Poultry Industries Association, June 2002

Table 11: Projected Employment generation by poultry production

Particulars	1991-92	1993-94	1994-95	1999-00	2005 (projected)
No. of poultry farms	21500	31363	40133	60000	100000
Employment (full time)	330000	440000	610000	1500000	2500000
No. of parent stock farms Layer : Broiler :	8 6	16 11	21 26	32 48	45 95
Production (000 tons) Eggs : Meat :	36.6 7.05	53.8 17.3	111.3 33.65	196 156.3	398 667

Source: BBS 2002 and BPIA, June 2002

185

CHAPTER-X

SUMMARY AND CONCLUSION

Rationale of the Study

Bangladesh is an agro-based country in the south-east Asian region, having a small territory and a large population. The country has already been marked for her low productivity, chronic food shortage, poverty and external dependence. The country possesses a large predominant agricultural sector and a small rudimentary industrial sector.

The importance of agriculture in Bangladesh can never be overemphasized. Growth and sustainability of agricultural production is an important prerequisite for attaining the rate of overall growth of the Bangladesh economy. About 29.0 percent of the Gross Domestic Product (GDP) of the country come from agriculture and about 64 percent of the total civilian labour force are engaged in agriculture and other allied activities.

However, it has been observed over the recent past years that because of land and technological constraints, growth of crop agriculture has been less than expected. It is, however, maintained that the agricultural growth can be augmented through expansion of non-crop agricultural enterprises such as livestock, fishery and forestry. The contribution of agriculture to GDP (at constant price) declined from 35.92 percent in 1992-93 to 29 percent in 2002. The contribution of crop sector also declined from 27.92 percent in 1992-93 to 21 percent in 2002. On the other hand, contribution of non-crop agriculture (NCA) comprising livestock, fishery and forestry increased from 8.01 percent to 12 percent during the same period.

Livestock plays an important role in the agricultural economy of Bangladesh. Livestock includes cattle, buffaloes, goats, sheep and poultry rearing. The contribution of the livestock sub-sector to the GDP is estimated at 3.86 percent. About 20 percent people are involved in poultry rearing, which also provide part time employment to 50 percent people.

Poultry rearing are considered as a highly viable sector for generation of employment and income for the landless, unemployed youths and destitute women. Poultry farming, unlike crops, are not seasonal. People in this country raise poultry mainly with a view to getting meat, egg, etc. to fulfil their day-to-day consumption. Income from sale proceeds also help them to satisfy their various financial needs.

The poultry products have also industrial uses. Eggs are used in the preparation of culture media for the growth of some species of bacteria. Fertile eggs are used in the preparation of vaccines. Inedible eggs are used in the preparation of animal feeds and fertilizers, egg-whites are used in the manufacture of pharmaceutical paints, varnishes, adhesive and printer's ink. They are also used in photography, bookbinding, wine purification, tanning leather and textile dying. Egg yolks are used in the manufacture of soap, paints and shampoos.

Poultry waste is an excellent source of organic manure, which can be utilized for growing field crops. About 40 adult birds raised on deep litter can produce about ten quintals of organic manure having 3 percent nitrogen, 2 percent potassium and 2 percent phosphorus. In recent years, manure price has gone up. So poultry excreta has become a considerable source of income to the poultry farmers.

Poultry raising require limited land of marginal and infertile categories, which are easily available. The short production cycle in the case of broiler and continuous production after every 4 months in layer provides a more regular cash flow than other agricultural enterprises.

Protein consumption from animal origin is much lower in Bangladesh than in other countries of the world. According to a report of GOB total production of meat is 0.62 million tons and total egg production is 3252 million (no.). The annual average deficit of meat is 5.08 million metric tons and the annual average deficit of chicken egg is 9975 million numbers.

In view of the above scenario in Bangladesh, the poultry farming might play a crucial role. Poultry meat and eggs are excellent source of protein in Bangladesh. Poultry can efficiently and rapidly meet the shortage of protein, as the production proposition requires lesser time and small investment.

Studies on the performance of poultry farming have been done across the country. However, little or no attempt was made to analyze the marketing system of poultry farming in Bangladesh. The present study makes a comprehensive investigation into the marketing performance of poultry sector in Bangladesh.

Objective of the Study

The overall objective of this study is to investigate the marketing patterns and performance of broiler and layer poultry farming industry in Bangladesh. The study utilizes both primary and secondary data. Primary data were collected from the respondents through a set of structured questionnaires. Main sources of secondary data are published government documents and research reports conducted by the various scholars on poultry rearing in Bangladesh.

Organization of the Study

The study contains ten chapters. Chapter two, which provides some information on poultry industry and products from the global point of view, follows the present chapter. Chapter three furnishes a brief review of the empirical investigations related to this study. Chapter four deals with the methodology of the study. In Chapter five, poultry marketing system and performance in the study area is presented along with a brief description of the socio-economic characteristics of the sample households. The costs, returns and profitability of poultry enterprises are presented in Chapter six. Chapter seven describes factors affecting production, costs and returns of different categories of broiler and layer poultry and analyses resource use efficiency in the rearing of poultry. Chapter eight discusses the marketing problems related to poultry rearing. Chapter nine assesses the prospect of the poultry industry in Bangladesh and finally, summary and conclusion are presented in Chapter ten.

Major Findings of the Study

Chapter-II: (Global Poultry Production)

Poultry, today is a fast-growing agricultural-business in the globe. Demand for poultry products has been increasing with rapid growing consumption. Population expansion and the rate of growth of individual purchasing power are the most important factors affecting the demand for poultry products. Approximately 60 percent of the world's total population live in Asia. On contrast, average consumption poultry products of the people in this region are well below that in the developed countries.

Global hen-egg production is growing at a faster rate, from 35,241 thousand metric tones in 1990 to 47,980 thousand metric tones in the year 1999. China is the top hen-egg producing country in the world followed by USA, Japan, Russian Federation, India, Brazil and Mexico. India ranks fifth position among the globe and reasonably first among the SAARC countries. Bangladesh ranks 46th position in the global hen egg production.

Poultry meat production in the world is growing sharply over the years, from 27,628 thousand metric tones in 1992 to 39,113 thousand metric tones in 1999. The USA appeared to be the top producer of poultry meat in the world. The USA shares almost 33% of the world's total poultry meat production. Other top poultry meat producing countries are Brazil, China, Mexico, France, The UK, Japan and Thailand. The production of broiler meat in Bangladesh has also got the momentum during the early 1990s mainly due to the private initiatives.

Global per capita consumption of hen egg has risen slowly during the last decade. This is true, in fact, for almost all the countries of the world. World average egg consumption has been growing by almost 3% annually since 1990. Japan has bagged the top position in term of per capita hen egg consumption among the countries of the world that consumed 19.9 kg/year followed by Lebanon, France, Hungary, Malta, China and the USA. In Bangladesh, per capita consumption of eggs is not worth mentionable but rising gradually.

Complying with the global production and consumption, volume of world trade of eggs in terms of export and import is also expanding. The USA is the pioneer egg-exporting country in the world exporting 2640 million eggs in the year. The other top egg exporting countries in the world are Netherlands, China, India, Canada, France, Italy and Germany. India has been seen to become increasingly active in this market in recent years. In the import list, Japan ranks the top position importing 1730 million eggs in the year. The other top scorers are Hong Kong, Canada, Mexico, France, Netherlands, Poland and Germany.

Global poultry meat business has been seen to expand in terms of export and import during the last decade. The USA has occupied the first position in export list followed by Brazil, France, China, Thailand, Netherlands, Hungary, and Canada. Turning to the import, China has got the first position importing 820 thousand metric tones in the year. The other top importing countries are Russian Federation, Japan, Saudi Arabia, Hong Kong, Mexico, Canada and Germany. Among the markets showing growth are Mexico, Canada, South Africa and Argentina.

During the last 20 years, spectacular expansion in the livestock industries around the globe has been witnessed. Currently, 23% of the world's people consume four times the amount of animal protein as those in the rest of the world, reflecting the unequal distribution of wealth. Future predictions indicate a marked slowdown in livestock growth in developed countries and a rise in developing countries.

Poultry products are widely accepted in most all third world countries. About 75% of Indians, historically vegetarians, now eat meat, and 92% prefer chicken. However industrialized poultry production depends on clean water, a stable electricity supply, and expensive inputs, not often available in these low-income countries, which are highly vulnerable.

Although poultry provide food security, employment, income and animal protein, most low-income countries do not have the resources, particularly capital, to establish a modern industrialized poultry industry. They are at the mercy of the developed countries. Future predictions indicate that with few exceptions, these low-income countries will have to import feed from the developed countries, particularly the USA. India and Thailand are the possible exceptions, at least in short term. Establishing modern poultry production has been a nightmare in many developing countries. Unstable markets and prices have led to uneconomical production and dumping of produce. Sri Lanka experienced crippling import duties, high borrowing costs and increased utility charges, adding to the demise. India and Pakistan have seen sharp fluctuations in demand for eggs and meat, and escalating feed prices with some companies going bankrupt particularly those in processing. Not only is there dumping of chicken meat from developed countries but there are examples of dumping of eggs and chicks among low-income countries.

Matching livestock production with available resources seems to be the only practical long-term solution to the future of the poultry industry. Given the forecast of escalating prices in crude oil, and depleting reserves, it seems that it is only a matter of time before the entire structure of industrialized livestock production will be challenged.

Small-scale poultry production may be part of the solution but only when there is a sound infrastructure in place and strong government support. In Bangladesh NGOs like BRAC, PROSHIKA have provided invaluable assistance to village poultry. Indonesia is actively promoting village chicken production. It is inevitable that in most developing countries, a modern poultry industry will flourish around cities to meet the demand for products by the growing affluent population but without necessarily benefiting the needy.

Chapter-III: (Review of Literature)

The study reviews almost 100 studies on poultry rearing in Bangladesh and across the globe. It is evident from the review of literature that most of the studies were conducted on poultry production, economic feasibility, disease control, consumption patterns of poultry etc. But little or no systematic and comprehensive study was conducted on poultry marketing in Bangladesh. This inspires the researcher to conduct a study on the marketing and economic aspects of poultry farming in Bangladesh.

Chapter-IV: (Methodology of the Study)

The term "poultry" is used to designate those species of birds which render and economic service reproduce freely under proper care. It includes chickens, turkey, ducks, geese, swans, pigeons, and ostriches and refers to them whether alive or dressed. The poultry industry is thus made up of three segments: eggs, chickens, and turkeys. This study describes the marketing pattern, performance, and prospects of eggs and chickens (both broiler-layer and local).

Among the various process of defining a research problem (such as interviews with experts, secondary data analysis etc.), this study applies the secondary data analysis technique in defining the problem. Secondary data on agricultural sector of Bangladesh indicates that the contribution of live stocks and poultry- a sub-sector of agriculture has been increasing in Bangladesh over the last decade, while the contribution of main agriculture to the GDP gas been declining. This has motivated the researcher to pick up the research issue and therefore, a study has been conducted to investigate the marketing performance, problems and prospect of the poultry sub-sector in Bangladesh. The present study is basically a problem identification research in nature as it explores the marketing characteristics of poultry products in Bangladesh.

Objective evidence (evidence that is unbiased and supported by empirical findings) has been gathered by compiling relevant findings from secondary sources. Objective evidence obtained from secondary sources indicates a secular-increasing trend of poultry sector in Bangladesh. Variables selection which, formed the theoretical framework of the study, were identified from the past studies

conducted mainly by the researchers of the Bangladesh Agricultural University.

Present study applies both verbal and mathematical model to describe the relationships of the variables. Mathematical model applied in this study has been the Cobb-Douglas production function. Calculating the coefficient of determination (R-square) and F-value has tested goodness of the fit of the model. Six research questions were formulated for the study. These are:

(i) What are the socio-economic characteristics of broiler and layer growers?

(ii) What is the marketing pattern of poultry farms?

(iii) How well poultry growers are performing their marketing activities?

(iv) What are costs, returns and profitability of broiler and layer production?

(v) What factors contribute to the production processes of poultry products.

(vi) What are the major socio-economic and marketing problems facing by the broiler and layer farm owners?

The following null hypotheses were formulated and tested in the study:

a) The broiler and layer farming in the study areas are not profitable.

b) There is no significant difference in profit between the broiler poultry farm and layer poultry farm.

c) The contribution of the key variables to the production processes of broiler and layer poultry farms is negligible.

The marketing performance of poultry products is extremely inefficient

The study utilizes both primary and secondary data. Secondary data have been collected from such sources as Bangladesh Bureau of Statistics (BBS), economic survey of Bangladesh, world poultry statistics, published theses and research reports, conference reports of the poultry association of Bangladesh etc.

The quality and accuracy of the secondary data may raise some questions. Firstly, an inconsistency in data from different sources is observed. Secondly, within the same source a discrepancy is also witnessed. Thirdly, a wide gap is found between the Bangladeshi sources and international sources of data. And finally but not least, methodology used by the above sources is not free from criticisms.

The present study was based on a field survey where primary data were collected from individual farmers. Survey method was chosen because it was thought to be more advantageous. But the investigator has to depend upon the memory of the respondents. To overcome this, repetitive visits were made in the study area and the questions were asked in such a manner that the farmers could answer from memory.

The steps followed in the present study were: selection of the study area, selection of the samples, periods of data collection, preparation of the survey schedule, collection of data, analytical techniques and methods of measuring cost items. In this study, Bajitpur thana of Kishoregong district has been selected as a study area. Selection of the

study area has been done using certain criteria, which are discussed in detail in chapter four. Considering the nature of poultry rearing and farm size, a sample size of 100 farms was chosen for the present study. A stratified proportionate random sampling technique was followed in this study. In total 100 poultry farms were selected taking 33 from each of the selected categories.

The period of investigation of this study covered a one-year beginning from January to December 2003. Formal data were collected during January to March 2003 through direct interviews with broiler farmers.

Chapter-V: (Poultry Marketing Pattern in Study Area)

This chapter initially examines some of the socioeconomic background of the sampled respondents (e.g. age, income, education income, family size, farm size etc.). The study observed that consumption pattern of the respondents is largely influenced by the economic characteristics, but not the age, family size and education. Data indicated that consumption of poultry is increased with enlargement of farm size and increased level of income. In the study area meat and eggs of deshi chicken and duck are more attractive to the consumers because of taste and quality. Despite higher demand for local chicken, consumption of broilers and layers has been increasing in a linear fashion with advancement of time in the study area.

The marketing pattern of poultry products did not show any uncommon trend in the study area. The quality and variety of products are less similar, price variation is minimum, distribution channel is traditional and there is a complete lack of promotional activities. The net

marketing margin of farms is higher for large and middle farms than that of small farm. Average net profit per kg. of live broiler was Taka 4.23. Poultry rearing have been facing a number of chronic problems in the study area. These are high transportation cost, inadequate marketing facilities, lack of market information, lower market price, shortage of birds, absence of storage facility, lack of institutional credit facilities and unfavorable business condition.

Chapter VI: (Cost, Return and Profitability of Raising Poultry)

This chapter estimates and analyzes the par farm costs and returns of different categories of broiler and layer farms in order to determine the comparative profitability of the selected enterprises. Among the variable costs, feed cost and purchase of day-old chick accounted for more than 75% of the total costs followed by labour cost, veterinary expenses, electricity and transportation costs. In the fixed cost category, interest on operating capital has been the highest accounting for about 11 percent, followed by housing cost, family labour and depreciation on tools and equipment. The net return was found highest in medium farms followed by large and small farms in the study area. The Benefit-cost ratio was highest (1:33) for medium poultry farms and was significantly higher than that of large and small broiler farms.

Chapter-VII: (Factors Affecting Production, Costs and Returns of Poultry Rearing).

The inputs used for producing layer and broiler products were mainly human labour, feed, veterinary expenses, day-old chicks, electricity and transportation. Apart from these inputs there were some other factors,

such as quality of housing, tools and equipment, time of feeding and treatment also affected net return of the enterprise. The effects of human labour, feed, veterinary expenses, day-old chick and electricity used per 100 birds per farm on net returns have been analysed in this chapter. Cobb-Douglas production function has been applied to explore the quantitative relationship between the production and returns from broiler and layer poultry and the inputs used.

Results show that there is a variation in net return among the sampled farmers. The variation in net return among the sample farmers would indicate the possibilities of improving net returns from the enterprises. The farmers who received comparatively lower net return could improve their performance by ensuring effective management of the existing resources. The regression coefficients of feed, labour, veterinary expense, electricity and day-old chick for broiler and layer poultry farms have shown an expected signs and significant mostly at 1 percent level. The regression coefficients of two dummy variables, representating the size of the farms were also statistically significant at 1 percent and 5 percent level. This indicates that the farm size significantly affected gross returns of the farms. The results therefore, reject the null hypotheses that the contributions of the key variables to the production processes of poultry farms are negligible.

The overall performance of the Cobb-Douglas model for all categories of poultry farms was satisfactory as indicated by the estimated R-square and F-values. Elasticity values of different inputs shows that the production function exhibited an increasing return to scale, implying

that opportunities remain to use more of the resources to maximize returns from rearing broiler and poultry birds.

Chapter-VIII: (Problems of Rearing Poultry)

Poultry farmers have facing a number of constraints in raising birds. In chapter nine, three broad categories of problems have been identified. These are economic and technical problems, marketing problems, and social and natural problems. Lack of capital, higher prices of feed, lack of institutional credit facilities, poor conception of poultry housing, inadequate knowledge about poultry diets, non-availability of day-old chick, non-availability of training facilities, inadequate electricity, and inadequate health care and veterinary services are the major economic and technical problems mentioned by the farmers. Lower price of meat, lower prices of eggs, lower price of quality of meat, non-availability of feed throughout the year, and higher price of day-old chick are the major marketing problems in raising poultry birds. Problems of theft, outbreak of diseases, social stigma associated with poultry rearing, pollution of environment, poultry creates family disruption, predatory animals, and problems natural calamities are identified in the social and natural constraints in poultry rearing in Bangladesh.

Chapter-IX: (Prospect of the Poultry Industry in Bangladesh)

This chapter assesses the future prospect of the poultry industry in Bangladesh. Prospect has been assessed based on the demand and supply situation. Demand for layer and broiler is related to demand for protein. Future requirement has been estimated on the basis of demand for protein. Future supply from commercial sources has been estimated

using third degree poly-nominal regression model over the past supply of commercial sources. Finally, demand for commercial feed has been calculated from the requirement of feed by each of the layer parent and broiler parent. Details of the estimation procedure of future requirements for broiler and layer poultry have been described in the chapter.

The last decade witnessed a drastic transformation in the commercial poultry market. Layer parent stock has grown almost 6.5 fold from 22.5 thousand in 1991 to 145 thousand in 1999-2000. Layer DOC has grown almost 5.9 fold from 2 million in 1991 to 11.8 million in 1999-2000. The broiler market has increased even faster specially in second half of the past decade. Broiler parent stock has grown almost 25 times from 30 thousand in 1991 to 215 thousand in 1995-96 to 750 thousand in 1999-2000. Broiler DOC has grown almost 30 times from 3.5 million in 1991-92 to 104 million in 1999-2000.

The industrial feed market has also increased from 18.5 thousand metric tons in 1995-96 to 277 thousand metric tons in 1999-2000. Keeping life cycle of this market and other factors in mind, layer parent stock is expected to grow from present level to 425 thousand by the year 2005. Layer DOC is expected to grow 38.25 million per year by 2005.

Broiler market is expected to grow at a faster rate. Broiler parent stock is expected to grow 3.8 million in number by the year 2005. Broiler DOC is expected to grow at 456 million per year by 2005. The industrial feed market will also grow to 2.27 million metric tons a year by 2005 from 277 thousand metric tons a year in 1999-2000. Therefore, in the time to

come, there lies a vast scope to expand this industry to bridge the demand and supply gap of protein likely to get from this sector. This industry can therefore, expect to attract huge investment in both public and private sector. In terms of employment generation, this sector offers ample opportunity particularly, in the private initiatives.

Each year almost 1.5 million fresh young men and women await for employment, and since scope of new employment generation by the government is extremely limited, many of this young are coming forward to get their employment through poultry business (Rahman: 2003). The full time employment in poultry sector in 1999-2000 was estimated to be 1500000 persons, which has been projected to be some 2500000 by the year 2005. This figure has been estimated based on the persons directly involved in poultry production; persons involved in feed mill, vaccine industry, marketing, and other allied activities revolving poultry business has been kept aside from this estimation. It could therefore, safely be concluded that in terms of employment creation and income generation poultry sub-sector would dominate to the whole gamut of agricultural sector of Bangladesh in years to come. To that extent, future of the poultry sub-sector is extremely bright in Bangladesh.

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223

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