COMPARATIVE PRODUCTION (GROWTH) PERFORMANCE AND COST BENEFIT ANALYSIS OF SONALI CHICKEN UNDER INTENSIVE AND EXTENSIVE CARE

A THESIS

BY

UTPAL ROY

Registration No. 1605478

Semester: January-June, 2018

MASTER OF SCIENCE (M.S)

IN

POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

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Submitted to

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Hajee Mohammad Danesh Science and Technology University, Dinajpur in partial fulfillment of the requirements for the degree of

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Approved as to style and content by

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DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

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Dedicated to
My
Beloved Parents

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The author
December, 2018

ABSTRACT

The study was conducted to investigate the production system, cost benefit analysis feeding, management, disease prevalence and others problems and prospects of sonali chicken and assess the potentiality of sonali chicken rearing in Dairy and Poultry Science farm of HSTU, Dinajpur and in rural areas of Khochana, Chrirbandar, Dinajpur District in Bangladesh. Data were collected randomly from 90 sonali chicks rearing. I using a pre-tested interview schedule during April to June 2017 from different areas of Dairy and Poultry Science farm of HSTU, Dinajpur and in my home Khochana, Chrirbandar, Dinajpur District. Cost benefit analysis of different dietary treatment on sonali chicken production. Feed cost for production T_0 (70.27±3.82), T_1 (87.05±2.09) and T_2 (28.0±0.00). Total cost for production T_0 (106.77±3.82), T_1 (128.05±2.09) and T_2 (58.0±0.00).

Net profit Tk. T_2 (4.60±0.81), T_1 (2.37±0.76) and T_0 (2.19±1.32) per chick. Most of the farmers (81.25%) stated that the sonali chicken farming is increasing day by day. On the comparison of sonali rearing with intensive and extensive care showed that the costing is less in case of extensive group of sonali than intensive group of sonali. As a result said that extensive group is more beneficial than intensive group.

It was concluded that proper knowledge of feeding, vaccination, housing, prevention and control of diseases are given to the rural people could increase the sonali chicken farming with increased household income and employment to youth, rural women and the small-holder marginal farmers.

CONTENTS

LIST OF TABLE

LIST OF FIGURES

ABBREVIATIONS

BW	=	Body Weight
d	=	Days
DFC	=	Daily Feed Consumption
BBS	=	Bangladesh Bureau of Statistics
BRDB	=	Bangladesh Rural Development Board
GOB	=	Government of Bangladesh
DLS	=	Department of Livestock Services
DOC	=	Day-Old-Chick
et al.	=	Et alia (L.) and others
GDP	=	Gross Domestic Product
M.S.	=	Master of Science
NGOs	=	Non-Government Organizations
%	=	Percentage
Etc.	=	Etcetera
gm.	=	Gram
Kg.	=	Kilo Gram
Tk.	=	Taka
IR	=	Interest Rate
OC	=	Operating Capital
Ltd.	=	Limited Company
GP	=	Grand Parent
No.	=	Number
Dr.	=	Doctor
Fig.	=	Figure
HSTU	=	Hajee Mohammad Danesh Science and Technology University
Prof.	=	Professor
SEM	=	Standard Error of Means
Sl.	=	Serial Number
&	=	and
/	=	Per/or

@	=	At the rate of
+	=	Plus/and
<	=	Less than
>	=	Greater than
±	=	Plus-minus
µl	=	Micro Liter
ME	=	Metabolizable Energy
FCR	=	Feed Conversion Ratio

CHAPTER-I
INTRODUCTION

Bangladesh is the biggest delta landscape in the world with a large human and natural resources (Mondal *et al*., 2002). Our country takes place 136th position in Human Resource Development Index under UNDP report 2017. The agriculture sector in Bangladesh is gradually diversifying in favor of high-value commodities, mainly fruits, vegetables, livestock, poultry and fish products. After readymade garment sector, poultry farming has turned out to be promising dynamic enterprise with enormous potential for rapid poverty reduction in Bangladesh. Poultry enterprise is also most vital due to its contributions to national economy in sphere of generation of local income-employment creation and improving the nutrition level of third world country like Bangladesh. Poultry farms in Bangladesh are growing fast in recent times. With a high population and income growth, urbanization and high income elasticity of demand, the demand for poultry products is expected to increase appreciably in the future. People in our country raise poultry mainly with a view to getting meat and egg to fulfill their day to day consumption. Poultry plays a pivotal role in bridging the protein gap of animal origin in Bangladesh. Meat holds an important position in our daily diet. It provides palatability and is a good source of essential amino acids, vitamins and minerals. Local as well as crossbred chicken production which is still important as an appropriate system to support the fast growing human population with high quality protein. Poultry meat shared second position of the meat production. Chowdhury (2013) pointed out that the per capita consumption of all meat is 14.67 kg and that of egg is 31 numbers as against the requirements of 56 kg meat and 365 eggs, respectively.

The poultry industry is crucial in the context of agricultural growth and improvement of diet for the people in Bangladesh. This sub-sector is particularly important in the sense that it is a significant source of supply of protein and nutrition in a household's nutritional intake. Poultry is a common enterprise in rural Bangladesh. The poultry industry in Bangladesh is very important for the reduction of poverty and creation of employment opportunities. The livelihoods of a substantial section depend directly on this industry. Poultry rearing can play a vital role in a country like Bangladesh where most of the people are landless, disadvantaged and devoid of formal education or skill to participate in income generating activities. Poultry can be an important tool for fighting with poverty

not only for these groups of people but also for the distressed women and unemployed young generation as poultry requires minimum land, short capital and skill.

With the unfavorable land-man ratio accompanied by unexpectedly high growth rate of population, poultry development has become a challenging task. The number of disguised unemployed manpower in the country is increasing day by day. A part of this disguised unemployed people can probably be employed with the poultry business if it is noticed to be a profitable one. In Bangladesh, the poultry farming is also an integral part of the farming system. The numbers of livestock and poultry population are increased day by day in our country. In 2004-05, total livestock was 454.1 lakh where it reaches to 523.65 lakh in 2011-12. Poultry population was 2207.3 lakh in 2004- 05 and in 2011-12 it reaches to 22843.64 lakh (BER, 2011). Table 1. shows the growth rate of the livestock and poultry population of Bangladesh over the past few years. It is observed from the Table that the increasing rate is satisfactory throughout the period.

Table 1: Numbers of Livestock and Poultry in Bangladesh

(Number in Lakh)

Particulars	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**
Cattle	229.0	229.76	230.51	231.21	231.68
Buffalo	12.6	13.04	13.49	13.94	14.24
Goat	215.6	224.01	232.75	241.49	247.54
Sheep	27.8	28.77	29.77	30.02	30.19
Total livestock	485.0	495.58	506.52	516.66	523.65
Chicken	2124.7	2213.94	2280.35	2346.86	2392.49
Duck	398.4	412.34	2280.35	441.20	451.15
Total poultry	2523.1	2626.28	2707.12	2788.06	22843.64

Source: BER, 2011.

With a unique communal harmony, Bangladesh has 147570 km sq land area with a large population about 146.6 million (BBS, 2011) and a major percentage of people depend on agriculture for their livelihood. Agriculture sector plays an important role in the overall economic development of Bangladesh and it is regarded as the lifeline of Bangladesh economy. It is also an important social sector concerned with some issues like food and nutritional security, income generation, and poverty reduction. According to the

provisional estimation of Bangladesh Bureau of Statistics, the overall contribution of the broad agriculture sector at constant price was 19.95 percent of GDP in 2010/11 (BER, 2011). In agriculture sector, contribution of the three sub-sectors namely crops and vegetables, livestock and forestry were 11.24 percent, 2.57 percent and 1.71 percent, respectively and contribution of fisheries was estimated at 4.43 percent. Sectoral growth rate of GDP at constant prices since 2005/11 years are shown below in Table 2.

Table 2: Sectoral Growth Rate of GDP at Constant Prices

(In percentage)

Sector/Sub-sector	2007/ 08	2008/ 09	2009/ 10	2010/ 11
Agriculture and Forestry	2.93	4.10	5.56	4.82
Crops and horticulture	2.67	4.02	6.13	5.04
Animal farming	2.44	3.48	3.38	3.54
Forest and related services	5.47	5.69	5.23	5.35
Fisheries	4.18	4.16	4.15	5.44

Source: BBS, 2011.

Importance of raising poultry in a developing country like Bangladesh cannot be ignored from economic and nutritional points of view. The contribution of poultry industry to the national economy is very significant. Poultry keeps a great contribution in GDP and growth rate in our economy. A large number of people in our country are involved with poultry industry either as full time or part time basis. About 60 lacks people are engaged directly or indirectly in poultry industry (Chowdhuary, 2013). Poultry plays a key role in the agro-based economy of Bangladesh. Poultry are most vital due to their key contribution to national economy in generating income, employment creating and improving the nutritional level of our country. Poultry provide products as well as some other services. Meat and eggs (raw, cooked, soup), manure (for crops and fish), nutrient supply (ruminants) are some products and cash income, gifts, loans, religious rituals, pleasure/sports, medicine, barter material for other goods are some services of poultry. The concept of human nutrition has taken a new dimension. Today emphasis has been given on high protein and low calorie diet, as protein plays a vital role in the balanced and health growth of human being. In this circumstance, poultry appears to be a good way of meeting the protein gap by providing eggs and meat with low cost. The price of poultry meat is comparatively lower than other livestock like beef, mutton, ducks meat and

others. Imbalanced and inadequate food consumption is a major cause of under nutrition or malnutrition. Consumption of protein of animal origin is much lower in Bangladesh than in some other countries of the world. About 60 percent families of Bangladesh cannot meet their protein requirements in their daily food consumption (Akter, 2008).

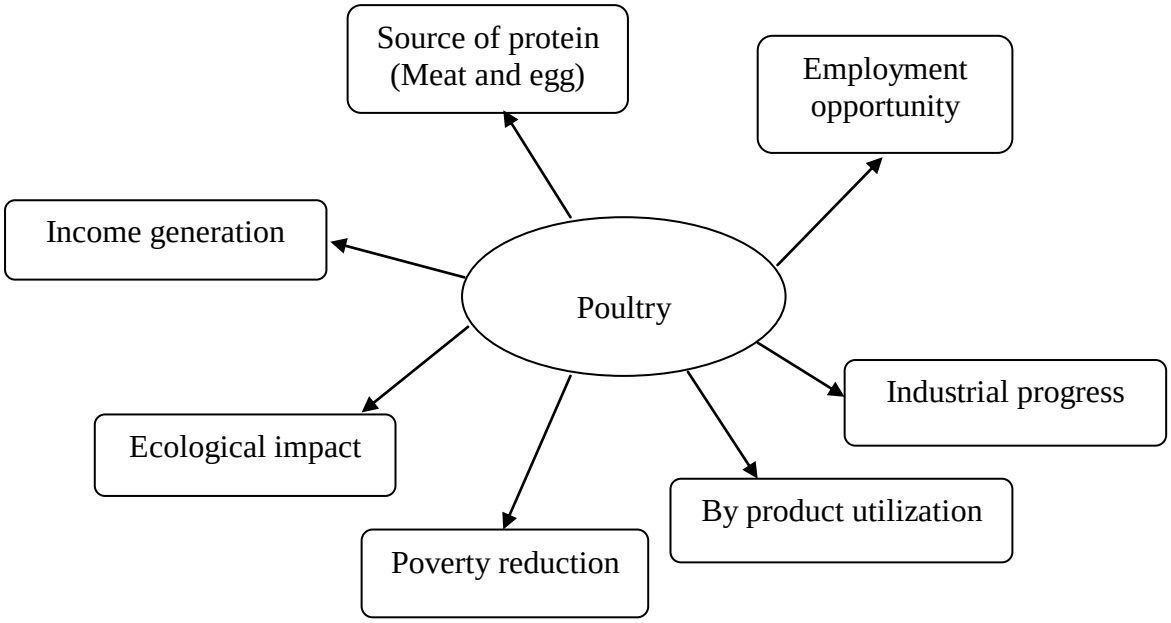

Figure 1: Contributions of the Poultry Industry to the Nutrition Level and National Economy in Bangladesh

Objectives of the Study

The experiment was conducted at the Dairy and Poultry Science farm of HSTU, Dinajpur and Khochana, Chrirbandar, Dinajpur during the period from mid April to June 2017. Commercial sonali chick was used in this study for a period of 63 days to find out the production performance of Sonali chicken in intensive and extensive care.

i. To identify the growth performance of *sonali.*
ii. To estimate the dressing percentage.
iii. To estimate the profitability of *Sonali* poultry production.

CHAPTER-II
REVIEW OF LITERATURE

2.1 Preamble

Review of related literature in any research is necessary because it provides a scope for reviewing the stock of knowledge, primary concept and relevant information to the proposed research. These knowledge, concept and information give a guideline in designing and conducting the research successfully. It is essential for reviewing that gives a proper instruction in designing a future research problems and validating the new findings. Studies on the economics of *Sonali* enterprise are of recent origin in Bangladesh. Though a good numbers of researches have been completed on poultry production, broiler production and layer production, but the studies on the particular concerned of economic analysis on *Sonali* farming is rare one. In present part, the most common and fruitful relevant studies about poultry are given which were conducted in home and abroad in the recent past.

2.2 History of *Sonali* Poultry in Bangladesh

Sonali poultry is a crossbred chicken. Crossbreeding has been a major tool for the development of present day commercial breeds of chickens and could likewise be used to improve the rural chicken. Crossbred progenies were superior to purebred in terms of growth rate, meat quality, and body weight and feed conversion (Sarkar, 2008).

- Poultry
- Source of protein (meat and egg)
- Employment opportunity
- Income generation
- Industrial progress
- Poverty reduction
- By product utilization
- Ecological impact

Sonali poultry, the F1 crossbred of Fayoumi female and RIR (Rhode Island Red) male developed in 1986, has been reported to perform better with respect to egg production and considering environmental factors such as predators, rainfall, housing and economic traits

as Survivability and rapid growth to male chicks as well as egg production to female (Sarker, 2008). *Sonali* poultry has been observed to give good egg production, meat production, rapid growth and low mortality under scavenging, semi scavenging and intensive farming system.

The Department of Livestock Services (DLS) of Bangladesh has launched village poultry development program through 'DANIDA' funded poultry oriented extension projects "PLDP" and "SLDP-2". The Small Holder Livestock Development Project (SLDP-2) is trying to increase egg and meet production from poultry bird in the project area (Khatun, 2004). The program is giving emphasis on rearing the crossbred chicken named "*Sonali*".

Sonali poultry has been taking its place besides the indigenous hens due to its adaptability and acceptability in the climatic conditions of Bangladesh. *Sonali*, with a phenotypic appearance similar to local chicken has higher market demand than exotic breed. *Sonali* poultry has specially been advocated in terms of their higher egg production rate and better adaptability in rural households even in adverse agroclimatic conditions.

2.3 Importance of *Sonali* Poultry

Poultry is one of the best tools for poverty reduction throughout the world. Intensive chicken production especially *Sonali* poultry is a subsistence activity, providing eggs and meat for family consumption and to some extent, cash income. *Sonali* poultry is appreciated for its better egg production (156 eggs per year with low supplementary feed input) and meat production both (Sarker *et al.,* 2008). The *Sonali* chickens are harder than the exotic breeds of broiler and the taste, flavor and juiciness are almost similar to the exotic cockerel stocks. In our country, contest *Sonali* rearing is better than broiler for meat due to suitable environment for *Sonali* birds rearing. *Sonali* meat is more palatable and has more market demand than broiler in our country. It can perform better for our economic growth and development.

As an important sub-sector of livestock production, the poultry industry in Bangladesh is considered a great avenue for the economic growth and simultaneously creates numerous employment opportunities. *Sonali* poultry is able to provide employment opportunity for our large unemployed, unskilled and poor people especially for women and for young generation also. It requires less care and attention so that surplus family members like women and children can easily rears *Sonali* for meat and income generation.

Saleque and shah, 2013. Commercial *Sonali* farming provides employment opportunities for unemployed family members to improve socioeconomic conditions and increase women employment among rural people of Bangladesh. In our country, about 76 percent of *Sonali* beneficiary has improved their conditions by rearing this type of poultry (Hossen *et al*., 2012).

Bangladesh reportedly is turning to be a society of sick, stunted and degenerated bunch of people due to chronic protein deficiency. This country has already marked for its poverty, external dependence and unemployment problem. In this circumstance, *Sonali* poultry farming would be an excellent and appropriate way to promote the nutritional and economic security of the people living in rural, tribal and inaccessible areas in a sustainable manner.

2.4 Related Studies

Chowdhury (2013) conducted a study on opportunities and challenges facing commercial poultry production in Bangladesh. The paper is an overview of the situation that prevails at the present time and its attempts to identify major opportunities and challenges in poultry sector. The outbreak of avian influenza has appeared as a major challenge in the recent years while a number of other constraints like weak and no educational and training background of farmers, too much dependency on imports of farm inputs, instable prices of major farm inputs etc. are continuously hindering a healthy production atmosphere. Absence of strong linkage among industry, government institution, NGOs, universities and research institutes is still significant. Some recommendations were made for the policy maker to react promptly for the development of poultry sector in Bangladesh.

Khawaja *et al*. (2013) examined a production performance, egg quality and biochemical parameters of three way crossbred chickens with reciprocal F1 crossbred chickens in sub-tropical environment. They took a total of 225 hens (18 weeks of age) of each Rhode Island Red male x Fayoumi female (RIFI), Fayoumi male x Rhode Island Red female (FIRI) and White Leghorn male x FIRI female (RLH) were maintained on deep litter system for a period of 72 weeks of age. The highest egg weight was observed in RLH than those of FIRI and RIFI crossbred chickens. The RIFI crossbred chickens achieved sexual maturity earlier than both FIRI and RLH crossbred chickens with lower egg traits.

Saleque and shah, (2013) conducted a study on production and economic performance of small scale *Sonali* bird farming for meat production in Bangladesh. To evaluate the production and economic performance of this small scale *Sonali* bird farming, data was collected from selected upazilas. It was found that 85% farmers raised *Sonali* chickens for meat purposes and only 15% for production of hatching eggs. The poultry rearers bought the *Sonali* chicks from local hatcheries and rear up to 65-90 days and sold for meat purpose. The body weight at the time of sold varied from 700-900 gm (average 775 gm). Economic performance was assessed through the calculation of gross return, gross cost and net cost of per bird per production cycle. *Sonali* farming seems to be an important source of cash income for poor rural families, particularly for women and substantially contribute to meet the protein need of the nation.

Hossen *et al*. (2012) conducted a study on the problems and prospects of *Sonali* poultry farming in different village levels of Joypurhat district in Bangladesh. The study outlined major concern focusing on the entire problems. The study was conducted in five upazilas in Joypurhat district. Some major problems like lack of day old chicks, lack of quality chicks, high price of feed but low price of live bird, marketing problem, lack of quality vaccine, insufficient bank loan and weak nation policy were found in the study area. They suggested that the government should adopt a system of approach to *Sonali* development which will encourage basic research in genetics and breeding, feeds, feeing and nutrition, general management, economic and social aspects of raising the profitability and usability of *Sonali* for high productivity.

Miazi1 *et al.* (2012) conducted a study on fertility and hatchability of Fayoumi and *Sonali* chicks. The study was conducted in Chittagong district and in Noakhali District. Twelve eggs of each breed were supplied to each farmer. The fertility of Fayoumi and *Sonali* chicks were found to be respectively 88.6% and 89.8%. Hatchability of Fayoumi chicks was higher (87.1%) in Noakhali than that of Chittagong (84.9%) and hatchability of *Sonali* was 90.2% and 84.9% in Chittagong and Noakhali respectively which did not differ significantly. So the fertility and hatchability of two breed were near to similar in case of both breed and both location and did not differ significantly.

Halcyan (2011) conducted a socioeconomic study on household poultry rearing in some selected areas of Mymensingh district. In the present study researcher selected sixty household farmers in Sadar upazilla and Trishal upazila under Mymensingh district. The

study revealed that most of the broiler farmers were of age group of 25-45 years and highest number had secondary education. The total cost, average gross return, net return and benefit cost ratio were taka 9810, taka 11087, taka 1277 and 1.13 respectively. It is evident conclusion from the study that socioeconomic development can be achieved with the help of household poultry farming.

Akter (2008) conducted a study on an economic analysis of layer farming in some selected areas of Taingail district. To calculate the cost and return and find out the profitability, researcher took a sample of 70 farmers. The net returns above total cost for per batch per hundred eggs were estimated at Tk. 45.43, Tk. 55.51 and Tk. 60.48 for small, medium and large farms respectively. The study identified some major social, medical, marketing and general problems and constraints and researcher gave some recommendations for improving layer farming.

Akther (2008) conducted a study on broiler farming under Aftab bahamuhkhi farm limited supervision and farmers own management: a comparative efficiency analysis. Total 90 farmers were selected under both management from three upazila named Bajitpur, Kuliarchar and Kishoregonj Sadar. The total cost and average net return per batch per farm for 1000 birds were estimated Tk. 99429; Tk. 106330 and Tk. 4259; Tk. 3631 for the Aftab bahamuhkhi farm limited supervised farmers and own managed farmers respectively. The study also identified some major problems of broiler farming and suggested some recommendations for the development of broiler farming.

Sarkar *at el*. (2008) studied comparative study on the productivity and profitability of commercial broiler, cockerel of a layer strain and cross-breed (RIR*Fayoumi) chicks. They took two hundred sixteen birds of 3 genotypes named commercial broiler, cockerel and *Sonali* bird each of 72 birds having 18 chicks up to target body weights of 850, 1000 and 1250g. Commercial broilers attain the target weights of 850, 1000, 1250g at the age of 21, 24, 28 days respectively whereas cockerels attained weights close to those targets at 56, 63, 74 days respectively and in the case of *Sonali*, the days were 63, 77 and 90 for those targets respectively. At conclusion, they said commercial broiler, cockerel and *Sonali* could be reared up to 28, 56 and 63days respectively to reach target weights close to 1250, 850 and 850g respectively to obtain maximum profit.

Raihan and Mahmud. (2008) conducted a study on trade and poverty linkages case study of the poultry industry in Bangladesh. This industry is particularly important in the sense

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

Dhar *et al*. (2007) examined response of semi-scavenging F1 crossbred (Rhode Island Red male Fayoumi female) grower and pre-layer chickens to diet of different nutrient density formulated with locally available feed ingredients. Two experiments were conducted to investigate the birds' responses to diet the varying nutrients concentrations, one with 126 eight-week-old F1 crossbred *Sonali* birds up to 20 weeks of age (growing stage) and another with ninety 20-week-old birds up to 22 weeks (prelayer stage) under semi-scavenging condition in the poultry farm. It may be concluded that it is possible to formulate least-cost poultry diets by incorporating locally available feed ingredients and the responses of birds to HND is most favorable and therefore its nutrient specifications may be followed for formulating diets of semi-scavenging F1 crossbred *Sonali* grower and pre-layer chickens.

Sarker (2008) conducted comparative study on the productivity and profitability of commercial broiler, cockerel of a layer strain and cross-breed (RIR*Fayoumi). The experience was conducted with 72 birds each of 3 genotypes having 18 chicks. Commercial broilers, cockerels and *Sonali* bird attain the target weights of 850, 1000, 1250g at the age of 21, 24, 28 days; 56, 63, 74 days and 63, 77 and 90 days respectively. FCR were best in broiler, followed by cockerel and *Sonali* respectively. On the basis of result of productivity, it was concluded that broiler, cockerel *Sonali* are profitable at the targeted body weight.

Islam (2006) conducted an economic study on broiler farming and its impact on livelihood improvement in selected areas of Gazipur district. The researcher took fifty farmers for the present study. The study revealed that most of the broiler farmers were of age group of 23-45 years. For average per batch per farm for 100 birds total cost, gross

return, gross margin and net return were estimated at taka 96075.42, taka 106650, taka 13239.50 and taka 10574.58 respectively. Gross return and net return indicated that broiler farming was profitable business. The study identified some economic, marketing, technical, social and natural problems, with their provable solution.

Roy *et al*. (2006) determined the production potentiality and economics of rearing cockerels from a commercial layer strain. The birds achieved body weights close to target weight at 42, 53 and 63 days, respectively. Feed conversion ratio was higher in target body weight of 750 than in 500 and 1000g. Total costs of production were Tk. 66.4, 62.7 and 59.7 per kg and producer's profit per kg was Tk. 9.6, 13.4 and 16.3 for target body weight of 500, 750 and 1000g, respectively. Birds of all target body weight were profitable but target body weight of 1000g was the most profitable.

Islam (2005) examined a comparative performance of *Sonali* and fayoumi chickens from day old to eight weeks of age with or without supplementary feeding. *Sonali* and Faymoui chicks were distributed to control without supplementary feeding in scavenging condition and 60 percent without supplementary feeding in semi scavenging condition. The egg weight and body weight at 8 weeks of age were significantly higher in *Sonali* than fayoumi. Body weight was highest in *Sonali* with supplementary feeding. Livability was better in *Sonali* than then fayoumi. The higher profit was found in *Sonali* in control followed by fayoumi in control. So, it may be suggested that egg weight, body weight, livability and profitability of *Sonali* chicken is superior to fayoumi under scavenging and semi-scavenging condition.

Khatun (2004) examined the performance of Sonali (RIR* Fayoumi) chicks on balanced feed with or without antibiotic reared under rural condition. A total of 160 days old straight run *Sonali* (RIR Fayoumi) chicks were given antibiotic at the rate of 0g, 1g, 1.5g and 2 gram per liter. The growth and feed conversion efficiency of chicks increased significantly ($P<0.1$). Antibiotic had no effect on feed consumption ($P>0.05$) of chicks. Increasing antibiotic increased survivability ($P>0.05$). It was concluded that addition of antibiotic in drinking water increased performance of chicks at the level.

Talukder and Uddin (2003) conducted a comparative economic analysis of poultry credit programs of Bangladesh rural advancement committee (BRAC) and Bangladesh Krishi bank (BKB) in some selected areas of Sreepur upazila in Gazipur district. For achieving the objectives, both organizations took 80 farmers equally. Cost and return were

calculated to find out profitability. In terms of profitability, large farms secured the highest profit followed by small and medium farms. Feed cost was found to be the largest cost items. The study identified some socioeconomic constrains of poultry farming. At conclusion, the author suggested some possible steps to overcome these constrains and encouraged livestock farming with favorable credit and other supports by GO and NGOs.

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

CHAPTER-III
METHODOLOGY

3.1 Location of the study

The experiment was conducted at the Dairy and Poultry Science farm of HSTU, Dinajpur and Khochana, Chrirbandar, Dinajpur during the period from mid April to June 2017. Commercial sonali chick was used in this study for a period of 63 days to find out the production performance of sonali chicken in intensive and extensive care.

3.2 Experimental birds

Ninety (90) vigorous day old Sonali chicks were procured from Polly hatchery limited, Joypurhat.

3.3 Layout of the experiment

The experiment was conducted in complete randomized design (CRD)**.** The chicks were randomly distributed to three dietary treatment groups (T_0, T_1 and T_2) having three replications in each treatment. The chicks were reared in separated pens according to treatments and replications, each dietary treatment group contain of 10 birds. The layout of the experiment is shown in the following table:

Table 3.1: Layout of the experiment

Dietary treatment	**No. of chicks in each replication**			**Total number of chicks in each treatment**
	R_1	**R_2**	**R_3**	
T_0	10	10	10	30
T_1	10	10	10	30
T_2	10	10	10	30
Total				90

Where,

T_0: control (intensive)
T_1: Antibiotic group (intensive)
T_2: Extensive group

3.4 Preparation of the experimental house

HSTU poultry farm was used for rearing experimental birds. Intensive care Experimental shed was constructed with compartment for housing ten birds. Each compartment was dimensions 54x42 inch for length and breadth, respectively. The shed was constructed by net and wooden materials. At first the experimental house was properly washed and cleaned by using tap water. Ceiling, walls and floor are thoroughly cleaned and subsequently disinfected with bleaching powder, then the room was left vacant for two weeks later, the house was again disinfected with virocid solution 1ml per 3 liter water, at the same time, all feederers, watarers and other necessary equipment were also properly cleaned, washed and disinfected with bleaching powder. After drying the house was used for this study.

3.5 Experimental diet

The experimental diet was provided into two phages (Sonali-starter and Sonali-grower), starter was provided 0 to 30 days and grower was 31days to end day of experiment in intensive care. The experimental diets were purchased from local market in Dinajpur, namely company (Nourish Poultry and Hatchery Limited).

In case of extensive bird's, after brooding period broken rice was provided adequately as deshi chicken. The extensive birds gathered feeds from natural resources also.

3.6. Routine Management

The birds were exposed to similar care and management in all treatment groups throughout the experimental period in case of intensive care. But in extensive care the birds were exposed as deshi chickens care and management. The following management practices were followed whole experimental period.

3.7 In case of intensive care

3.7.1 Litter Management

Fresh and dried rice husk was used as litter at a depth of 2-3 inch. After 5 weeks old litter was totally removed and new litter was provided as same depth. The litter was stirred one time per day from four weeks to up to end day of experimental period.

3.7.2 Floor Space

Each pen 4.5×3.5 sq. ft. was allocated for feeding, watering and housing for 10 birds

3.7.3 Brooding Management

Brooding is the first management of day old chick. In brooding, electric brooder was used to provide heat in chick. The brooder was hanged just above the bird level at the center of chick guard. Before entry day old chick fresh dried litter provide at depth 3 inch then covered by newspaper. Pre-heating the brooding space and temperature adjust at 33 ±2°C. After enter the day old chick provided vitamin C and glucose later one hour feed was provided. At first day temperature maintain 33 ± 2°C then gradually decrease 1°C per day. Temperature and humidity recorded by using clinical thermometer and hygrometer.

Figure. 2. Brooder Preparation

Figure. 3. Brooding Management

3.7.4 Lighting Management

The birds were exposed to 23 hours of lighting and 1 hour dark period throughout the experimental period.

3.7.5 Feeding and drinking

During the period of experiment feed and water was provided adequately to the intensive bird's for its proper growth.

Fig.4. Feeding

Fig.5. Watering

3.7.6 Vaccination

Name of Vaccine	Name of diseases	Age (days)	Route of administration
IB + ND	Infectious Bronchitis & Newcastle	5th	One drop in one eye
IBD	Gumboro	10th	One drop in one eye
IBD	Gumboro	17th	Through drinking water
ND	Newcastle	22th	Through drinking water
ND	Newcastle	42th	Through drinking water

Vaccine, prepared by Inter vet International, Netherland, was applied as per recommendation of the manufacturer.

3.7.7 Sanitation

Drinkers were washed daily in the morning and feeders were cleaned weekly before being used. Strict sanitary measures were followed during the experimental period.

3.8 Temperature and relative Humidity measure

Temperature (^{0}C) was recorded by clinical thermometer and relative humidity (%) was recorded by digital hygrometer thrice time daily in case of intensive system.

3.9 In case of extensive care

The management system was followed just like as deshi chickens only the vaccination schedule maintain like intensive birds. But other management such as sanitation, feeding and drinking, lighting should not follow as intensive care. The birds gathered feed from nature and some feed supplied as deshi chicken.

3.10 Slaughtering of the birds

Prior to slaughtering the birds were fasted for 8 hours, but water was provided adlibitum. 0ne birds were randomly selected in each replication for slaughtering. The live weight of birds was taken individually before slaughtering. At the time of slaughtering the birds were secured by holding both shanks with one hand and both wings with other hand by the help of an assistant to prevent struggling. Slaughtering was done by proper method with sharp Knife. Complete bleeding was accomplished by raising the bird approximately 45^{o} angle so that the caudal part will be higher than the head. After complete bleeding was done then removal of shank, head and skin. Finally evisceration was done manually to separate liver, spleen, heart, gizzard, and meat yield.

3.11 Calculation

1. Total weight gain in (kg). This was computed as a group by subtracting the initial weight from the final weight.

   Total weight gain = final weight – initial weight

2. Dressing percentage: The dressing percentage of sonali chicken was calculated as follows:

$$\text{Dressing (\%)} = \frac{\text{Dressed Weight}}{\text{Body Weight}} \times 100$$

3. Total feed consumption (kg): The amount of feeds consumed by the birds from the start until the end of the experiment (63 days). This was computed by adding the total feeds offered after the total left over have been subtracted.

   Total feed consumption = Total feed offered – Total left-over feed

4. $$\text{Mortality rate (\%)} = \frac{\text{No.of dead chickens}}{\text{Total no.of birds as a group}} \times 100$$

5. Cost of production: This includes the cost of stocks, feeds, commercial antibiotics and vitamins, electricity and materials used.

6. Gross income: This was obtained as a group by multiplying the sum of the final weight of the birds by the price per kilogram of live weight.

   Gross Income = total weight of the birds (as a group) × price per kilogram

7. Net income: This was obtained by subtracting the cost of production from the gross income.

   Net income = gross income – cost of production

3.12 Dressing yield

Dressing yield is based on the relationship between the dressed carcass weight and live bird weight after things like the skin and internal organs have been removed. Dressing yield can be calculated by taking weight of the carcass divided by weight of live bird.

$$\text{Dressing yield} = \frac{\text{Weight of the carcass}}{\text{Weight of live bird}}$$

Fig.7. Carcass and different parts of sonali chicken

3.12.1 Data collection and record keeping

The following records were kept during the experimental period initial DOCs weight and after brooding weight of chicks. Weekly Body weight gain and feed intake was recorded replication wise in each treatment group at end day of week. Mortality was recorded daily if death occurred. The different meat yield parameters like carcass, thigh, breast meat, heart, liver, and lungs weight for individual birds were recorded after slaughtering. Temperature and relative humidity was recorded three times daily.

3.12.2 Statistical analysis

The collected data were recorded and analyzed by SPSS version-20 software by using one way ANOVA in accordance with the principles of Complete Randomized Design (CRD). All values were expressed as Mean± SEM and significance was determined when ($P<0.05$) and ($P<0.001$) Mean was compared among the treatment groups by using Duncan test.

CHAPTER-IV
RESULTS

This experiment was conducted to evaluate the growth and production performance in terms of weekly body weight gain, final live weight gain, feed intake, feed efficiency, dressing percentage of *sonali* chicken. This experiment was held under the department of Dairy and Poultry Science, Faculty of Veterinary and Animal Science HSTU Dinajpur.

One day old chicks are randomly divided into 3 groups (T_0 T_1 T_2) after 15 days T_2 group was separated from the intensive condition and rear in extensive condition.

4.1 Weekly Body weight gain

At the start of the experiment, the average body weight of the birds in different groups was not significantly different. In Table 4.1 showed that after 7 days of brooding, initial body weight of chicks in different dietary treatment was similar. The live weight of birds in 1st weeks did not significantly ($P>0.05$) vary among the treatment groups.

In 2nd week, the body weight statistically significant ($P<0.05$) between intensive control group and intensive antibiotic & extensive group. The maximum live weight (122.67) gain found in T_0 group minimum live weight (110.00) in T_1 group.

In 3rd week, the body weight significantly ($P<0.01$) vary between intensive group and extensive group. The highest live weight (192.67) was shown in T_1 group and lowest live weight (138.00±3.12) was in T_2 group.

In 4th week, the body weight highly significant ($P<0.001$) among intensive group and extensive group. The highest body weight (270.67) found in T_1 group and lowest body weight (170.33) found in T_2 group.

The body weight statically significant ($P<0.01$) in 5th, 6th, 7th week. In 5th week the highest body weight (283.33) found in T_1 group and in T_2 group the body weight (208.00) found lowest. Similarly occur in 6th week T_1 (415.00) and T_2 (252.00), 7th week T_1 (493.33) and T_2 (283.67).

The body weight statically highly significant (P<0.001) in 8th, 9th week. In 8th week, the body weight was highly significant (P<0.05) between intensive group and extensive group. The maximum live weight (648.33) gain occurred in T_1 group and minimum live weight (332.11) gain occurred in T_2 group. Similarly occurred in 9th week for T_1 (760.00) and T_2 (384.67).

4.2 Body weight gain

Initial body weight of *sonali* chicks fed on different dietary treatments was similar (p>0.05). Final live weight gain was statistically highly significant (p<0.001) among the different treatment group. The highest body weight (790.44±17.32) gain was attained in T_1 group and lowest body weight (379.44±0.08) gain was attained in T_2 group.

Table 4.1. Body weight and body weight gain

Parameters	**T_0**	**T_1**	**T_2**	**Level of Sign.**
Initial live wt.(g)	29.56±0.00	29.56±0.00	29.56±0.00	(NS)
1st week	83.33±2.48	81.67±2.29	84.00±1.49	0.731(NS)
2nd week	$122.67±3.30^{b}$	$110.00±2.58^{a}$	$111.67±3.25^{a}$	0.015*
3rd week	$192.67±3.04^{b}$	$188.33±3.28^{b}$	$138.00±3.12^{a}$	0.00**
4th week	$247.00±3.48^{b}$	$270.67±4.19^{c}$	$170.33±3.52^{a}$	0.00***
5th week	$279.00±4.14^{b}$	$283.33±30.74^{b}$	$208.00±2.04^{a}$	0.00**
6th week	$407.22±3.87^{b}$	$415.00±6.66^{b}$	$252.00±3.67^{a}$	0.00**
7th week	$480.00±3.98^{b}$	$493.33±13.53^{b}$	$283.67±3.63^{a}$	0.00**
8th week	$583.67±5.46^{b}$	$648.33±7.40^{c}$	$332.11±5.72^{a}$	0.00***
9th week	$664.00±4.55^{b}$	$760.00±7.77^{c}$	$384.67±6.62^{a}$	0.00***
Body wt. gain	$664±29.56^{b}$	$760±29.56^{C}$	$384.67±29.56^{a}$	0.00***

The mean values with different superscript (a to c) within the same row differs significantly, at least (p<0.05). All values indicate mean ± Standard error of mean

NS=Non significant (P>0.05).

** Means statistically significant (P<0.01).

*** Means statistically highly significant (P<0.001).

4.3 Feed intake

The cumulative feed intake of *sonali* chicken in different dietary treatment during experimental periods was statistically highly significant ($p<0.01$) between intensive group and extensive group. However, the lowest feed intake (1000.00±0.00g) was found T_2 extensive group and the birds of T_1 group showed highest feed intake (2159.13±23.12) shown in Table 4.2.

4.4 Feed efficiency

Feed efficiency of different treatment groups during the experimental period was statistically significant ($P<0.05$). Among T_0, T_1 and T_2 treatment group highest feed efficiency (2.63±0.03) found in T_2 group and lowest feed efficiency (3.26±0.18) was found in T_0 group. In case of extensive rearing the birds were moved freely around the surrounding that why the feed efficiency higher than the intensive groups shown in Table 4.2.

4.5 Mortality

Mortality Percentage was shown in the T_0 group and T_2 group, when T_2 group shown higher mortality percentage than the T_0 group. In case of T_2 group mortality percentage was 10 and in T_0 group mortality percentage was 6.67 shown in Table 4. 2.

Table 4.2. Feed intake, feed efficiency, mortality, and mortality percentage

Parameters	**T_0**	**T_1**	**T_2**	**Level of Sign.**
Feed intake(g)	2149.30±23.87^b	2159.13±23.12^b	1000.00±0.00^a	0.00**
Feed efficiency/kg	3.26±0.18^b	2.73±0.07^a	2.63±0.03^a	0.016*
Mortality %	6.67	0	10	

The mean values with different superscript (a, b, c) within the same row differs significantly, at least ($P<0.05$). All values indicate mean ± Standard error of mean

NS=Non significant ($P>0.05$).

* Means statistically significant ($P<0.05$).

** Means statistically significant ($P<0.01$).

4.6 Dressing percentage

After slaughtering and eviscerating all edible and non edible by-products, dressing percentage of different treatment group showed in Table 4.3. The Table indicated significant differences among the treatment group. Relatively the heavier dressing percentage was observed in T_0 (52.92±1.06 %) groups than other treatments T_1 (52.43±0.40 %) and T_2 (45.56±0.08 %) respectively. The highest dressing percentage was found (52.92±1.06 %) in T_0 treatment group and lowest was found (45.56±0.08 %) in T_2 treatment group.

4.7 Breast meat

Breast meat was obtained in Table 4.3 statistically highly significant ($P<0.001$) among the different treatment group T_0,T_1 and T_2, the highest weight (118.27±2.49g) was found in T_1 group and lowest weight (59.57±0.72g) was found in T_2 group.

4.8 Thigh meat

Thigh meat was obtained in Table 4.3 statistically highly significant ($P<0.001$) among the different treatment group T_0,T_1 and T_2, the highest weight (139.34±2.77g) was found in T_1 group and lowest weight (69.03±0.83g) was found in T_2 group.

4.9 Heart, liver, and lungs weight

Heart, liver, and lungs weight insignificant between the intensive T_0 and T_2 group. But statistically significant ($P<0.001$) between intensive and extensive group. From Table 4.3 it was seen that heart weight (6.12±0.42g) maximum in T_1 treatment group and minimum (3.14±0.045g) in T_2 treatment group. Liver weight (22.10±1.38g) was maximum in T_1 group and minimum (15.73±0.37g) in T_2 treatment group. Lungs weight (4.63±0.12g) was maximum in T_1 group and minimum (2.01±0.01g) in T_2 treatment group.

4.10 Carcass

Carcass weight was obtained in Table 4.3 statistically highly significant ($P<0.001$) among the different treatment group. The highest weight (429.97±8.72g) was found in T_1 group and lowest weight (186.36±1.97g) was found in T_2 group.

Table 4.3. Dressing parameters

Parameters	T_0	T_1	T_2	Level of Sign
Final Live wt. (g)	690.00 ± 30.55^b	820.00 ± 17.32^c	409.00 ± 8.54^a	0.00***
Breast meat wt. (g)	90.71 ± 4.01^b	118.27 ± 2.49^c	59.57 ± 0.72^a	0.00***
Thigh meat wt. (g)	112.06 ± 4.96^b	139.34 ± 2.77^c	69.03 ± 0.83^a	0.00***
Heart (g)	5.00 ± 0.43^b	6.12 ± 0.42^b	3.14 ± 0.045^a	0.003**
Liver (gm)	20.60 ± 1.02^b	22.10 ± 1.38^b	15.73 ± 0.37^a	0.010**
Lungs (g)	4.32 ± 0.29^b	4.63 ± 0.12^b	2.01 ± 0.01^a	0.00**
Carcass wt. (g)	364.80 ± 13.19^b	429.97 ± 8.72^c	186.36 ± 1.97^a	0.00***
Dressing (%)	52.92 ± 1.06^b	52.43 ± 0.40^b	45.56 ± 0.08^a	0.00**

The mean values with different superscript (a to c) within the same row differs significantly, at least ($p<0.05$). All values indicate mean ± Standard error of mean

NS=Non significant ($P>0.05$).

* Means statistically significant ($P<0.01$).

** Means statistically highly significant ($P<0.001$).

4.11 Economic efficiency of production

Production cost of *sonali* chicks in this study are presented in Table 4.4 spending on feed, chick, vaccine, medicine, litter, miscellaneous (labour, electricity, transport cost) were constituted cost/chick and cost/kg live weight. Total production cost (58.0±0.00 tk.) lowest was found in T_2 group extensive of *sonali* and highest cost (128.05±2.09 tk.) was found in T_1 group (antibiotic) of intensive *sonali*.

Total feed cost per chick in different dietary treatment was statistically highly significant ($P<0.001$). Highest feed cost (87.05±2.09tk) was found in T_1 group (antibiotic) of intensive *sonali* and lowest cost (28.0±0.00 tk) was found in T_2 group extensive of *sonali*.

However, the total feed cost decrease that was reared in extensive environment.

The net profit statistically non significant ($P>0.05$). The highest profit (4.60±0.81 tk.) was found in in T_2 group and lowest (2.19±1.32 tk.) was found in control T_0 group.

Table 4.4: Cost benefit analysis of different dietary treatment

Parameters (Tk.)	T_0 control	T_1 Intensive	T_2 Extensive	Level of sign
Chick cost/chick	20	20	20	NS
Litter cost/chick	4	4	0	NS
Vaccine + medicine cost/chick	10	10	10	NS
Dietary treatment cost/ chick	0	4.5	0	NS
Feed cost for production	70.27±3.82[b]	87.05±2.09[c]	28.0±0.00[a]	0.00***
Miscellaneous cost/ chick	2.5	2.5	0	NS
Total cost production/bird	106.77±3.82[b]	128.05±2.09[c]	58.0±0.00[a]	0.00***
Selling price Tk./kg	165	165	165	NS
Selling price Tk./bird	108.97±5.04[b]	130.42±2.85[c]	62.60±0.815[a]	0.00***
Net profit Tk./bird	2.19±1.32	2.37±0.76	4.60±0.81	0.222 (NS)

The mean values with different superscript (a, b, c) within the same row differs significantly, at least ($P<0.05$). All values indicate mean ± Standard error of mean

NS=Non significant ($P>0.05$).

*** Means statistically highly significant ($P<0.001$).

This study result showed that the extensively reared *sonali* group was more profitable than the intensively rear *sonali* group. The study has shown that intensive group higher body weight gain, weekly gain in weight, feed consumption and feed efficiency than the extensive group. The production cost also higher in intensive group than the extensive group. That why the profit is less in intensive group than extensive group.

CHAPTER-V
DISCUSSION

The experiment was conducted at the Dairy and Poultry Science farm of HSTU, Dinajpur and Khochana, Chrirbandar, Dinajpur during the period from mid April to June 2017. Commercial *sonali* chick was used in this study for a period of 63 days to find out the production performance of *sonali* chicken in intensive and extensive care. The experiment was conducted to evaluate the production performance and economic efficiency of *sonali* in extensive and intensive rearing. For this purpose 90 day old chicks were purchas from Polly hatchery limited, Joypurhat. After 7 days of brooding the chick were randomly divided into three treatment groups namely (T_0, T_1 and T_2) having three replication in each treatment group. Experimental birds in T_0 and T_1 group was reared in intensive environment and T_2 group reared in extensive environment. At the terminal stage of experiment the cumulative body weight gain Table 4.1 of different treatment groups was T_0 (660.44±30.55g), T_1 (790.44±17.32g) and T_2 (379.44±0.08g) respectively. Birds that reared intensive T_2 group with regular antibiotic was gained highest (790.44±17.32g) body weight and lowest was found (379.44±0.08g) in extensive reared group.

The feed intake among different treatments were statistically highly significant ($p<0.001$) between intensive group and extensive group. However, the lowest feed intake (1000.00±0.00g) was found T_2 extensive group. The birds of T_0 (2149.30±23.87g) T_1 group in intensive care showed higher feed intake (2159.13±23.12g). Feed efficiency of different treatment was statistically significant ($P<0.05$) compared to T_0 intensive group. Respective feed efficiency was found T_0 (3.26±0.18), T_1 (2.73±0.07) and T_2 (2.63±0.03) and the extensive group T_2 converted feed to meat most efficiently then T_1, and T_0 treatment respectively.

Meat yield parameters there was significant ($P>0.01$) difference among treatments group relatively the heavier dressing percentage was observed in T_0 (52.92 ± 1.06^b %) groups than other treatments T_1 (52.43±0.40 %) and T_2 (45.56±0.08 %) respectively. Breast meat and thigh meat obtained (Table 4.3) was statistically highly significant ($P<0.001$) among the different treatment group. Between the intensive group T_1 higher than T_0. Breast meat and thigh meat obtained (Table 4. 3) the highest weight was found (118.27±2.49g) in

group T_1, lowest weight was found (59.57±0.72g) in group T_2 and thigh meat (139.34±2.77g) in group T_1 and lowest weight was found (69.03±0.83g) in group T_2.

Among the treatment relatively the heavier dressing percentage was observed in T_0 (52.92±1.06 %) groups than other treatments T_1 (52.43±0.40 %) and T_2 (45.56±0.08%) respectively. The highest dressing percentage was found (52.92±1.06 %) in T_0 treatment group and lowest was found (45.56±0.08 %) in T_2 treatment group. In case of intensive and extensive group Carcass weight obtained (Table 4.3) was statistically highly significant ($P<0.001$) highest weight was found (429.97±8.72g) in group T_1 and lowest weight was found (186.36±1.97g) in group T_2. The net profit *sonali* was statistically non significant ($p>0.05$). The highest profit (4.60±0.81tk.) was found in T_2 group extensive of *sonali* and lowest (2.19±1.32 tk.) was found in T_0 group.

The findings of the present study are similar to (Rehman, 2016) they determined overall means demonstrated significant difference ($P<0.05$) in BW with respect to different rearing systems, *sonali* chick, and their interaction. Birds kept under CF and SI rearing systems exhibited enhanced BW (2419.11±30.23) and (2388.39±27.20), respectively than those reared under FR (2290.46±25.69). Minimum activity or exercise in CF rearing system might be the factor behind enhanced BW. Body weight, similarly, was also found to be elevated in broiler breeder reared under CF than those under FR. Improved BW of broilers, furthermore, has already been reported in CF rearing system as compared with those reared under FR (Poltowicz and Doktor, 2011). Similarly, it was also observed that FR rearing reduced BWG in birds as compared with the indoor reared ones (Wang *et al.*, 2009) with the indoor reared ones (Sharlin, 2013) the study revealed that all of the *Sonali* poultry farmers were in the age group of 14 to 64 years and 93.0 percent *Sonali* poultry farmers were literate in the study area where the highest number (55 percent) of farmers had completed their secondary education. The major findings of the study was that total cost for 1000 birds were estimated at Tk. 120613 per batch. Variable cost constituted the major part of the total costs. Average variable costs for 1000 birds stood at Tk. 115432 where average fixed cost for 1000 birds was estimated at Tk. 5181 per batch only. Average gross margin and average net returns for 1000 birds was estimated at Tk. 57240 and Tk. 52059 per batch. An average gross return for 1000 birds was estimated at Tk. 172672 per batch. Benefit Cost Ratio was estimated 1.4 for *Sonali* poultry production. Six explanatory variables like day-old-chick cost, feed cost, electricity cost, veterinary and medicine cost, labor cost and litter cost were considered for Cobb-Douglas production function. Most of the variables included in the

model such as veterinary and medicine cost, labor cost and electricity cost had positive and significant impact on *Sonali* poultry production. Resource use efficiency was calculated by the ratio of marginal value product and marginal factor cost. The result of resource use efficiency showed that by increasing the use of day-old-chick, feed cost, electricity, litter, labor and veterinary variables, it would possible to increase the production of the *Sonali* poultry.

CHAPTER-VI
SUMMARY AND CONCLUSION

Sonali poultry production provided higher returns to the farmers. This enterprise is gaining popularity in the country gradually due to its high yield potentiality. Proper management and appropriate level of input use are important for achieving higher yield and profits. Sample farmers showed their opinion that higher yield and income encouraged them to continue *Sonali* poultry production. It can be concluded that rising of *Sonali* is a profitable business in the study area. There is a wider scope for the development of *Sonali* farming in this country. The findings suggest that the enterprise is helpful in employment generation and poverty alleviation which are now the major concern of the planning process of the country. Poultry is making a key contribution to the national economy through creating employment, generating local income and improving nutrition level of the low income people. Lot of problems and difficulties were found in *Sonali* production in the study area. To overcome the difficulties of *Sonali* raising and to make *Sonali* production more profitable in the country, the following recommendations are put forward in order to improve the existing production of live *Sonali*. *Sonali* chicken farming on commercial basis is a popular endeavor in Bangladesh. The gross margin, net return and BCR of *Sonali* birds indicated that *Sonali* chicken farming is a profitable venture. Cobb-Douglas production function was estimated for the study to determine the effects of inputs on *Sonali* chicken production. The production function involved the inputs of feed cost, day-old-chick cost, labour cost, veterinary and medicine cost, electricity cost and litter cost. The coefficient of veterinary and medicine cost, electricity cost and labour cost were significant for different levels of degrees of freedom. Regarding resource use efficiency, the ratios of MVP and MFC of day-old-chick cost, feed cost, veterinary and medicine cost, electricity cost, labour cost and litter cost were greater than unity. The study identified some problems and constraints associated with *Sonali* chicken production and some solutions of these problems were given for improving the productivity and sustainability of *Sonali* chicken production. If we applied the knowledge properly the income of the rural people increase. As a result their life style also will be changed and lead a healthy life.

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APPENDICES

APPENDIX I: Daily temperature (^{0}C) was recorded by clinical thermometer at 6 AM, 2 PM and 7 PM

Sl No	Date	6 AM	2 PM	7 PM
1	25-7-17	27	30	25
2	26-7-17	25	30	28
3	27-7-17	29	31	30
4	28-7-17	31	32	32
5	29-7-17	29	30	27
6	30-7-17	28	31	29
7	31-7-17	29	33	29
8	1-8-18	30	32	29
9	2-8-18	29	32	29
10	3-8-18	28	33	30
11	4-8-18	29	33	31
12	5-8-18	30	34	30
13	6-8-18	32	33	30
14	7-8-18	32	33	29
15	8-8-18	29	31	29
16	9-8-18	30	32	31
17	10-8-18	25	23	24
18	11-8-18	26	22	23
19	12-8-18	22	25	24
20	13-8-18	27	29	28
21	14-8-18	31	32	30
22	15-8-18	28	32	29
23	16-8-18	30	32	29
24	17-8-18	31	33	30
25	18-8-18	29	32	31
26	19-8-18	29	33	30
27	20-8-18	30	34	30
28	21-8-18	29	33	30
29	22-8-18	28	32	29

Sl No	Date	6 AM	2 PM	7 PM
30	23-8-18	29	31	30
31	24-8-18	30	33	29
32	25-8-18	27	32	29
33	26-8-18	30	33	31
34	27-8-18	28	30	29
35	28-8-18	29	31	28
36	29-8-18	30	32	30
37	30-8-18	27	31	28
38	31-8-18	28	30	29
39	1-9-18	29	31	30
40	2-9-18	30	33	31
41	3-9-18	26	29	28
42	4-9-18	27	30	28
43	5-9-18	29	31	29
44	6-9-18	30	32	30
45	7-9-18	29	31	28
46	8-9-18	28	32	29
47	9-9-18	27	30	27
48	10-9-18	29	31	30
49	11-9-18	28	32	29
50	12-9-18	30	33	30
51	13-9-18	28	30	29
52	14-9-18	27	31	28
53	15-9-18	30	33	29
54	16-9-18	29	33	30
55	17-9-18	28	31	29
56	18-9-18	27	30	28

Relative humidity (%) was recorded by digital hygrometer at 6 AM, 2 PM and 7 PM

Sl No	Date	6 AM	2 PM	7 PM
01	25-7-17	91	90	88
02	26-7-17	92	78	85
03	27-7-17	94	75	84
04	28-7-17	88	71	82
05	29-7-17	87	75	88
06	30-7-17	88	77	87
07	31-7-17	89	76	82
08	1-8-18	94	78	89
09	2-8-18	92	76	86
10	3-8-18	89	77	84
11	4-8-18	86	75	86
12	5-8-18	94	82	86
13	6-8-18	88	72	76
14	7-8-18	79	71	75
15	8-8-18	78	73	78
16	9-8-18	81	75	82
17	10-8-18	85	74	90
18	11-8-18	86	79	90
19	12-8-18	80	82	87
20	13-8-18	90	95	97
21	14-8-18	93	79	84
22	15-8-18	96	77	86
23	16-8-18	85	76	82
24	17-8-18	80	71	85
25	18-8-18	83	78	81
26	19-8-18	81	77	83
27	20-8-18	79	64	78
28	21-8-18	84	73	84
29	22-8-18	82	72	83
30	23-8-18	79	69	79
31	24-8-18	83	73	82

Sl No	Date	6 AM	2 PM	7 PM
32	25-8-18	88	76	80
33	26-8-18	90	79	81
34	27-8-18	81	74	80
35	28-8-18	77	69	74
36	29-8-18	80	73	77
37	30-8-18	90	79	84
38	31-8-18	78	72	77
39	1-9-18	80	75	80
40	2-9-18	81	73	80
41	3-9-18	79	69	81
42	4-9-18	75	68	77
43	5-9-18	82	72	79
44	6-9-18	85	75	83
45	7-9-18	80	70	81
46	8-9-18	86	79	85
47	9-9-18	73	68	77
48	10-9-18	78	69	75
49	11-9-18	80	71	75
50	12-9-18	79	71	76
51	13-9-18	80	76	78
52	14-9-18	82	72	78
53	15-9-18	85	76	80
54	16-9-18	80	73	81
55	17-9-18	79	75	78
56	18-9-18	80	72	79