



working paper

COMPARATIVE PERFORMANCE OF
SONALI CHICKENS,
COMMERCIAL BROILERS, LAYERS AND
LOCAL NON-DESCRIPT (*DESHI*) CHICKENS
IN SELECTED AREAS OF BANGLADESH

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Executive summary

The purpose of this study was to assess the technical, economic and social performance of *Sonali* birds compared with the performances of commercial broiler, commercial layer and local non-descript/*deshi* chickens. The study was conducted in four districts of Bangladesh: Joypurhat, Mymensingh/Gazipur, Bogra and Naogaon. Primary data were collected from a total of 500 respondents – 100 each from the *Sonali* semi-scavenging, *Sonali* intensive (meat or egg producing), commercial broiler, commercial layer and local non-descript systems – selected randomly from these districts. To analyse the data, a combination of descriptive statistics (sums, averages, percentages, etc.) and mathematical techniques were used. The results indicate the differences in production and economic performance among the five types of bird.

The average flock size was largest on *Sonali* intensive farms for meat production (averaging 1 442.7 birds), followed by *Sonali* intensive farms for egg production (1 207.5), layer farms (1 102.9), broiler farms (917.8), *Sonali* semi-scavenging farms (34.7) and local non-descript/*deshi* farms (8.1). The main outlets for selling eggs were intermediaries for intensive farming, whereas most farmers with semi-scavenging birds sold their products to consumers at the farmgate. *Sonali* intensive, commercial broiler and commercial layer birds were housed mainly with roofing and wire mesh and solid walls, and fed mainly on branded commercial poultry feed. Semi-scavenging birds were housed in tin and bamboo structures, or sometimes mud and tin structures. These birds were fed mainly on crop by-products. Most of the *Sonali* intensive and commercial broiler or layer farmers had access to government veterinary services and used disinfecting footbaths. Personnel changed their shoes when entering poultry units, and cleaned their shoes, clothing and hands when returning from market or another farm. All the respondent farmers in these categories used poultry manure as fertilizer in their fields and disinfectant for routine cleaning on the farms.

Sonali semi-scavenging and local non-descript farmers mainly treated their birds themselves, with some private and government veterinary care. A proportion of *Sonali* semi-scavenging farmers had adopted biosecurity practices; none of the local non-descript farmers had done so, although some practised vaccination. Most of the local non-descript/*deshi* farmers (86.5 percent) did not use any kind of disinfectant to clean their farms. The most common method of carcass disposal in the study areas was burying on the premises, for all types of birds. However, some farmers used other methods such as throwing into rivers, ponds, etc. Commercial broiler birds were found to have the lowest mortality in the study areas (at 4.1 percent). Biosecurity scores were assigned to each farm based on five groups of indicators reflecting quality of inputs, prevention of disease introduction and of transmission within the farm and among poultry units, and reduction of flock susceptibility. The four commercial production systems had similar biosecurity scores, with most farms ranging from 56.3 to 63.8 percent, and none scoring higher than 70 percent. There were clear differences in biosecurity scores in each of the production systems among the four regions, which may reflect diversity of management skills. However, at the regional level, higher biosecurity scores did not correspond with higher profitability.

The points of lay were estimated at 21.8 weeks for *Sonali* intensive egg producing birds, 20.7 weeks for commercial layers, 24.7 weeks for *Sonali* semi-scavenging birds and 29.9 weeks for local non-descript birds. The rearing system for local non-descript chickens was complex, and farmers were unable to record average ages for reaching maximum egg production, production amounts and ages at which production started to decline.

The economic performances of different types of birds revealed that the net change in inventory was positive for all enterprises in the study areas. The major cost items were human labour, feed, veterinary services, electricity and transport. Most farms raising non-descript and semi-scavenging *Sonali* birds used crop by-products for feeding. As a result, their feed costs were lower than those of other enterprises.

The estimated benefit/cost ratio (BCR) per batch and bird for all enterprises was greater than 1, indicating that these are all profitable businesses. The local non-descript/*deshi* farms were able to derive the highest BCR (1.71), followed by *Sonali* semi-scavenging (1.65), *Sonali* intensive meat producing (1.49), *Sonali* intensive egg producing (1.44), commercial broiler (1.22) and commercial layer (1.11) farms, indicating that local non-descript birds were the most profitable venture.

Local non-descript birds are reared under semi-scavenging conditions for subsistence purposes. In the study, smaller numbers of birds were reared under this system, with fewer supplementary feeds, less veterinary care and poorer housing than the other types of birds. As a result, rearing indigenous birds cost less, making it a more economically viable enterprise. If these birds were reared for commercial purposes, farms size would have to increase and farmers would have to provide more supplementary feed and veterinary care, better housing and more labour. The cost of rearing these birds would therefore increase, lowering the BCR. *Sonali* birds reared under the semi-scavenging system were also found to have better economic returns than birds reared under the intensive system. Relatively few farmers in the study area practised the semi-scavenging system, but those who did were economically better-off and able to provide their birds with better supervision, more supplementary feeds, better housing and greater care, allowing them to obtain better BCRs than farmers practising intensive production.

Sonali intensive meat producing farms achieved higher net returns as well as BCRs per bird and per batch than those of commercial broiler farms. With the same flock size, farmers rearing semi-scavenging *Sonali* could raise almost twice as much income of farmers rearing local non-descript birds under the traditional production system.

In all regions, almost all the farmers of all types of bird started their businesses with their own resources. Some borrowed from family members or moneylenders. *Sonali* intensive, commercial broiler and commercial layer farms employed more hired labour, while *Sonali* semi-scavenging and local non-descript farms depended mainly on family labour. The study found that *Sonali* birds were used mainly for meat production, where they performed better than other birds in terms of adaptability and BCR. People also prefer *Sonali* chickens to indigenous birds.

The study team recommends carrying out further detailed study into the productive and reproductive performance of *Sonali* birds in comparison with that of commercial broilers to establish the long-term sustainability of *Sonali* production systems.

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The team particularly acknowledges the support and cooperation that were extended by District Livestock Officers (DLOs), Upazila Livestock Officers (ULO), hatchery owners and service providers in the selected study areas. Team members express their gratitude to the respondents in study areas for their collaboration and assistance in conducting surveys and collecting primary data. We want to thank all our co-workers and research associates who worked persistently and with great competence on the collection and subsequent analysis of data collected from the field. This study was carried out under a special grant allocated by the Food and Agriculture Organization of the United Nations (FAO).

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The contribution of the poultry sector as an important tool in global efforts to overcome malnutrition and poverty in developing countries is widely recognized. Poultry often represents a farmer's first investment in the livestock ladder (followed by goats/sheep and then cattle) as a way of increasing income and emerging from the poverty trap. The share of commercial poultry production by the private sector is expanding rapidly in Bangladesh, and now accounts for 50 percent of egg production and 60 percent of meat production (Bhuiyan, 2011). Bangladesh is an agriculture-based developing country in southeast Asia where natural disasters are frequent. Poultry is one of the most important agricultural subsectors in the country and about 87 percent of rural households rear poultry, with an average flock size of 6.9 birds (Apu and Saleque, 2012).

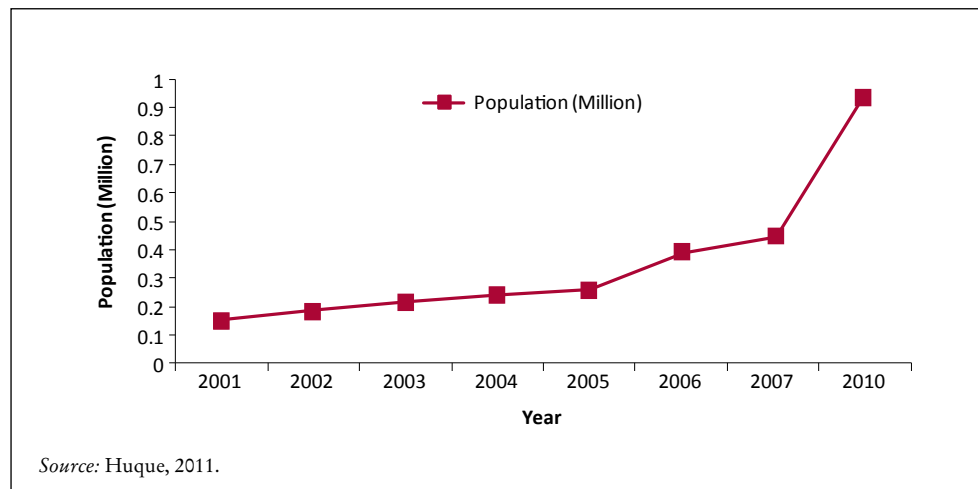
Between the 1960s and the 1980s various agencies made several attempts to improve local poultry through cockerel exchange programmes and the distribution of hatching eggs. However, these initiatives met with limited success and did not produce sustainable technical and institutional mechanisms to support the development of scavenging poultry. In the late 1980s, the non-governmental organization (NGO) Bangladesh Rural Advancement Committee (BRAC), in collaboration with the Department of Livestock Services, designed the poultry development model for rural poor women. The model targeted model breeders, mini-hatcheries, chick breeders, poultry rearers, poultry workers, feed sellers and egg collectors (Dolberg, 2008), and was accepted by all agencies.

Between 1992 and 2001, several donors funded projects in Bangladesh, including the Smallholder Livestock Development Project (SLDP-1 and SLDP-2) and the Participatory Livestock Development Project (PLDP-1 and SLDP-2) (Dolberg, Mallorie and Brett, 2002), which involved nearly 1 million women beneficiaries. These projects emphasized the rearing of cross-bred *Sonali* birds and encouraged other small-scale farmers in rural areas to become involved in the poultry sector. A significant change occurred in the commercial poultry sector in the 1990s, when private poultry farms began to produce day-old chicks (DOCs) as parent stock to supply commercial broiler and layer farmers. The commercial poultry sector achieved a significant annual average growth rate of 15–20 percent in 1995–2007 (Saleque, 2009), but was seriously affected due to avian influenza in March 2007.

CURRENT STATUS OF THE POULTRY SECTOR

The poultry sector in Bangladesh is dynamic and has potential for rapid poverty reduction through income generation and employment creation. As commercial poultry farming gains in popularity, employment opportunities are created for rural farmers, retailers, traders, service providers, entrepreneurs, etc. The current poultry production system in Bangladesh can be divided into four main categories: i) traditional rural backyard scavenging systems; ii) semi-scavenging systems; iii) commercial farming systems; and iv) contract farming or integrated systems (Saleque, 2009; Dolberg, 2008).

Rapid income growth, diversification in food demand patterns, decline in income-induced demand for rice and coarse grains, a dietary shift towards high-value

Figure 1. Year-wise population of *Sonali* birds

foods, and rapid migration to urban areas are increasing the demand for foods of animal origin; poultry meat and eggs are acceptable protein sources for many population groups. The commercial poultry sector supports the livelihoods of 6 million people directly and indirectly through 100 000 commercial farms with an estimated total investment of 1 875 million USD (Chowdhury, 2013). Currently there are six grandparent stock farms producing about 60-70 000 day old chicks per week and 140 parent stock farms producing 10.1 million commercial day old chicks per week, resulting in a produce by the commercial farms of over 15 000 tonnes of broiler meat and 2.4 million eggs per week (Khaled, 2015).

Annual per capita egg consumption reached its highest level of 48 eggs in 2012, but this still represents a deficit of 53.85 percent compared with the minimum recommended requirement of 104 eggs per head per year. However, the net availability and per capita consumption of chicken meat and eggs increased steadily from 1995/96 to 2012/2013 (Raha, 2013).

Production of commercial broiler and layer DOCs has declined because of outbreaks of highly pathogenic avian influenza (HPAI), which was first identified in March 2007 and has caused irreparable losses to the poultry industry. The situation improved from July 2008 to August 2011, but HPAI re-emerged in all categories of farms – parent stock, commercial boiler and layer, *Sonali* intensive and semi-subsistence and local non-descript – from September 2011 to March 2012. In the two years following the 2011 outbreaks, nearly 25 000 farms were closed, mainly because of the disease but the incidence of HPAI decreased since 2013 and the overall disease situation improved (WPSA-BB, 2015).

The *Sonali* is a cross-breed of Rhode Island Red (RIR) cocks and Fayoumi hens and has a similar phenotypic appearance to that of local chickens; it was introduced in 1996–2000 in northern parts of Bangladesh, through SLDP and PLDP. *Sonali* birds are well adapted to the country's environmental conditions so require less care and attention than other breeds, making them easier for women and children to rear (Saleque and Saha, 2013). Traders can sell *Sonali* at higher prices than local chickens. The *Sonali* population has been increasing and in 2010 about 150.9 million *Sonali* DOCs were produced, representing about 35 percent of the country's total commercial broiler and layer production (Huque, 2011).

Small and marginal farmers started to rear *Sonali* birds commercially in response to the market demand for coloured birds. Government farms were not able to supply sufficient *Sonali* DOCs to satisfy the increasing demand, which ultimately led to the establishment of private-sector hatcheries. Currently, more than 60 hatcheries of different sizes are supplying *Sonali* DOCs to small and marginal farmers in rural areas (Huque, 2011). These hatcheries have their own parent stock farms for producing hatching eggs, and also buy eggs from other parent stock farms nearby. About 900 *Sonali* parent stock farms produce hatching eggs.

Earlier studies to compare the production and economic performance of *Sonali* chickens with conventional broiler and layer chickens were made by Sarkar *et al.* (2008) and Dutta *et al.* (2012), This study seeks to further increase understanding of the technical, economic and social performance of *Sonali* birds and their potential for spread into other areas.

Objectives and methodology

OBJECTIVES

The overall goal of this study was to assess the technical, economic and social impacts of *Sonali* birds compared with commercial broilers, commercial layers and indigenous chickens. The specific objectives were to:

- assess the performance of *Sonali* birds in different production systems;
- conduct comparative analysis of the economic and production performances of *Sonali*, local non-descript birds and hybrid broilers and layers.

METHODOLOGY

Project locations

The survey was conducted in four districts of Bangladesh: Joypurhat, Mymensingh/Gazipur, Bogra and Naogaon (Figure 2). These districts were considered representative in terms of availability of various types of birds including *Sonali*. At least two *upazilas* (subdistricts) were selected from each district based on the concentration of poultry rearing.

Sample selection procedure

Before selecting survey samples, a list of *upazilas* and villages was prepared in consultation with government officials, the local offices of non-governmental organizations (NGOs) and poultry dealers/agents. Farms were selected randomly from the sample frame, which was created through discussions with different stakeholders. Data and information were collected from a specific locality at the same time to avoid survey errors.

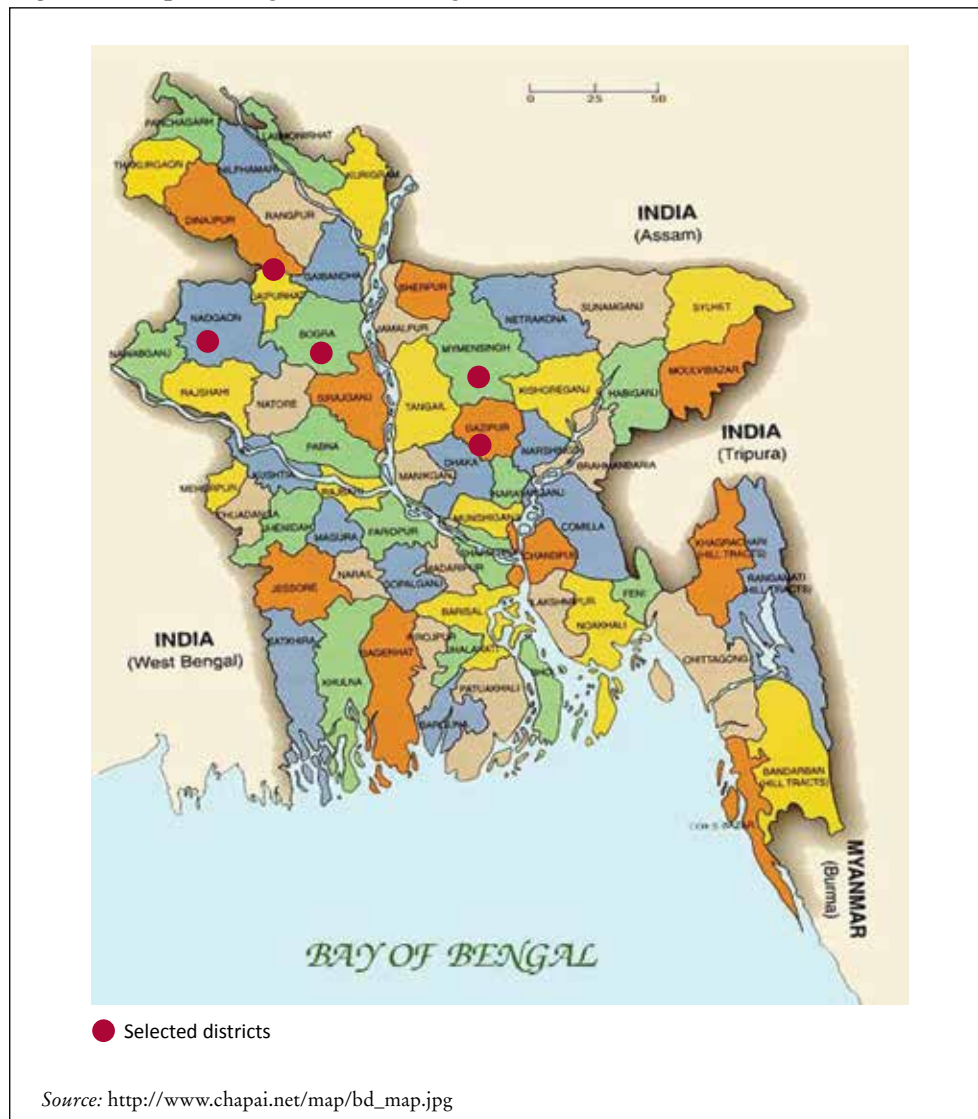
A total of 500 respondents were selected randomly for primary data collection, 100 from each production system – *Sonali* semi-scavenging, *Sonali* intensive (meat or eggs), local non-descript, commercial layer and commercial broiler (Table 1). The survey included two *Sonali* production systems (semi-scavenging and intensive) because *Sonali* birds are reared under both types of management; the *Sonali* intensive system was subdivided into meat and egg producing farms.

Table 1. Distribution of sampled farms in the study areas

Type of birds	Rearing system	District sample size				Total
		Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	
<i>Sonali</i>	Semi-scavenging	25	34	25	16	100
<i>Sonali</i>	Intensive (meat and eggs)	25	34	25	16	100
Local non-descript	Semi-scavenging	25	25	25	25	100
Commercial layer	Intensive	25	32	25	18	100
Commercial broiler	Intensive	25	31	25	19	100
Total		125	156	125	94	500

Source: Field survey, 2012.

Figure 2. Map of Bangladesh showing the selected districts



Development of survey instruments

Tools for the study were based on the information needed to fulfil the study objectives and included a predesigned structured interview schedule for the sample survey. For retrospective analysis, farm management records/information and personal interviews were used. The interview schedule had several sections on the specific aspects required for the study objectives. In-depth interviews with key informants were conducted on various aspects of the management patterns for different types of chickens.

A consultant prepared the interview schedule based on field tests and identification of data gaps. After pre-testing in the field, the schedule was modified, finalized and printed. All study instruments were finalized in consultation with FAO personnel.

Recruitment of field staff

Data collectors were recruited and given an orientation course on data collection procedures before being sent to the field. Minimum qualifications for data collectors were a doctorate of veterinary medicine or a bachelor of science (with honours) degree in animal health or agricultural economics and two to three years of field experience.

Sources of data

The study used both primary and secondary data. The main source of primary data were the 500 farmers from whom both qualitative and quantitative data were collected. Secondary data and information were collected from the Department of Livestock Services, the Poultry Association and other government and non-government sources.

Data processing and analysis

Data collected from the field were entered into computers using MS Excel. For analysing the data, a combination of descriptive statistics (sums, averages, percentages, etc.) and mathematical techniques (gross margins, net returns, benefit/cost ratios [BCR], etc.) were used to obtain meaningful results.

Findings of the study

The study analysed the comparative performance of birds under five production systems: *Sonali* intensive (meat or egg producing), commercial broiler, commercial layer, *Sonali* semi-scavenging, and local non-descript. *Sonali* birds under intensive production systems are reared with better feeding, housing, care, treatment, management practices, etc., while those under the semi-scavenging system receive some supplementary feed and veterinary care. Birds are sometimes kept free-range around the homestead. The survey found that about 81 percent of intensive *Sonali* farms reared birds for meat production while the remaining 19 percent reared them mainly to produce hatching eggs.

Small and marginal farmers started rearing *Sonali* birds commercially mainly for meat production in response to the market demand for coloured birds. *Sonali* is a cross-bred bird produced by crossing Rhode Island Red (RIR) cocks with Fayoumi hens. Its phenotypic appearance is similar to that of local chickens.

Government farms raise some pure-line RIR cocks and Fayoumi hens for the production of hatchable *Sonali* eggs, but they cannot satisfy the growing demand for *Sonali* day-old chicks (DOCs) for the whole country. Commercial hatcheries do not raise pure-line RIR or Fayoumi. Currently, small and medium-sized commercial farmers are rearing *Sonali* crossed birds, which have a genetic composition of RIR male \times *Sonali* female or *Sonali* male \times *Sonali* female.

Farmers raising *Sonali* parent stock buy DOCs of both male and female *Sonali* birds from commercial hatcheries and rear them to produce more eggs for sale back to the hatcheries. The hatcheries either sell DOCs to commercial rearers for meat production or rear them as parent stock to produce more hatching eggs. As these birds have different genetic compositions, their performance also varies from farm to farm.

Broilers and layers are reared commercially under intensive management practices for meat and egg production respectively. Raising broiler chickens is an efficient and rapid way of filling any protein gaps because broilers grow more quickly than other meat producing birds. Local non-descript birds are reared under traditional husbandry practices as scavengers in and around the homestead compound. These birds eat various types of food, including household food waste and crop residues.

FLOCK SIZES

Table 2 shows the flock sizes under the different production systems. The highest average flock size was found for *Sonali* birds reared for meat production under intensive farming (1 442.7 birds per flock) followed by *Sonali* birds reared for egg production (1 207.5), commercial layers (1 102.9), commercial broilers (917.8), *Sonali* birds reared under the semi-scavenging production system (34.7) and local non-descript poultry (8.1). Most flocks were small, with very few of medium size.

Regional variation in average flock sizes was higher among commercial layer farms. The maximum flock size for these farms was 3 500 birds, with a minimum of 250. Commercial broiler farms reared various breeds of birds including Cobb 500, Hubbard Classic and Ross 308. Commercial layer farms reared Hisex Brown, Hyline Brown, Isa Brown, Shaver 579 and Novogen breeds.

Table 2. Poultry flock sizes

Production system		Number of farms	Flock sizes		
			Minimum	Maximum	Average
<i>Sonali</i> intensive	Meat	81	840	2 200	1 442.7
	Eggs	19	490	1 800	1 207.5
Commercial broiler		100	450	2 000	917.8
Commercial layer		100	250	3 500	1 102.9
<i>Sonali</i> semi-scavenging		100	4	242	34.7
Local non-descript		100	4	20	8.1

Source: Field survey, 2012.

Table 3. Sources of new birds (percentages of responses)

Production system	Hatcheries	Market	Dealers/agents	Other
<i>Sonali</i> intensive (meat)	53.7	0	20.7	25.6
Commercial broiler	58.0	0	42.0	0
<i>Sonali</i> intensive (eggs)	21.1	0	47.4	31.6
Commercial layer	68.0	0	23.0	9.0
<i>Sonali</i> semi-scavenging	7.0	0	0	93.0
Local non-descript	0	24.0	22.0	54.0

Source: Field survey, 2012.

SOURCES OF BIRDS

Table 3 summarizes information on the sources of new birds for the farms. Almost all the *Sonali* intensive farms (egg or meat producing) purchased new stock as DOCs from hatcheries and intermediaries. All the farmers raising *Sonali* under the semi-scavenging system purchased birds of different ages from local sources (see Table A1 in the Annex), including NGOs, *upazila* livestock officers and neighbours. The surveyed farmers reported various prices for purchasing new stock.

Commercial broiler and layer farmers bought DOCs from well-known hatcheries and dealers/agents. Most local non-descript farms (54 percent) hatched their own eggs from brooding hens, but some bought birds from neighbours or intermediaries.

HOUSING AND FEEDING

The housing and feeding patterns of birds are shown in Tables 4 and 5. Irrespective of region, almost all the farms under intensive production systems (*Sonali*, commercial broiler and commercial layer) housed chickens with roofing and walls made from wire-mesh or solid walls. Regional variations in housing were observed among farms using the semi-scavenging production system. All the *Sonali* semi-scavenging farms in Mymensingh/Gazipur district housed their chickens in netting and wooden boards. Farms in other districts housed their birds with roofing and wire-mesh walls. Local birds were housed in shelters made with corrugated iron (tin) and bamboo, or sometimes with mud and tin.

The intensive *Sonali* farms fed mainly branded commercial poultry feed to their chickens. Some used unbranded feed or purchased crop by-products. All the commercial broiler farms used branded poultry feed. Layer farms used both branded and unbranded feed, with some farms in Joypurhat and Naogaon purchasing crop

Table 4. Housing (*percentages of responses*)

Type of birds	Roofing and wire-mesh walls	Roofing and solid walls	Other
Sonali intensive (meat)	95.1	2.5	2.5
Commercial broiler	70.0	20.0	10.0
<i>Sonali</i> (eggs)	78.9	15.8	5.3
Commercial layer	86.0	14.0	0
<i>Sonali</i> semi-scavenging	38.9	4.2	56.8
Local non-descript	11.0	12.0	77.0

Source: Field survey, 2012.

Table 5. Feeding (*percentages of responses*)

Type of birds	Branded commercial poultry feed	Unbranded poultry feed	Purchased crop by-products	Self-produced crop by-products
Sonali intensive (meat)	78.0	9.8	12.2	0
Commercial broiler	100	0	0	0
<i>Sonali</i> intensive (eggs)	73.7	21.1	5.3	0
Commercial layer	89.0	7.0	4.0	0
<i>Sonali</i> semi-scavenging	3.0	17.0	15.0	65.0
Local non-descript	0	1.0	46.0	53.0

Source: Field survey, 2012.

Table 6. Veterinary support (*percentages of responses*)

Type of birds	Para-veterinarians	Government veterinarians	Self-treatment
<i>Sonali</i> intensive (meat)	18.5	79.0	2.5
Commercial broiler	17.0	80.0	3.0
<i>Sonali</i> intensive (eggs)	21.1	73.7	5.3
Commercial layer	44.0	47.0	9.0
<i>Sonali</i> semi-scavenging	61.0	24.0	15.0
Local non-descript	0.0	41.0	59.0

Source: Field survey, 2012.

by-products. The semi-scavenging *Sonali* farms used mainly unbranded poultry feed and crop by-products, particularly self-produced. Local birds were fed almost exclusively on crop by-products.

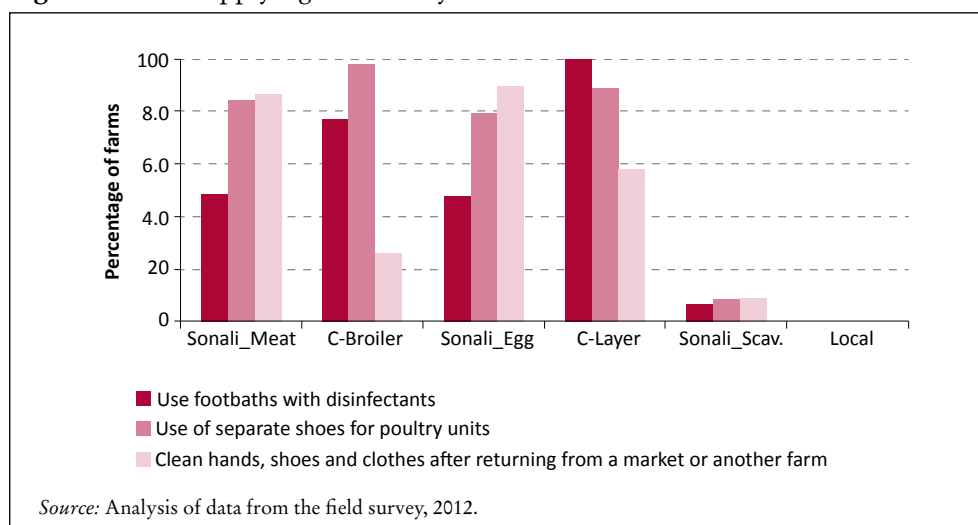
VETERINARY SUPPORT

Most of the *Sonali* intensive (79 percent) and broiler (80 percent) farms, and many of the layer farms (47 percent) used government veterinary care for their birds, while most *Sonali* semi-scavenging farms called on para-veterinarians (private veterinary care). Most indigenous chicken farmers treated their birds themselves, but some received services from government veterinarians (Table 6).

BIOSECURITY

Biosecurity covers many farm management activities, including aspects of housing, feeding, overall management, personal hygiene, disposal of waste and dead birds, and

Figure 3. Farms applying biosecurity measures



vaccination. Most of the *Sonali* intensive, broiler and layer farms practised some biosecurity measures, with disinfectant footbaths and special footwear for people entering and leaving poultry units; procedures for cleaning shoes, clothes and hands when returning from market or another farm; and proper cleaning of poultry sheds and disposal of manure and dead birds. Timely vaccination against diseases is also important in preventing disease outbreaks on the farms. A small proportion of *Sonali* semi-scavenging farms were found to have adopted biosecurity practices, but none of the local non-descript/*deshi* farms had, although some vaccinated their birds (Figure 3).

Carcass disposal

If dead birds are not disposed of regularly, carcasses on farms can cause surface and groundwater pollution; disease; insect, rodent and predator problems; and odour and aesthetic problems. Proper management of dead birds is vital for disease control. The most common method of carcass disposal in the study areas was burying on the premises, but some farms used other methods, such as throwing into rivers, ponds, etc. (Table 7).

Use of chicken manure as fertilizer

Table 8 reveals the percentages of respondents using chicken manure as fertilizer. Used poultry litter is an excellent, low-cost fertilizer when properly applied, but it can contribute to the spread of diseases. Most of the *Sonali* intensive (meat or egg producing), commercial broiler and commercial layer farms used chicken manure as a fertilizer on their crop fields. These farms were also routinely cleaned with disinfectant. On the other hand, most of the *Sonali* semi-scavenging and local non-descript farms did not use poultry manure as fertilizer.

Disinfecting of farms

Most of the *Sonali* intensive, commercial broiler and commercial layer farmers used disinfectant for cleaning on a routine basis and all of them used it to clean their farms after a disease outbreak. However, most of the non-descript/*deshi* farms (87 percent) never used any kind of disinfectant (Table 9).

Table 7. Methods of carcass disposal (*percentages of responses*)

Type of birds	Buried on the premises	Other
<i>Sonali</i> intensive (meat)	100	0
Commercial broiler	99.0	1.0
<i>Sonali</i> intensive (eggs)	100	0
Commercial layer	99.0	1.0
<i>Sonali</i> semi-scavenging	86.0	14.0
Local non-descript	71.0	29.0

Source: Field survey, 2012.

Table 8. Use of chicken manure as fertilizer (*percentages of responses*)

Type of birds	Yes	No
<i>Sonali</i> intensive (meat)	75.3	24.7
Commercial broiler	75.0	25.0
<i>Sonali</i> intensive (eggs)	73.7	26.3
Commercial layer	85.0	15.0
<i>Sonali</i> semi-scavenging	35.0	65.0
Local non-descript	11.0	89.0

Source: Field survey, 2012.

Table 9. Use of disinfectants (*percentages of responses*)

Type of birds	Routine use	Between batches	After an outbreak	Never
<i>Sonali</i> intensive (meat)	95.1	100	100	0
Commercial broiler	84.0	100	100	0
<i>Sonali</i> intensive (eggs)	78.9	100	100	0
Commercial layer	100	100	100	0
<i>Sonali</i> semi-scavenging	25.0	86.0	87.0	11.0
Local non-descript	0	0	13.0	87.0

Source: Field survey, 2012.

Biosecurity index

Biosecurity encompasses all the measures used to protect the farm's flock from infectious disease, including ensuring quality inputs, preventing disease introduction on to the farm, preventing disease transmission within the farm, and limiting the susceptibility of the flock (Figure 4). Biosecurity measures can be classified into different categories or levels, based on the production cycle and farm management practices (Susilowati *et al.*, 2011). Scores are assigned to each farm based on indicators for each category (Table 10). Each indicator has equal weighting and is expressed as a percentage, with 100 percent indicating the best biosecurity status possible.

Figure 5 and Table A6 show the average biosecurity indices for the four study regions and five of the production systems; no indices were calculated for local non-descript farms as most of the indicators are not applicable to that system. The four commercial production systems had similar biosecurity scores, ranging from 50 to 70 percent, with most farms scoring between 56.3 and 63.8 percent. Farms with

Figure 4. Levels of biosecurity

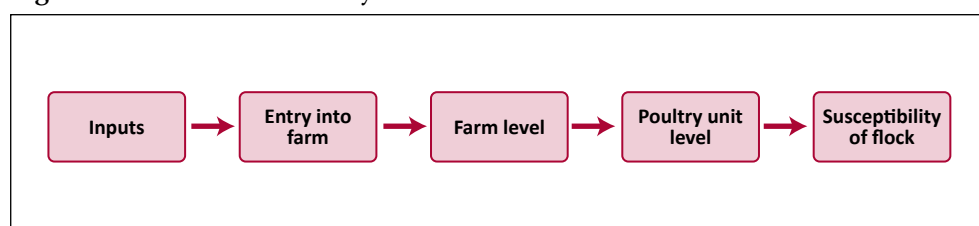


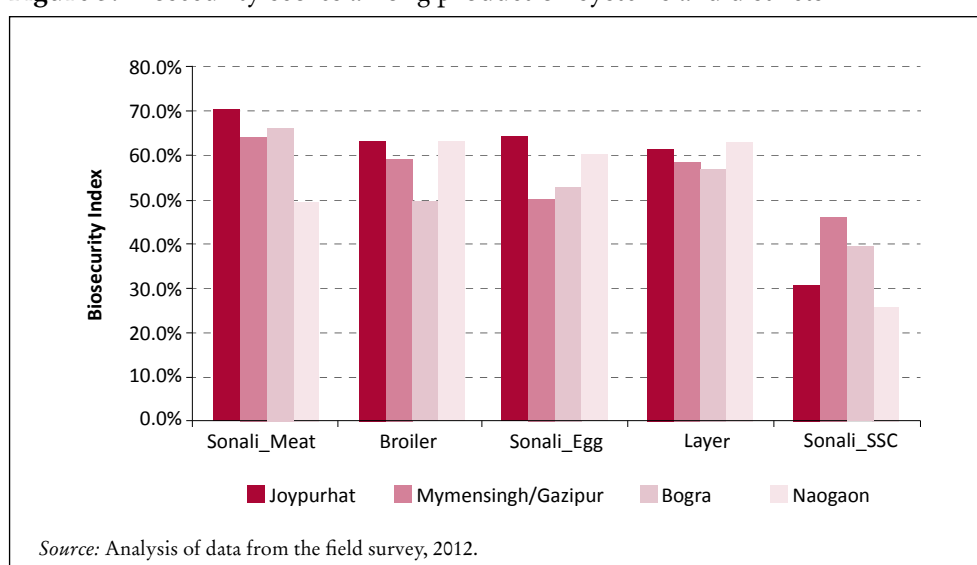
Table 10. Biosecurity indicators

Level 1: quality of inputs
<ul style="list-style-type: none"> • Birds purchased from a registered hatchery • Branded food used
Level 2: measures to prevent introduction of disease to the farm
<ul style="list-style-type: none"> • Distance to the closest backyard poultry • Distance to the closest commercial poultry farm • Cleaning procedures on farm entry • Return of birds from the market if not sold
Level 3: measures to control disease spread within the farm
<ul style="list-style-type: none"> • Carcass disposal method • Use of poultry manure for fertilizer on the farm
Level 4: measures to prevent and control disease in the poultry unit building
<ul style="list-style-type: none"> • Buyers allowed to enter the unit • Use of footbaths or separate shoes when entering the unit • Frequency of disinfection
Level 5: measures to limit susceptibility of the flock
<ul style="list-style-type: none"> • Use of vaccines • Use of vitamins (improving nutrition status of the birds)

Table 11. Physical performance of birds

Parameters	Intensive system				Sonali semi-scavenging	Local non-descript
	Sonali (meat)	Commercial broiler	Sonali (eggs)	Commercial layer		
Estimated slaughter weight (kg)	0.85	1.64	-	-	-	-
Age at slaughter	12 (weeks)	31 (days)	-	-	-	-
Age at point of lay (weeks)	-	-	21.8	20.7	24.7	26.3
Age of maximum egg production (weeks) and daily farm production (numbers of eggs)	-	-	31.1 (971)	31.5 (918)	34.0 (22.8)	-
Age when egg production starts declining (weeks)	-	-	44.8	67.3	37.8	-
Weight at end of laying period (kg)	-	-	1.7	2.0	1.6	1.3

Source: Field survey, 2012.

Figure 5. Biosecurity scores among production systems and districts

Sonali semi-scavenging birds implemented some biosecurity measures. There were clear differences among the four regions in the biosecurity scores of each production system, which may reflect different management skills. However, at the regional level, higher biosecurity scores did not correspond with higher profitability of farms (Table A6 and Tables A12–A16).

PHYSICAL PERFORMANCE OF BIRDS

The physical performances of birds in the different production systems are shown in Table 11. The average slaughter weights and ages of *Sonali* intensive meat birds and commercial broiler birds were estimated at 0.85 kg at 12.0 weeks of age and 1.64 kg at 31.0 days, respectively. Average ages of first lay were estimated to be 21.8 weeks for *Sonali* intensive egg producing birds and 20.7 weeks for commercial layers. *Sonali* intensive egg producers reached maximum production at 31.1 weeks, and average daily egg production at this peak period was estimated at 971 per farm (with 80.4 percent egg production). The average age at which commercial layers reached maximum production was estimated at 31.5 weeks, with peak daily production of 918 eggs per farm (with 83.3 percent egg production). Egg production started to decline at 44.8 weeks in *Sonali* egg producers and 67.3 weeks in commercial layers. The average weights of the birds at the end of the laying period were 1.7 kg and 2.0 kg respectively.

The ages at point of lay were estimated at 24.7 weeks for *Sonali* semi-scavenging and 26.3 weeks for local non-descript chickens. *Sonali* semi-scavenging birds reached maximum production at 34 weeks, with peak egg production estimated at 22.8 per farm (with 64.6 percent egg production). Egg production gradually declined from 37.8 weeks. Farmers with local non-descript chickens could not clearly remember the ages when birds reached maximum egg production, the numbers produced or the ages when production started to decline. *Sonali* birds under the semi-scavenging system weighed about 1.6 kg when they were removed from egg production, while local non-descript birds weighed 1.3 kg. Rahman, Baqui and Howlider (2004) found the age at first lay of *Sonali* (RIR x Fayoumi) to be 147.0 days – similar to the age found in this survey.

Table 12. Mortality rates of birds during the production cycle (*percentages of birds*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
<i>Sonali</i> intensive (meat)	4.6	3.7	6.1	9.6	5.4
Commercial broiler	3.6	3.6	4.3	5.2	4.1
<i>Sonali</i> intensive (eggs)	2.6	8.8	5.9	4.7	5.7
Commercial layer	7.7	10.1	14.7	3.7	9.5
<i>Sonali</i> semi-scavenging*	4.2	9.9	1.6	17.9	9.9
Local non-descript*	13.4	11.8	15.0	12.6	13.2

* Among birds aged > 5 months only.

Mortality

Bird mortality rates vary among the different production systems, as shown in Table 12. The mortality rates of only adult birds (> 5 months) were considered for *Sonali* semi-scavenging and local non-descript farms, but mortality rates among *Sonali* intensive, commercial layer and commercial broiler birds were calculated from data for the full production cycle. The highest mortality was observed for local non-descript birds (13.2 percent), mainly because of Newcastle disease and worm infestation. Apu and Saleque (2012) report that community-based biosecurity and regular vaccination can reduce the mortality of local birds from 40 to 12 percent, which is a similar rate to that found in the present study. However, several other reports have found higher mortality in local non-descript poultry, with rates for birds under traditional rural backyard systems remaining as high as 35–40 percent, owing to outbreaks of various diseases and predators (SAPPLPP, 2009).

Commercial broilers showed the lowest mortality rate (4.1 percent) followed by *Sonali* birds kept for meat production under the intensive management system (5.4 percent). The mortality rate among broilers correspond to those of Saleque, Rahman and Apu (2012), who found rates varying from 2.83 to 6.14 percent depending on the season. The mortality rate among *Sonali* for meat production correspond to those of Hossain *et al.* (2012), who found rates of 2 to 5 percent and an average of 3.5 percent during the growing stage of *Sonali* birds.

This study found mortality rates of 9.5 percent among commercial layers and 5.7 percent among *Sonali* egg producers. Uddin *et al.* (2011) reported for commercial layers an overall mortality of 8.43 percent which was close to the findings of this study. The most common diseases in commercial layers and *Sonali* chickens in the study areas were infectious bursal disease (Gumboro), mycoplasma infections, coccidiosis, Newcastle disease, fowl pox and fowl cholera. However, avian influenza was found to be one of the most important disease challenges for rearing poultry in the study areas.

SALES OF FARM PRODUCTS

The study found that almost all the farmers practising *Sonali* intensive systems produced eggs for sale to hatcheries (Figure 6), which sold the resulting DOCs to Parent stock farms. The unfertilized table eggs produced on parent stock farms were sold mainly at markets and to dealers/agents. Most of the farmers using the semi-scavenging system sold their eggs directly to consumers at the farmgate, while some sold them to shops, restaurants and hotels.

Figure 6. Product flow of *Sonali* intensive farming

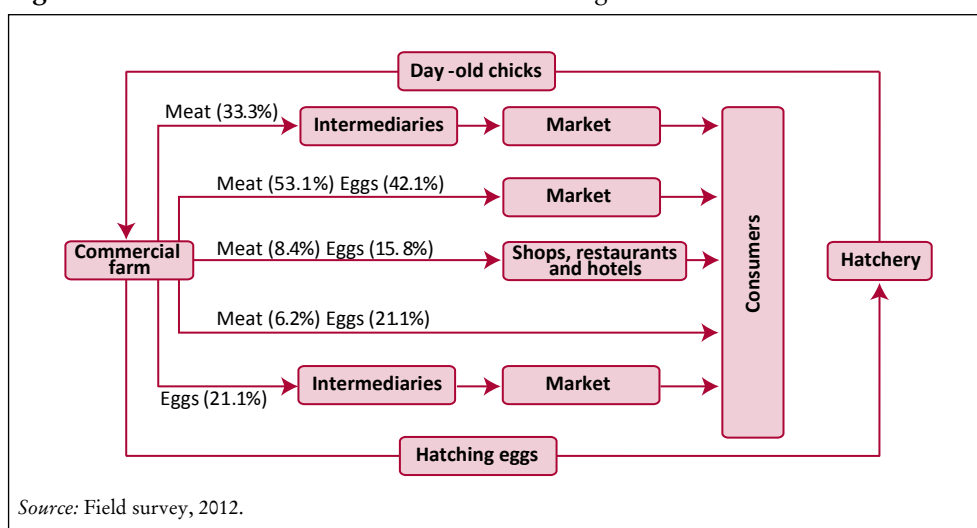
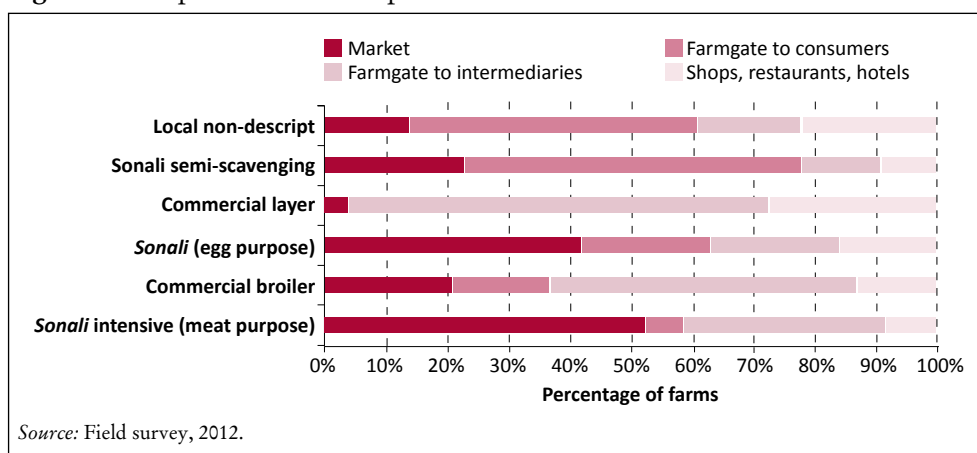


Figure 7. Sale patterns for farm products



Commercial broiler and layer farms sold their products mainly to dealers/agents – 50.0 percent of broiler farms and 68.7 percent of layer farms – but some sold in markets or to shops, restaurants, hotels, etc. Indigenous chicken farmers sold their products mainly to consumers at the farmgate (47 percent) (Table 13 and Figure 7).

COMPARATIVE ECONOMIC PERFORMANCES OF BIRDS

This following section summarizes findings on the comparative economic performances of birds under the different production systems.

Inventory of birds

The inventory of birds for the study year (2012) is presented in Table 14. The net change in inventory was calculated by using the following formula:

$$\text{Net change in inventory} = (\text{Closing stock} + \text{Consumed/Gifted/Sold} + \text{Died}) - (\text{Opening stock} + \text{Bought})$$

Table 14 shows the positive net changes in inventory, in value, for all types of birds. The highest net change was for *Sonali* intensive meat producing birds

Table 13. Sales patterns for farm products (*percentages of responses*)

Type of birds	Market	Farmgate to consumers	Farmgate to dealers/ agents	Shops, restaurants, hotels
<i>Sonali</i> intensive (meat)	53.1	6.2	33.3	8.4
Commercial broiler	21.0	16.0	50.0	13.0
<i>Sonali</i> intensive (eggs)	42.1	21.1	21.1	15.8
Commercial layer	4.0	0	68.7	27.3
<i>Sonali</i> semi-scavenging	23.0	55.0	13.0	9.0
Local non-descript	14.0	47.0	17.0	22.0

Source: Field survey, 2012.

at Tk 873 387.2 (US\$10 397.5), followed by commercial broilers at Tk 840 298.3 (US\$10 003.6), *Sonali* intensive egg producers at Tk 263 983.0 (US\$3 142.7), commercial layers at Tk 119 747.4 (US\$1 425.6), *Sonali* semi-scavenging at Tk 6 318.2 (US\$75.2) and local non-descript at Tk 5 623.1 (US\$66.9).

Variable and fixed costs

Tables 15 and 16 reveal the average variable and fixed costs of chicken rearing in the study districts, per bird and per batch (equivalent to production cycle). The production cycles were found to be three months (four cycles a year) for *Sonali* intensive meat birds, 1.5 to 2 months (six cycles a year) for commercial broilers, 18 months for *Sonali* intensive egg producing birds and commercial layers, 15–18 months for *Sonali* semi-scavenging birds, and 12 months for local non-descript birds. The major variable cost items for *Sonali* intensive, commercial broiler and commercial layer farms were for feed and hired labour. Most of the local non-descript and *Sonali* semi-scavenging farms used crop by-products for feeding, so their feed costs were lower than those of other enterprises. Fixed cost items included housing, family labour and interest on operating capital. The cost of family labour was calculated based on the opportunity cost principle. All costs were estimated on a monthly basis. Interest on operating capital was calculated by applying the following formula:

$$\text{IOC} = \text{AI} * i * t$$

Where IOC = Interest on operating costs; AI = (Total investment)/2; i = interest rate per year (12 percent); and t = number of months.

The highest average variable costs per batch and per bird were calculated for *Sonali* intensive egg producing farms at Tk 1 425.1 (US\$17.0), which have the longest-lasting batches; the lowest costs were for *Sonali* intensive meat producing farms at Tk 93.5 (US\$1.1). Commercial broiler farms had the shortest-lasting batches. The average variable costs for *Sonali* intensive egg producing birds were higher than those for *Sonali* meat producing birds. The fixed costs of production were highest for commercial layer farms at Tk 155.8 (US\$1.9) (Table 16).

Average gross costs

The average gross costs per batch and per bird were highest for *Sonali* intensive egg producing farms at Tk 1 579.6 (US\$18.8) followed by commercial layer farms at Tk 1 577.2 (US\$ 18.8), *Sonali* semi-scavenging farms at Tk 1 100.2 (US\$13.1), local non-descript farms at Tk 430.4 (US\$5.1), commercial broiler farms at Tk 126.6 (US\$1.5) and *Sonali* intensive meat producing farms at Tk 102.2 (US\$1.2) (Table 17 and Figure 8).

Table 14. Inventory of birds, 2012

Type of birds	Opening stock (1)		Bought (2)		Died (3)		Sold/gifted/consumed (4)		Closing stock (5)		Net change in inventory 6 = (5 + 4 + 3) - (1 + 2)		Net change in inventory (US\$)
	No.	Value (Tk)	No.	Value (Tk)	No.	Value (Tk)	No.	Value (Tk)	No.	Value (Tk)	No.	Value (Tk)	
<i>Sonali</i> intensive (meat)	1 250.0	22 500.0	4 518.0	90 360.0	219.2	26 302.1	5 548.8	959 945.2	-	-	-	873 387.2	10 397.5
Commercial broiler	900.0	25 200.0	4 602.0	133 458.0	319.1	28 720.4	5 182.9	970 235.9	-	-	-	840 298.3	10 003.6
<i>Sonali</i> intensive (eggs)	1 207.0	42 245.0	-	-	89.3	15 630.7	1 117.7	290 597.3	-	-	-	263 983.0	3 142.7
Commercial layer	1 102.9	66 174.0	0.0	0.0	104.8	16 240.2	998.1	169 681.2	-	-	-	119 747.4	1 425.6
<i>Sonali</i> semi-scav-enging	34.7	2 082.0	-	-	3.4	584.0	31.3	7 816.2	-	-	-	6 318.2	75.2
Local non-descript	6.0	660.0	30.0	0.0	4.7	848.9	23.2	4 057.2	8.1	1	377.0	5 623.1	66.9

Note: US\$1 = Tk 84.0.

Source: Authors' calculation based on field survey, 2012.

Table 15. Average variable costs per bird, per batch

Type of birds	Joypurhat (Tk)	Mymensing/Gazipur (Tk)	Bogra (Tk)	Naogaon (Tk)	All-area average (Tk)	All-area average (US\$)
<i>Sonali</i> intensive (meat)	94.6	92.6	93.5	93.3	93.5	1.1
Commercial broiler	128.5	119.8	115.6	108.6	118.1	1.4
<i>Sonali</i> intensive (eggs)	1 416.7	1 403.9	1 452.7	1 427.2	1 425.1	17.0
Commercial layer	1 442.7	1 401.6	1 443.8	1 397.2	1 421.3	16.9
<i>Sonali</i> semi-scavenging	966.1	965.7	966.2	966.7	966.2	11.5
Local non-descript	406.8	419.3	368.0	396.1	397.6	4.7

Source: Authors' calculation based on field survey, 2012.

Table 16. Average fixed costs per bird, per batch

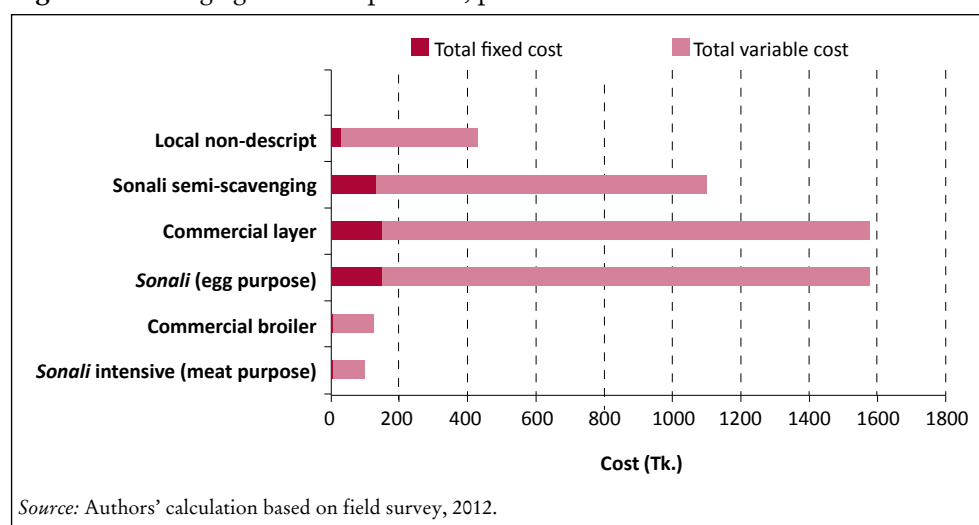
Type of birds	Joypurhat (Tk)	Mymensing/Gazipur (Tk)	Bogra (Tk)	Naogaon (Tk)	All-area average (Tk)	All-area average (US\$)
<i>Sonali</i> intensive (meat)	8.7	8.7	8.6	8.6	8.7	0.1
Commercial broiler	8.4	8.6	8.5	8.5	8.5	0.1
<i>Sonali</i> intensive (eggs)	156.5	153.7	155.1	152.5	154.5	1.8
Commercial layer	157.1	154.7	157.2	154.4	155.8	1.9
<i>Sonali</i> semi-scavenging	132.2	137.2	132.4	134.3	134.0	1.6
Local non-descript	33.4	34.2	31.0	32.9	32.9	0.4

Source: Authors' calculation based on field survey, 2012.

Table 17. Average gross costs per bird, per batch

Type of birds	Joypurhat (Tk)	Mymensing/Gazipur (Tk)	Bogra (Tk)	Naogaon (Tk)	All-area average (Tk)	All-area average (US\$)
<i>Sonali</i> intensive (meat)	103.3	101.3	102.1	101.9	102.2	1.2
Commercial broiler	137.0	128.3	124.2	117.1	126.6	1.5
<i>Sonali</i> intensive (eggs)	1 573.2	1 557.6	1 607.8	1 579.7	1 579.6	18.8
Commercial layer	1 599.7	1 556.3	1 601.0	1 551.5	1 577.2	18.8
<i>Sonali</i> semi-scavenging	1 098.2	1 102.9	1 098.6	1 101.0	1 100.2	13.1
Local non-descript	440.2	453.5	399.0	429.0	430.4	5.1

Source: Authors' calculation based on field survey, 2012.

Figure 8: Average gross costs per bird, per batch**Table 18.** Average gross return per bird, per batch

Type of birds	Joypurhat (Tk)	Mymensing/Gazipur (Tk)	Bogra (Tk)	Naogaon (Tk)	All-area average (Tk)	All-area average (US\$)
Sonali intensive (meat)	157.8	144.2	144.7	164.1	152.7	1.8
Commercial broiler	151.0	146.1	165.7	153.9	154.2	1.8
Sonali intensive (eggs)	2 300.5	2 301.1	2 242.6	2 242.6	2 271.7	27.0
Commercial layer	1 772.5	1 718.0	1 811.5	1 723.3	1 756.3	20.9
Sonali semi-scavenging	1 767.9	1 768.4	1 886.0	1 821.3	1 810.9	21.6
Local non-descript	685.8	752.3	743.2	763.3	736.1	8.8

Source: Authors' calculation based on field survey, 2012.

Average gross returns

The average gross returns per batch and per bird are shown in Table 18. The gross return includes net inventory change, returns from sales of litter as fertilizer and – for commercial layers, *Sonali* egg producers and semi-scavenging, and local non-descript chickens – from egg sales. The *Sonali* intensive egg producing farms derived the highest return per batch and bird at Tk 2 271.7 (US\$27.0), followed by *Sonali* semi-scavenging at Tk 1 810.9 (US\$21.6), commercial layer at Tk 1 756.3 (US\$20.9), local non-descript at Tk 736.1 (US\$ 8.8), commercial broiler at Tk 154.2 (US\$1.8) and *Sonali* intensive meat producing at Tk 152.7 (US\$1.8). Although there were regional variations in gross costs and returns (see the annex), average figures were obtained for simplification.

Profitability

Of all types of enterprise, those rearing local non-descript birds were the most profitable per batch and bird. Indigenous chickens are reared with little supplemental

feeding, veterinary care, etc., so the gross cost (Tk 430.4) for local non-descript farms was much lower than the gross return (Tk 736.1). As a result, the BCR estimated for local non-descript farms was higher (1.71) than the BCRs for other enterprises. For every Tk 1 that a farmer invests on local non-descript birds, he/she will generate Tk 1.71 in return. These results reflect the gross margin and net return analyses in Table 19.

Gross margins and net returns were calculated using the following formulae:

$$\text{Gross margin} = \text{Gross return} - \text{Total variable costs}$$

$$\text{Net return} = \text{Gross return} - \text{Total costs}$$

The highest gross margin per batch and per bird was calculated for *Sonali* intensive egg producing farms at Tk 846.6 (US\$ 10.1) and the highest net return was for *Sonali* semi-scavenging farms at Tk 710.7 (US\$ 8.5). Following local non-descript farms, the highest BCR per batch and per bird was calculated for *Sonali* semi-scavenging farms at 1.65, followed by *Sonali* intensive meat producing farms at 1.49, *Sonali* intensive egg producing farms at 1.44, commercial broiler farms at 1.22, and commercial layer farms at 1.11. *Sonali* intensive meat producing birds were more profitable than commercial broilers. *Sonali* intensive egg producing farms derived higher net returns per bird than commercial layer farms, and *Sonali* semi-scavenging farms had higher net returns than local non-descript farms. The estimated BCRs for all production systems were all greater than 1, indicating that all are profitable farming enterprises.

The local non-descript farms derived the highest BCR (1.71), indicating that this was the most profitable type of poultry enterprise in the study areas. However, local non-descript birds are reared under semi-scavenging conditions for subsistence purposes, and the numbers reared are low. If these birds were reared for commercial purpose, farm sizes would have to increase and farmers would have to provide more feed and veterinary care, better housing and more labour. As a result, production costs would increase, reducing the BCR. *Sonali* birds reared under the semi-scavenging system were also found to have better economic performance than birds reared under intensive systems. However, relatively few farms in the study areas practised the semi-scavenging system. The farmers who did were slightly better-off and had higher managerial capacity than others, enabling them to provide some supplementary feed, better housing and veterinary care, etc. As these farmers take more individual care of their birds, they were able to obtain better BCRs than intensive production systems.

Sonali intensive meat producing farms derived higher gross margins per batch and per bird (Tk 59.2 or US\$0.7) than commercial broiler farms. *Sonali* intensive egg producing farms were also found to perform better than commercial layer farms with respect to egg production, as indicated by the respective BCRs. *Sonali* intensive meat producing farms had lower gross costs compared with gross returns than *Sonali* intensive egg producing farms, making them more profitable enterprises.

Farm net returns

The average annual net returns from poultry production were calculated for farms under each of the six production systems based on the average net return per batch and bird, the flock size, the length of production cycle and – for *Sonali* intensive meat producing and commercial broiler systems – the actual number of birds pro-

Table 19. Gross margins, net returns and BCRs per bird, per batch

Parameter	Intensive system				Sonali semi-scavenging	Local non-descript
	Sonali (meat)	Commercial broiler	Sonali (eggs)	Commercial layer		
Tk.						
A. Total variable costs	93.5	118.1	1 425.1	1 421.3	966.2	397.6
B. Total fixed costs	8.7	8.5	154.5	155.8	134.0	32.9
C. Gross costs (A + B)	102.2	126.6	1 579.6	1 577.2	1 100.2	430.4
D. Gross return	152.7	154.2	2 271.7	1 756.3	1 810.9	736.1
E. Gross margin (D – A)	59.2	36.0	846.6	335.0	844.7	338.6
F. Net return (D – C)	50.5	27.6	692.1	179.2	710.7	305.7
G. BCR (undiscounted) (D/C)	1.49	1.22	1.44	1.11	1.65	1.71
US\$						
A. Total variable costs	1.1	1.4	17.0	16.9	11.5	4.7
B. Total fixed costs	0.1	0.1	1.8	1.9	1.6	0.4
C. Gross costs (A + B)	1.2	1.5	18.8	18.8	13.1	5.1
D. Gross return	1.8	1.8	27.0	20.9	21.6	8.8
E. Gross margin (D – A)	0.7	0.4	10.1	4.0	10.1	4.0
F. Net return (D – C)	0.6	0.3	8.2	2.1	8.5	3.6

Source: Author's calculation based on field survey, 2012.

Table 20. Average annual farm net returns (Tk)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All areas
Sonali intensive (meat)	53 040 (975)	65 974 (1 538)	51 891 (1 218)	64 562 (1 057)	62 857 (1 245)
Commercial broiler	42 114 (2 987)	62 759 (3 526)	331 502 (7 988)	158 441 (4 294)	128 410 (4 653)
Sonali intensive (eggs)	493 480 (1 077)	562 086 (1 200)	590 288 (1 476)	449 784 (1 077)	526 716 (1 208)
Commercial layer	193 992 (1 783)	72 940 (716)	92 786 (700)	131 288 (1 213)	124 524 (1 103)
Sonali semi-scavenging	8 036 (15)	5 857 (11)	67 401 (107)	3 457 (6)	19 900 (35)
Local non-descript	2 546 (10)	2 988 (10)	2 065 (6)	2 005 (6)	2 446 (8)

Note: Figures in parenthesis indicate average number of bird per farm.

Source: Author's calculation based on field survey, 2012.

duced during the year before the survey. The results in Table 20 show that farms producing *Sonali* eggs had by far the highest net returns. In the Mymensingh/Gazipur areas *Sonali* intensive meat producers could achieve very similar returns to those of commercial broiler producers, but with far smaller flocks and operations. The average net returns of commercial broiler farms were also very similar to those of commercial layer farms. With the same flock size, small-scale producers raising *Sonali* birds under the semi-scavenging system could generate almost twice as much income as farmers raising non-descript birds in the traditional production system.

Table 21. Sources of investment in poultry business (*percentages of responses*)

Type of birds	Own resources	Family loan	Commodity loan	Moneylender	Bank
<i>Sonali</i> intensive (meat)	80.2	7.4	3.7	3.7	4.9
Commercial broiler	86.0	9.0	3.0	0	2.0
<i>Sonali</i> intensive (eggs)	73.7	21.1	0	0	5.3
Commercial layer	89.0	7.0	0	0	4.0
<i>Sonali</i> semi-scavenging	91.0	6.0	0	3.0	0
Local non-descript	100	0	0	0	0

Source: Field survey, 2012.

Table 22. Employment in poultry rearing (*minutes/day*)

Type of birds	Family labour	Hired labour
<i>Sonali</i> intensive (meat)	250.8	308.1
Commercial broiler	320.1	312.0
<i>Sonali</i> intensive (eggs)	181.6	274.7
Commercial layer	141.2	281.4
<i>Sonali</i> semi-scavenging	105.7	36.1 (Bogra)
Local non-descript	95.9	-

Source: Field survey, 2012.

SOURCES OF INVESTMENT IN THE POULTRY BUSINESS

The various sources of money for investment in starting up a poultry business are summarized in Table 21 and comprised farmers' own resources, family loans, commodity loans, moneylenders and banks. In all regions, almost all farms of all types of poultry set up with their own resources. A few farmers resorted to loans from family members or others.

EMPLOYMENT GENERATION

Poultry provides a great opportunity for creating work for the rural unemployed. Both men and women are involved in poultry rearing, and women in rural areas are directly involved in home-based activities that increase the incomes generated from poultry. Table 22 reveals the time spent on poultry rearing activities by both family members and hired labour.

Areas of employment included gathering poultry for sale at the proper age, cleaning poultry sheds, feeding or supervising scavenging, providing veterinary care, tending chicks, and egg production tasks. Details are shown in Tables A19 and A20 in the Annex. Commercial farms – *Sonali* intensive, broiler and layer – hired more labour. *Sonali* semi-scavenging and local non-descript farms relied mainly on family labour. Depending on the type of enterprise, family labour spent between 95.9 minutes/day for local non-descript birds and 320.1 minutes/day for commercial broilers. Hired labour spent between 36.1 minutes/day for *Sonali* semi-scavenging birds in Bogra and 312 minutes/day for commercial broiler. None of the farms rearing local non-descript birds employed hired labour.

Conclusions and recommendations

This study was conducted to reveal the technical, economic and social performance of poultry production using *Sonali* birds – a cross of ♂Fayoumi x ♀ Rhode Island Red – compared with the performances of commercial broilers, commercial layers and local non-descript/*desbi* chickens. The study found that the average farm size was much higher for intensive farming than for the semi-scavenging production system. *Sonali* intensive farms were larger than their commercial equivalents and *Sonali* semi-scavenging farms were larger than farms raising local non-descript chickens. Egg production was higher from commercial layers than *Sonali* birds, which are reared mainly to produce hatching eggs that raise almost twice the price of eggs from commercial layers. On the other hand, *Sonali* birds under the semi-scavenging system showed better egg production than local non-descript birds. The live weight of *Sonali* meat birds was lower than that of commercial broilers, but *Sonali* meat raised almost twice the price of commercial broiler meat.

The economic viability of mixing compound feeds on the farm rather than purchasing them from feed mills depended on the production system. Most *Sonali* intensive (egg or meat producing), commercial layer and commercial broiler farmers bought feed, while farmers with local non-descript or *Sonali* semi-scavenging chickens depended on crop by-products. Homemade compound feeds provide a potentially cheaper alternative to commercially manufactured products, where these are locally available, but quality varies. Homemade feeds therefore provide farmers with an additional opportunity to increase productivity. Traditional feed resources for poultry, especially scavengers, include scattered grains from threshing, left-over grains, pulses, broken rice, kitchen waste, green grasses, insects, worms and boiled rice leftovers.

Farmers spent few hours per day on poultry farming activities, so other household activities – including integrated production – were not affected. However, commercial broiler, *Sonali* intensive (meat or egg producing) and commercial layer farming required more time and closer monitoring and supervision. *Sonali* birds command higher prices in the market and farmers could sell young birds aged 12 weeks to retailers or consumers, while farmers rearing commercial broilers had to use dealers/agents. Half of the local non-descript chickens were sold at the farmgate directly to consumers. Commercial layer farms sold their eggs mainly to dealers/agents, while *Sonali* intensive egg farms sold hatching eggs to hatcheries.

The BCR per batch and bird was highest for local non-descript chickens, followed by *Sonali* semi-scavenging. Results show that the flock size of local non-descript birds was only a quarter that of semi-scavenging *Sonali* birds, and there is little scope for scaling up local non-descript production. Due to limited space for scavenging an increasing of the flock sizes would require additional supplementary feed. The lower productivity of these birds also constrains their commercialization and profitability. On the other hand, *Sonali* semi-scavenging birds receive some supplementary feed and it was observed that these birds were reared mostly by slightly better-off farmers. *Sonali* birds under the semi-scavenging system were found to have better economic performance than birds reared under intensive management. However, this system requires more extension services like vaccination, technical advice etc. from government and NGOs. The study found that raising

Sonali birds, particularly for meat production under the intensive system, by rural households has good potential in supplying meat for the whole country, increasing incomes and generating employment. It is interesting to note that the market prices of *Sonali* birds are far higher than those of commercial broilers. Such price incentives will encourage people to rear more *Sonali* birds for meat production. *Sonali* meat was also found to be less affected by price fluctuations than meat from commercial broilers. *Sonali* layers are reared mainly as parent stock to produce hatching eggs for hatcheries, which fetch good prices. Their BCR is higher than that of commercial layers that produce table eggs; *Sonali* birds are less suitable for producing table eggs. For all production systems, improved biosecurity and proper vaccination are required to prevent and control diseases, especially highly pathogenic avian influenza.

This study found that *Sonali* meat producers performed better than commercial broilers, *Sonali* egg producers performed better than commercial layers, and *Sonali* semi-scavenging birds performed better than local non-descript birds. *Sonali* farming has created a value chain in Bangladesh. However challenges persist, particularly the risk of inbreeding and unplanned breeding between *Sonali* and *Sonali* and between RIR and *Sonali*. Other constraints include the lower productivity of *Sonali* birds (both intensive and semi-scavenging), which could be addressed by implementing appropriate technology and management practices. So far, however, stakeholders have introduced few technology packages to increase the population and productivity of *Sonali* birds in villages in the study districts. Action should therefore be taken to stimulate the development of the *Sonali* bird industry to achieve its full potential.

With this optimistic perspective in view, and based on field experience, the study team recommends further, more comprehensive research with broader coverage to trace the value chain for *Sonali* birds, estimate producers' shares in consumer prices, and explore breeding systems for Fayoumi and RIR to produce *Sonali*.

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Table A1. Source of birds (*percentages of responses*)

Age of birds at the time of buying new stock	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon
<i>Sonali</i> intensive (meat purpose)				
Day old chick (DOC)	100	80	100	100
Other	0	20 (9.3)	0	0
Commercial broiler				
Day old chick (DOC)	100	100	100	100
Other	0	0	0	0
<i>Sonali</i> intensive (egg purpose)				
Day old chick (DOC)	100	100	100	100
Other	0	0	0	0
Commercial layer				
Day old chick (DOC)	100	100	100	100
Other	0	0	0	0
Semi-scavenging				
Day old chick (DOC)	0	0	0	0
Other	100 (9.2)	100 (7.7)	100 (6.9)	100 (8.7)
Local non-descript				
Day old chick (DOC)	0	0	0	0
Other	100 (7.5)	100 (6.7)	100 (8.5)	100 (8.5)

Source: Field survey, 2012.

Note: Figures in the parentheses indicate age of birds in weeks.

Table A2. Production characteristics of poultry farms

Parameters	Joypurhat	Mymensing/ Gazipur	Bogra	Naogaon	All-areas
Sonali intensive (meat purpose)					
Number of farmers	20	28	21	12	81
Farm size (number)	1 138.7	1 552.5	1 395.1	1 684.3	1 442.7
Estimated slaughter weight (kg)	0.75	0.93	0.83	0.85	0.85
Age at slaughter weight (weeks)	11.1	12.5	11.8	12.3	11.9
Commercial broiler					
Number of farmers	25	31	25	19	100
Farm size (number)	735.0	1 290.0	945.8	700.5	917.8
Estimated slaughter weight (kg)	1.65	1.74	1.50	1.66	1.64
Age at slaughter weight (days)	31.2	30.5	30.9	33.1	31.2
Sonali intensive (egg purpose)					
Number of farmers	5	6	4	4	19
Farm size (number)	1 077	1 200	1 476	1 077	1 207.5
Point of lay (weeks)	22.0	23.7	20.9	19.8	21.8
Age at maximum egg production (weeks) and amount of flock production (number)	31.0 (840)	30.0 (933)	33.0 (1 122)	31.0 (1 038)	31.1 (971)
Age at which egg production starts declining (weeks)	46.5	43.5	47.3	42.0	44.8
Weight of hens at end of production (kg)	1.66	1.73	1.55	1.75	1.68
Commercial layer					
Number of farmers	25	32	25	18	100
Farm size (number)	1 782.5	716.0	700.0	1 213.4	1 102.9
Point of lay (weeks)	21.9	20.0	20.5	20.6	20.7
Age at maximum egg production (weeks) and amount of flock production (num- ber)	30.1 (1506)	29.3 (629)	34.7 (615)	33.0 (1038)	31.5 (918)
Age at which egg production starts declining (weeks)	65.7	69.0	67.5	66.2	67.3
Weight of hens at end of production (kg)	1.90	2.20	1.95	2.10	2.04
Sonali semi-scavenging					
Number of farmers	25	34	25	16	100
Farm size (number)	15.3	11.2	106.8	5.5	34.7
Point of lay (weeks)	24.8	25.5	24.7	22.8	24.7
Age at maximum egg production (weeks) and amount of flock production (number)	32 (9)	33 (8)	35 (69)	37.4 (3.7)	34.0 (22.8)
Age at which egg production starts declining (weeks)	35.0	40.3	34.9	41.4	37.8
Weight of hens at end of production (kg)	1.40	1.60	1.70	1.55	1.57
Local non-descript					
Number of farmers	25	25	25	25	100
Farm size (number)	9.5	10.4	6.3	6.1	8.1
Point of lay (weeks)	27.7	25.8	27.9	23.8	26.3
Weight of hens at end of production (kg)	1.25	1.33	1.25	1.27	1.28

Note: Figures in the parentheses indicate number of egg production.

Source: Field survey, 2012.

Table A3. Housing (percentages of responses)

Type of Housing	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
<i>Sonali</i> intensive (meat purpose)					
Roofing and wire-mesh walls	95.0	100	90.5	91.7	95.1
Roofing and solid walls	0.0	0.0	9.5	0.0	2.5
Other	5.0	0.0	0.0	8.3	2.5
Commercial broiler					
Roofing and wire-mesh walls	52.0	80.6	84.0	57.9	70.0
Roofing and solid walls	24.0	19.4	0.0	42.1	20.0
Other	24.0	0.0	16.0	0.0	10.0
<i>Sonali</i> intensive (egg purpose)					
Roofing and wire-mesh walls	80.0	83.3	75.0	75.0	78.9
Roofing and solid walls	20.0	16.7	0.0	25.0	15.8
Other	0.0	0.0	25.0	0.0	5.3
Commercial layer					
Roofing and wire-mesh walls	52.0	100	96.0	94.4	86.0
Roofing and solid walls	48.0	0.0	4.0	5.6	14.0
Other	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> semi-scavenging					
Roofing and wire-mesh walls	45.0	0.0	76.0	56.0	38.9
Roofing and solid walls	0.0	0.0	0.0	25.0	4.2
Other	55.0	100	24.0	19.0	56.8
Local non-descript					
Roofing and wire-mesh walls	24.0	20.0	0.0	0.0	11.0
Roofing and solid walls	24.0	0.0	0.0	24.0	12.0
Other	52.0	80.0	100	76.0	77.0

Source: Field survey, 2012.

Table A4. Feeding (percentages of responses)

Types of feed	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Sonali intensive (meat purpose)					
Branded commercial poultry feed	71.4	100	52.4	83.3	78.0
Unbranded poultry feed	14.3	0.0	14.3	16.7	9.8
Purchased crop by-products	14.3	0.0	33.3	0.0	12.2
Self-produced crop by-products	0.0	0.0	0.0	0.0	0.0
Commercial broiler					
Branded commercial poultry feed	100	100	100	100	100
Unbranded poultry feed	0.0	0.0	0.0	0.0	0.0
Purchased crop by-products	0.0	0.0	0.0	0.0	0.0
Self-produced crop by-products	0.0	0.0	0.0	0.0	0.0
Sonali intensive (egg purpose)					
Branded commercial poultry feed	60.0	83.3	75.0	75.0	73.7
Unbranded poultry feed	20.0	16.7	25.0	25.0	21.1
Purchased crop by-products	20.0	0.0	0.0	0.0	5.3
Self-produced crop by-products	0.0	0.0	0.0	0.0	0.0
Commercial layer					
Branded commercial poultry feed	88.0	100	100	55.6	89.0
Unbranded poultry feed	0.0	0.0	0.0	38.9	7.0
Purchased crop by-products	12.0	0.0	0.0	5.5	4.0
Self-produced crop by-products	0.0	0.0	0.0	0.0	0.0
Sonali semi-scavenging					
Branded commercial poultry feed	3.0	0.0	12.0	0.0	3.0
Unbranded poultry feed	17.0	28.0	16.0	6.3	17.0
Purchased crop by-products	15.0	12.0	28.0	18.7	15.0
Self-produced crop by-products	65.0	60.0	44.0	75.0	65.0
Local non-descript					
Branded commercial poultry feed	0.0	0.0	0.0	0.0	0.0
Unbranded poultry feed	0.0	0.0	0.0	4.0	1.0
Purchased crop by-products	76.0	0.0	64.0	44.0	46.0
Self-produced crop by-products	24.0	100	36.0	52.0	53.0

Source: Field survey, 2012.

Table A5. Veterinary support (*percentages of responses*)

Means of veterinary care	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Sonali intensive (meat purpose)					
Para veterinarians	0.0	39.3	9.5	16.7	18.5
Government veterinarians	100	60.7	90.5	66.7	79.0
Self-treatment	0.0	0.0	0.0	16.7	2.5
Commercial broiler					
Para veterinarians	0.0	38.7	8.0	15.8	17.0
Government veterinarians	100	61.3	92.0	68.4	80.0
Self-treatment	0.0	0.0	0.0	15.8	3.0
Sonali intensive (egg purpose)					
Para veterinarians	20.0	16.7	25.0	25.0	21.1
Government veterinarians	80.0	66.7	75.0	75.0	73.7
Self-treatment	0.0	16.7	0.0	0.0	5.3
Commercial layer					
Para veterinarians	24.0	53.1	60.0	33.3	44.0
Government veterinarians	76.0	28.1	40.0	50.0	47.0
Self-treatment	0.0	18.8	0.0	16.7	9.0
Sonali semi-scavenging					
Para veterinarians	88.0	41.2	60.0	62.5	61.0
Government veterinarians	12.0	32.4	28.0	18.8	24.0
Self-treatment	0.0	26.5	12.0	18.8	15.0
Local non-descript					
Para veterinarians	0.0	0.0	0.0	0.0	0.0
Government veterinarians	76.0	0.0	52.0	36.0	41.0
Self-treatment	24.0	100	48.0	64.0	59.0

Source: Field survey, 2012.

Table A6. Biosecurity scores (*maximum 100%*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Sonali intensive (meat purpose)	70.5%	63.9%	65.7%	49.2%	63.8%
Commercial broiler	62.8%	59.1%	49.6%	63.2%	57.6%
Sonali intensive (egg purpose)	64.0%	50.0%	52.5%	60.0%	56.3%
Commercial layer	61.2%	58.1%	56.8%	62.8%	59.4%
Sonali semi-scavenging	30.8%	45.6%	39.2%	25.6%	37.1%

Source: Author's calculation, 2012.

Table A7. Farms applying biosecurity measures (*percentages of responses*)

Parameters	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Sonali intensive (meat purpose)					
Use footbaths with disinfectants	60.0	21.4	85.7	25.0	48.1
Use of separate shoes for poultry units	100	67.9	95.2	75.0	84.0
Clean hands, shoes and clothes after returning from a market or another farm	100	78.6	81.0	91.7	86.4
Commercial broiler					
Use footbaths with disinfectants	100	87.1	40.0	78.9	77.0
Use of separate shoes for poultry units	100	100	100	89.5	98.0
Clean hands, shoes and clothes after returning from a market or another farm	12.0	12.9	56.0	100	26.0
Sonali intensive (egg purpose)					
Use footbaths with disinfectants	60.0	33.3	50.0	50.0	47.4
Use of separate shoes for poultry units	100	83.3	50.0	75.0	78.9
Clean hands, shoes and clothes after returning from a market or another farm	100	83.3	75.0	100	89.5
Commercial layer					
Use footbaths with disinfectants	100	100	100	100	100
Use of separate shoes for poultry units	100	100	100	35.3	88.9
Clean hands, shoes and clothes after returning from a market or another farm	0.0	100	37.5	100	57.9
Sonali semi-scavenging					
Use footbaths with disinfectants	0.0	0.0	24.0	0	6.0
Use of separate shoes for poultry units	0.0	0.0	32.0	0	8.0
Clean hands, shoes and clothes after returning from a market or another farm	0.0	0.0	36.0	0	9.0
Local non-descript					
Use footbaths with disinfectants	0.0	0.0	0.0	0.0	0.0
Use of separate shoes for poultry units	0.0	0.0	0.0	0.0	0.0
Clean hands, shoes and clothes after returning from a market or another farm	0.0	0.0	0.0	0.0	0.0

Source: Field survey, 2012.

Table A8. Use of chicken manure as fertilizer (*percentages of responses*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Yes					
Sonali intensive (meat purpose)	80.0	75.0	71.4	75.0	75.3
Commercial broiler	76.0	83.9	80.0	52.6	75.0
Sonali intensive (egg purpose)	60.0	83.3	75.0	75.0	73.7
Commercial layer	76.0	84.4	88.0	94.4	85.0
Sonali semi-scavenging	12.0	20.6	84.0	25.0	35.0
Local non-descript	16.0	12.0	16.0	0.0	28.1

Source: Field survey, 2012.

Table A9. Methods of carcass disposal (*percentages of responses*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Buried on the premises					
Sonali intensive (meat purpose)	100	100	100	100	100
Commercial broiler	100	100	100	94.7	99.0
Sonali intensive (egg purpose)	100	100	100	100	100
Commercial layer	100	100	100	94.4	99.0
Sonali semi-scavenging	100	79.4	100	56.3	86.0
Local non-descript	68.0	76.0	76.0	64.0	71.0
Other					
Sonali intensive (meat purpose)	0.0	0.0	0.0	0.0	0.0
Commercial broiler	0.0	0.0	0.0	5.3	1.0
Sonali intensive (egg purpose)	0.0	0.0	0.0	0.0	0.0
Commercial layer	0.0	0.0	0.0	5.6	1.0
Sonali semi-scavenging	0.0	20.6	0.0	43.8	14.0
Local non-descript	32.0	24.0	24.0	36.0	29.0

Source: Field survey, 2012.

Table A10. Use of disinfectants (*percentages of responses*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Routine use					
<i>Sonali</i> intensive (meat purpose)	100	96.4	90.5	91.7	95.1
Commercial broiler	84.0	80.6	84.0	89.5	84.0
<i>Sonali</i> intensive (egg purpose)	80.0	83.3	75.0	75.0	78.9
Commercial layer	100	100	100	100	100
<i>Sonali</i> semi-scavenging	60.0	0.0	32.0	12.5	25.0
Local non-descript	0.0	0.0	0.0	0.0	0.0
Between batches					
<i>Sonali</i> intensive (meat purpose)	100	100	100	100	100
Commercial broiler	100	100	100	100	100
<i>Sonali</i> intensive (egg purpose)	100	100	100	100	100
Commercial layer	100	100	100	100	100
<i>Sonali</i> semi-scavenging	84.0	88.2	88.0	81.3	86.0
Local non-descript	0.0	0.0	0.0	0.0	0.0
After an outbreak					
<i>Sonali</i> intensive (meat purpose)	100	100	100	100	100
Commercial broiler	100	100	100	100	100
<i>Sonali</i> intensive (egg purpose)	100	100	100	100	100
Commercial layer	100	100	100	100	100
<i>Sonali</i> semi-scavenging	88.0	85.3	92.0	81.3	87.0
Local non-descript	8.0	32.0	12.0	0.0	13.0
Never					
<i>Sonali</i> intensive (meat purpose)	0.0	0.0	0.0	0.0	0.0
Commercial broiler	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> intensive (egg purpose)	0.0	0.0	0.0	0.0	0.0
Commercial layer	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> semi-scavenging	0.0	14.7	0.0	37.5	11.0
Local non-descript	92.0	68.0	88.0	100	87.0

Source: Field survey, 2012.

Table A11. Sales patterns for farm products (*percentages of responses*)

Sales patterns	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
<i>Sonali</i> intensive (meat purpose)					
Market	50.0	53.6	61.9	41.7	53.1
Farmgate to consumers	5.0	7.1	0.0	16.7	6.2
Farmgate to dealers/agents	40.0	25.0	36.1	33.3	33.3
Shops, restaurants, hotels	5.0	14.3	0.0	8.3	8.4
Commercial broiler					
Market	20.0	33.0	8.0	21.1	21.0
Farmgate to consumers	8.0	9.7	32.0	15.8	16.0
Farmgate to dealers/agents	64.0	48.4	44.0	42.1	50.0
Shops, restaurants, hotels	8.0	9.7	16.0	21.1	13.0
<i>Sonali</i> intensive (egg purpose)					
Market	40.0	50.0	50.0	25.0	42.1
Farmgate to consumers	20.0	16.7	25.0	25.0	21.1
Farmgate to dealers/agents	20.0	16.7	25.0	25.0	21.1
Shops, restaurants, hotels	20.0	16.7	0.0	25.0	15.8
Commercial layer					
Market	8.0	0.0	0.0	11.8	4.0
Farmgate to consumers	0.0	0.0	0.0	0.0	0.0
Farmgate to dealers/agents	72.0	68.8	60.0	76.5	68.7
Shops, restaurants, hotels	20.0	31.3	40.0	11.8	27.3
<i>Sonali</i> semi-scavenging					
Market	31.0	25.5	0.0	31.3	23.0
Farmgate to consumers	52.0	50.0	76.0	37.5	55.0
Farmgate to dealers/agents	0.0	11.8	24.0	18.8	13.0
Shops, restaurants, hotels	12.0	11.8	0.0	12.5	9.0
Local non-descript					
Market	12.0	4.0	24.0	16.0	14.0
Farmgate to consumers	56.0	76.0	24.0	32.0	47.0
Farmgate to dealers/agents	12.0	12.0	24.0	20.0	17.0
Shops, restaurants, hotels	20.0	8.0	28.0	32.0	22.0

Source: Field survey, 2012.

Table A12. Profitability of *Sonali* intensive (*meat purpose*) per bird, per batch (*Tk.*)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	156.5	142.9	143.4	162.8	151.4
Litter sold	1.2	1.3	1.3	1.2	1.3
Total	157.8	144.2	144.7	164.1	152.7
B. Variable cost					
Human labour (Hired)	1.3	1.2	1.3	1.2	1.3
Feed	87.7	85.7	86.9	86.3	86.6
Medicine and vaccine	2.7	2.6	2.5	2.8	2.6
Water and electricity	2.1	2.0	1.9	2.0	2.0
Transport	0.2	0.3	0.2	0.3	0.2
Litter	0.7	0.8	0.7	0.8	0.8
Total	94.6	92.6	93.5	93.3	93.5
C. Fixed Cost					
Human labour (Family)	3.8	3.8	3.7	3.7	3.8
Depreciation on housing	3.6	3.5	3.5	3.5	3.5
Interest on operating capital	1.4	1.4	1.4	1.4	1.4
Total	8.7	8.7	8.6	8.6	8.7
D. Total cost	103.3	101.3	102.1	101.9	102.2
Gross margin (A-B)	63.2	51.6	51.2	70.7	59.2
Net return (A-D)	54.4	42.9	42.6	62.1	50.5
BCR (Undiscounted) (A/D)	1.53	1.42	1.42	1.61	1.49

Source: Field survey, 2012.

Table A13. Profitability of commercial broiler per bird, per batch (Tk.)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	149.6	144.6	164.3	152.5	152.7
Litter sold	1.4	1.5	1.4	1.5	1.5
Total	151.0	146.1	165.7	153.9	154.2
B. Variable cost					
Human labour (Hired)	1.5	1.4	1.4	1.4	1.4
Feed	118.2	109.5	105.5	98.4	107.9
Medicine and vaccine	3.8	3.8	3.8	3.9	3.8
Water and electricity	2.2	2.2	2.2	2.2	2.2
Transport	0.5	0.4	0.4	0.4	0.4
Litter	2.4	2.4	2.4	2.3	2.4
Total	128.5	119.8	115.6	108.6	118.1
C. Fixed Cost					
Human labour (Family)	4.2	4.2	4.2	4.2	4.2
Depreciation on housing	2.0	2.0	1.9	1.9	1.9
Interest on operating capital	2.3	2.4	2.4	2.4	2.4
Total	8.4	8.6	8.5	8.5	8.5
D. Total cost	137.0	128.3	124.2	117.1	126.6
Gross margin (A-B)	22.5	26.3	50.1	45.3	36.0
Net return (A-D)	14.1	17.8	41.5	36.9	27.6
BCR (Undiscounted) (A/D)	1.10	1.14	1.33	1.31	1.22

Source: Field survey, 2012.

Table A14. Profitability of *Sonali* intensive (egg purpose) per bird, per batch (Tk.)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	227.6	238.2	209.5	199.5	218.7
Egg sale	2 070.0	2 060.0	2 030.0	2 040.0	2 050.0
Litter sold	3.0	2.9	3.1	3.1	3.0
Total	2 300.5	2 301.1	2 242.6	2 242.6	2 271.7
B. Variable cost					
Human labour (Hired)	24.1	23.1	22.8	24.1	23.5
Feed	1 370.0	1 360.0	1 410.0	1 380.0	1 380.0
Medicine and vaccine	12.0	8.0	9.0	11.0	10.0
Water and electricity	8.0	10.0	8.5	9.5	9.0
Transport	1.6	1.7	1.4	1.5	1.5
Litter	1.1	1.1	1.1	1.1	1.1
Total	1 416.7	1 403.9	1 452.7	1 427.2	1 425.1
C. Fixed Cost					
Human labour (Family)	56.4	55.5	53.4	54.3	54.9
Depreciation on housing	15.1	14.0	14.5	12.6	14.0
Interest on operating capital	85.0	84.2	87.2	85.6	85.5
Total	156.5	153.7	155.1	152.5	154.5
D. Total cost	1 573.2	1 557.6	1 607.8	1 579.7	1 579.6
Gross margin (A-B)	883.8	897.2	789.9	815.5	846.6
Net return (A-D)	727.3	743.5	634.8	662.9	692.1
BCR (Undiscounted) (A/D)	1.46	1.48	1.39	1.42	1.44

Source: Field survey, 2012.

Table A15. Profitability of commercial layer per bird, per batch (Tk.)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	110.2	107.8	119.6	96.6	108.6
Egg sale	1 654.3	1 602.2	1 682.4	1 616.3	1 638.8
Litter sold	8.0	8.0	9.5	10.5	9.0
Total	1 772.5	1 718.0	1 811.5	1 723.3	1 756.3
B. Variable cost					
Human labour (Hired)	22.7	19.8	23.7	21.0	21.8
Feed	1 385.5	1 349.0	1 387.4	1 344.9	1 366.7
Medicine and vaccine	17.2	16.5	15.3	15.7	16.2
Water and electricity	13.0	12.2	13.1	11.4	12.4
Transport	2.5	2.5	2.6	2.5	2.5
Litter	1.8	1.7	1.7	1.8	1.7
Total	1 442.7	1 401.6	1 443.8	1 397.2	1 421.3
C. Fixed Cost					
Human labour (Family)	65.4	65.4	65.5	65.4	65.4
Depreciation on housing	5.2	5.2	5.1	5.1	5.1
Interest on operating capital	86.6	84.1	86.6	83.8	85.3
Total	157.1	154.7	157.2	154.4	155.8
D. Total cost	1 599.7	1 556.3	1 601.0	1 551.5	1 577.2
Gross margin (A-B)	329.8	316.4	367.7	326.2	335.0
Net return (A-D)	172.7	161.7	210.4	171.8	179.2
BCR (Undiscounted) (A/D)	1.11	1.10	1.13	1.11	1.11

Source: Field survey, 2012.

Table A16. Profitability of *Sonali* semi-scavenging per bird, per batch (Tk.)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	160.5	193.1	203.6	171.1	182.1
Egg sale	755.1	713.0	820.0	777.9	766.5
Litter sold	852.3	862.3	862.3	872.3	862.3
Total	1 767.9	1 768.4	1 886.0	1 821.3	1 810.9
B. Variable cost					
Human labour (Hired)	0.0	0.0	0.0	0.0	0.0
Feed	950.3	950.0	950.5	950.3	950.3
Medicine and vaccine	8.2	8.4	8.1	8.3	8.3
Water and electricity	5.7	5.5	5.7	5.9	5.7
Transport	0.7	0.8	0.7	0.9	0.8
Litter	1.2	1.0	1.2	1.4	1.2
Total	966.1	965.7	966.2	966.7	966.2
C. Fixed Cost					
Human labour (Family)	72.0	74.0	71.0	75.0	73.0
Depreciation on housing	3.0	3.1	2.6	3.4	3.0
Interest on operating capital	57.2	60.1	58.8	55.9	58.0
Total	132.2	137.2	132.4	134.3	134.0
D. Total cost	1 098.2	1 102.9	1 098.6	1 101.0	1 100.2
Gross margin (A-B)	801.9	802.7	919.8	854.6	844.7
Net return (A-D)	669.7	665.6	787.4	720.2	710.7
BCR (Undiscounted) (A/D)	1.61	1.60	1.72	1.65	1.65

Source: Field survey, 2012.

Table A17. Profitability of local non-descript per bird, per batch (*Tk.*)

Particulars	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
A. Gross return					
Net change in inventory	643.8	710.2	701.5	721.3	694.2
Egg sale	40.8	40.8	40.6	40.9	40.7
Litter sold	1.35	1.3	1.1	1.2	1.2
Total	643.8	710.2	701.5	721.3	736.1
B. Variable cost					
Human labour (Hired)	0.0	0.0	0.0	0.0	0.0
Feed	392.0	404.0	352.6	381.5	382.5
Medicine and vaccine	8.5	8.8	8.9	8.6	8.7
Water and electricity	2.4	2.4	2.6	2.3	2.4
Transport	2.4	2.5	2.6	2.4	2.5
Litter	1.6	1.6	1.5	1.4	1.5
Total	406.8	419.3	368.0	396.1	397.6
C. Variable cost					
Human labour (Family)	6.2	6.1	6.2	6.2	6.2
Depreciation on housing	2.9	2.9	2.8	2.9	2.9
Interest on operating capital	24.4	25.2	22.1	23.8	23.9
Total	33.4	34.2	31.0	32.9	32.9
D. Total cost	440.2	453.5	399.0	429.0	430.4
Gross margin (A-B)	279.0	333.0	375.2	367.2	338.6
Net return (A-D)	245.6	298.8	344.2	334.2	305.7
BCR (Undiscounted) (A/D)	1.56	1.66	1.86	1.78	1.71

Source: Field survey, 2012.

Table A18. Sources of investment in poultry business (*percentages of responses*)

Type of birds	Joypurhat	Mymensingh/ Gazipur	Bogra	Naogaon	All-area average
Own resources					
<i>Sonali</i> intensive (meat purpose)	75.0	96.4	61.9	83.3	80.2
Commercial broiler	100	61.3	100	89.5	86.0
<i>Sonali</i> intensive (egg purpose)	80.0	66.7	75.0	75.0	73.7
Commercial layer	92.0	87.5	88.0	88.9	89.0
<i>Sonali</i> semi-scavenging	88.0	100	76.0	100	91.0
Local non-descript	100	100	100	100	100
Family loan					
<i>Sonali</i> intensive (meat purpose)	5.0	3.6	14.3	8.3	7.4
Commercial broiler	0.0	29.0	0.0	0.0	9.0
<i>Sonali</i> intensive (egg purpose)	20.0	16.7	25.0	25.0	12.1
Commercial layer	8.0	12.5	4.0	0.0	7.0
<i>Sonali</i> semi-scavenging	12.0	0.0	12.0	0.0	6.0
Local non-descript	0.0	0.0	0.0	0.0	0.0
Commodity loan					
<i>Sonali</i> intensive (meat purpose)	5.0	0.0	4.8	8.3	3.7
Commercial broiler	0.0	9.7	0.0	0.0	3.0
<i>Sonali</i> intensive (egg purpose)	0.0	0.0	0.0	0.0	0.0
Commercial layer	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> semi-scavenging	0.0	0.0	0.0	0.0	0.0
Local non-descript	0.0	0.0	0.0	0.0	0.0
Money lender					
<i>Sonali</i> intensive (meat purpose)	5.0	0.0	9.5	0.0	3.7
Commercial broiler	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> intensive (egg purpose)	0.0	5.5	5.6	4.2	0.0
Commercial layer	0.0	0.0	0.0	0.0	0.0
<i>Sonali</i> semi-scavenging	0.0	0.0	12.0	0.0	3.0
Local non-descript	0.0	0.0	0.0	0.0	0.0
Bank					
<i>Sonali</i> intensive (meat purpose)	10.0	0.0	9.5	0.0	4.9
Commercial broiler	0.0	0.0	0.0	10.5	2.0
<i>Sonali</i> intensive (egg purpose)	2.0	16.7	0.0	0.0	5.3
Commercial layer	0.0	0.0	8.0	11.1	4.0
<i>Sonali</i> semi-scavenging	0.0	0.0	0.0	0.0	0.0
Local non-descript	0.0	0.0	0.0	0.0	0.0

Source: Field survey, 2012.

Table A19. Employment in poultry rearing through family labour (*Minutes/day*)

Scope of employment	Joypurhat	Mymensingh/Gazipur	Bogra	Naogaon	All
Sonali intensive(meat purpose)					
Taking poultry in and out	9.9	-	5.2	-	
Poultry shed cleaning	72.3	80.0	55.4	42.1	
Feeding/ Scavenging	34.9	17.5	62.4	70.0	
Veterinary care	23.9	55.0	24.7	38.2	
Chick growing purpose	85.2	87.5	91.8	44.7	
Egg production purpose	11.8	20.0	23.1	35.0	
Total	225.4	260.0	262.6	229.9	250.8
Broiler intensive					
Poultry shed cleaning	89.5	90.7	113.3	128.0	
Feeding/ Scavenging	120.4	110.5	131.7	129.7	
Veterinary care	61.2	52.8	49.2	53.3	
Chick growing purpose	25.3	37.8	46.7	59.3	
Total	296.4	291.8	340.9	370.2	320.1
Sonali intensive (egg purpose)					
Poultry shed cleaning	42.8	37.5	30.0	-	
Feeding/ Scavenging	59.2	42.8	48.5	48.0	
Veterinary care	28.6	22.8	28.5	-	
Egg production purpose	64.4	67.5	81.3	63.0	
Total	195.0	170.7	188.3	111.0	181.6
Layer intensive					
Poultry shed cleaning	26.4	30.0	23.6	-	
Feeding/ Scavenging	44.3	35.0	41.5	33.0	
Veterinary care	12.4	15.0	21.8	-	
Egg production purpose	48.9	60.0	74.2	52.0	
Total	132.0	140.0	161.1	85.0	141.2
Sonali semi-scavenging					
Taking poultry in and out	15.2	17.0	22.5	10.0	
Poultry shed cleaning	8.7	10.0	19.0	8.6	
Feeding/ Scavenging	33.3	20.0	32.7	3.0	
Veterinary care	8.7	9.0	15.3	14.4	
Chick growing purpose	11.4	22.5	23.7	-	
Egg production purpose	25.6	21.3	28.8	10.0	
Total	102.9	99.8	142.1	46.6	105.7
Local non-descript farming					
Taking poultry in and out	17.8	27.0	12.6	9.6	
Poultry shed cleaning	31.5	11.4	36.5	25.6	
Feeding/ Scavenging	40.8	13.6	34.8	7.9	
Veterinary care	4.5	-	5.2	2.3	
Chick growing purpose	-	-	2.3	-	
Egg production purpose	28.5	23.0	25.4	12.5	
Total	123.1	75.0	116.8	57.9	95.9

Source: Field survey, 2012.

Table A20. Employment in poultry rearing through hired labour (*Minutes/day*)

Scope of employment	Joypurhat	Mymensingh/Gazipur	Bogra	Naogaon	All
Sonali intensive(meat purpose)					
Poultry shed cleaning	77.4	95	65.4	102.5	
Feeding/ Scavenging	29.8	25	34.7	90.0	
Veterinary care	52.8	160	58.2	60.0	
Chick growing purpose	65.4	100	91.8	88.8	
Egg production purpose	-	-	-	36.8	
Total	225.4	380	251.3	378.0	308.1
Broiler intensive					
Poultry shed cleaning	38.6	42.9	13.3	283.0	
Feeding/ Scavenging	15.7	23.5	-	290.0	
Veterinary care	-	-	-	98.0	
Chick growing purpose	25.4	-	-	72.0	
Total	79.7	66.4	13.3	743.0	312.0
Sonali intensive (egg purpose)					
Poultry shed cleaning	44.0	26.3	31.8	45.0	
Feeding/ Scavenging	63.4	78.0	83.0	93.8	
Veterinary care	55.2	45.0	61.3	85.5	
Egg production purpose	87.2	93.0	110.5	118.3	
Total	249.8	242.3	286.5	342.5	274.7
Layer intensive					
Poultry shed cleaning	45.7	28.5	33.6	48.2	
Feeding/ Scavenging	65.4	80.2	85.4	95.3	
Veterinary care	57.1	47.5	63.1	87.1	
Egg production purpose	88.2	95.6	112.4	120.0	
Total	256.4	251.8	294.5	350.6	281.4
Sonali semi-scavenging					
Poultry shed cleaning	-	-	12.6	-	
Feeding/ Scavenging	-	-	8.7	-	
Veterinary care	-	-	2.5	-	
Chick growing purpose	-	-	-	-	
Egg production purpose	-	-	12.3	-	
Total	-	-	36.1	-	-
Local non-descript					
Taking poultry in and out	-	-	-	-	
Poultry shed cleaning	-	-	-	-	
Feeding/ Scavenging	-	-	-	-	
Veterinary care	-	-	-	-	
Chick growing purpose	-	-	-	-	
Egg production purpose	-	-	-	-	
Total	-	-	-	-	-

Source: Field survey, 2012.

Questionnaire 1

Sonali-intensive/Sonali- semi-scavenging/Layer-intensive/ Local non-descript (Deshi)-Semi-scavenging farm

DETAILS

Interviewer _____
Interview number _____
Interview date _____
Administrative region 1 _____
Administrative region 2 _____
Administrative region 3 _____
GPS coordinate, degrees _____
GPS coordinate, degrees _____

PART A. Trade Network Details

1. When you buy new stock, how old are the birds?

1 day Other (specify) _____

2. Where do you buy the birds?

Hatchery Market Middlemen Other (specify) _____

Name of market _____

Name of Hatchery _____

Is the hatchery registered?

Yes No Unknown

3. Last time you purchased new stock, what was the price of one bird?

Age ____ DOC _____ Lowest Most common Highest

4. Who is the owner of the birds?

Yourself/ immediate family

Group owned

We are contracted to rear the birds

5. How long have you been rearing commercial poultry?

Years ____

6. Where do you sell the birds you produce on your farm?

Markets: Always Often Rarely Never

Farm-gate, direct to consumers: Always Often Rarely Never

Farm-gate, to middlemen: Always Often Rarely Never

Shops: Always Often Rarely Never

7. In the past month when you sold eggs, how much money did you receive per tray of eggs?

Lowest Most common Highest Tray size _____ Eggs _____

PART B. Production information

8. What breed are your birds?

Indigenous breed Mixed breed Exotic breed

Name of breed _____

9. How many birds do you currently have on your premises?

	Number of bird	Age (weeks)	Size of unit (L x W in cm)
Unit 1			
Unit 2			
Unit 3			
Unit 4			
Unit 5			

10. With the current facilities, what is the highest number of layers you have had on your farm? _____

PART C. Farm expenses

11. How much do you spend on running costs for layer production?

Staff	<input type="text"/>	per month	Water	<input type="text"/>	per month
Rent	<input type="text"/>	per month	Electricity	<input type="text"/>	per month
Litter/bedding	<input type="text"/>	per month	Transport*	<input type="text"/>	per batch
Maintenance	<input type="text"/>	per year	Tax	<input type="text"/>	per batch
Disinfectants	<input type="text"/>	per batch	Other	<input type="text"/>	per batch

* Transport for buying new stock, buying feed, medical supplies, litter, etc

12. What do you feed your birds?

1. Branded commercial poultry feed	<input type="text"/>	Brand	<input type="text"/>
2. Unbranded poultry feed	<input type="text"/>		
3. Crop by-products, bought in	<input type="text"/>		
4. Crop by-products, self-produced	<input type="text"/>		
5. Other	<input type="text"/>	Specify	<input type="text"/>

Type of feed	Starter	Grower	Layer
Week number	0-6	7-18	19-
Measurement unit			
Unit size			
Price per unit			
Number of units used in total for the batch			

This information refers to a batch size _____ birds

PART D. Production parameters

13. What is the typical age in weeks at which your chickens normally start to produce eggs (Point of lay)?

Weeks _____

14. At what age in weeks do your chickens reach maximum production?

Weeks _____

15. How many trays of eggs does the laying flock produce at maximum production?

Trays _____ Eggs _____

16. At what age does the egg production start declining considerably?

Weeks _____

17. How many trays of eggs did your farm produce yesterday?

Trays _____ Eggs _____

18. How do you make a decision on when to stop laying?

Egg production _____ Age _____ Other (*Specify*) _____

19. At what age or level of egg production do you stop?

Trays _____ Eggs _____ Weeks _____

20. When you stop egg production do you

A. Sell the hens or _____

B. Moults the birds and start another cycle with the original hens? _____

21. If you moult the birds how often do you do this before selling them?

Times _____

22. Do you keep records of egg production?

Yes No

If yes, please can I see those records? Yes No

This information refers to a batch size of _____ birds

23. For how much money can you expect to sell these birds that have been removed from egg production?

Minimum _____ Most common _____ Maximum _____

24. How much will a bird weigh when it has been removed from egg production?

Kg _____

25. From the previous batch of new stock, how many died and at what age?

Age group	Starter	Grower	Layer	Total
Number at start				
Number died				

PART E. Veterinary interventions

26. Do you use pharmaceutical products and feed additives on a routine basis?

Product type				
Product name				
Frequency administered				
Cost per unit (packet/vital)				
Number of birds treated per unit				
Number of does wasted per unit				

27. In an average month, how much can you expect to spend on treating sick birds? _____

28. What is the most important disease challenge for rearing poultry in this area? _____

29. Please list symptoms or disease encountered in your flock in the past 12 months

A _____

B _____

C _____

D _____

30. How do you access veterinary care for your birds?

Private vet Government vet Self treat Other

If other, give details _____

PART F. Biosecurity and stocking density

31. Do you use footbaths with disinfectants for people entering and leaving poultry units?

Always Often Rarely Never

32. Do you use separate shoes for entering the poultry units?

Always Often Rarely Never

33. When returning from a market or another family's farm do you carry out any shoe, clothes or hand cleaning procedures?

Yes No

If yes, please specify what type of cleaning takes place _____

34. What method do you use for carcass disposal?

Buried on the premises Fed to dogs

Other (*specify*) _____

35. Do you use chicken manure as a fertilizer?

Yes No

36. How often do you use disinfectants to clean the farm?

Routine use Between batches After an outbreak Never

Name of disinfectant _____

37. How are your chickens housed?

A Housed with roofing, mesh wire walls

B Housed with roofing, solid walls

C Other (*specify*) _____

38. How far is the nearest household with backyard poultry?

This house Next door < 100 m < 500 m >500m

39. How far is the nearest commercial poultry unit?

Next door <100 m < 500 m >500m

40. If birds are taken to the market and they are not sold, are they returned to the flock at your farm?

Yes No Not applicable

PART G. Investment and credit

41. What is the current value of your poultry units?

Housing	<input type="text"/>	Total	
Feeders	<input type="text"/>	Unit price	<input type="text"/> Number
Drinkers	<input type="text"/>	Unit price	<input type="text"/> Number
Laying boxes	<input type="text"/>	Unit price	<input type="text"/> Number
Other	<input type="text"/>	Unit price	<input type="text"/> Number

42. When you first started your business, how did you raise the money for the investment?

Own resources Family loan Commodity loan Moneylender
 Bank Other

43. When beginning each batch of birds do you need to borrow money?

Yes No

If yes, who lends the money and what rate of interest do they charge?

Family loan	<input type="text"/>	Rate	<input type="text"/>
Community loan	<input type="text"/>	Rate	<input type="text"/>
Feed supplier	<input type="text"/>	Rate	<input type="text"/>
Moneylender	<input type="text"/>	Rate	<input type="text"/>
Bank	<input type="text"/>	Rate	<input type="text"/>
Other	<input type="text"/>	Rate	<input type="text"/>

PART H. Cost and return

44. Information on poultry inventory (for one year)

Type(s)	Beginning/ Opening stock		Bought		Died		Sold		Consumed/ Gifted		Closing stock	
	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)
Poultry												
Duck												

45. Cost of rearing poultry (month-wise)

Cost items	Unit	Quantity	Price/unit(Tk.)	Cost
Human labor Family Hired	man-days			
Feed Prepared feed Rice grain/bran Wheat grain/ bran Other(s)				
Veterinary Treatment Medicine				
Insecticide				
Water and electricity				
Housing				
Transport				
Others (specify, if any)				

46. Return from poultry rearing (month-wise)

Poultry product	Sold		Family purpose use		Gift		Others	
	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)
Egg								
Manure								
Other(s)								

47. Employment generation in poultry rearing

Scope of employment	Required time	
	Family labour (Minute/day)	Hired labour (Minute/day)
Taking poultry in and out		
Poultry shed cleaning		
Feeding/ Scavenging		
Veterinary care		
Chick growing purpose		
Egg production purpose		
Others (specify, if any)		

PART I. Farm records

48. Do you keep any farm records?

Yes No

49. Is your farm registered with a poultry association, or other authority?

Yes No

50. Are you registered with a veterinary clinic?

Yes No

50. What changes have you made in your production in the last two years?

Housing Feeding Disease control Input supply Marketing

Questionnaire 2

Questionnaire for commercial broiler farms

INTERVIEW DETAILS

Interviewer _____
Interview number _____
Interview date _____
Administrative region 1 _____
Administrative region 2 _____
Administrative region 3 _____
GPS coordinate, degrees _____
GPS coordinate, degrees _____

PART A. Trade network details

1. When you buy new stock, how old are the birds?

1 day Other (specify) _____

2. Where do you buy the birds?

Hatchery Market Middlemen Other (specify) _____

Name of market _____

Name of hatchery _____

Is the hatchery registered?

Yes No Unknown

3. Last time you purchased new stock, what was the price of one bird?

Age ____ DOC _____ Lowest Most common Highest

4. Who is the owner of the birds?

Yourself/ immediate family

Group owned

We are contracted to rear the birds

5. How long have you been rearing commercial poultry?

Years ____

6. Do you sell live birds or meat?

Live birds Meat

7. Where do you sell the birds you produce on your farm?

Markets: Always Often Rarely Never

Farm-gate, direct to consumers: Always Often Rarely Never

Farm-gate, to middlemen: Always Often Rarely Never

Shops: Always Often Rarely Never

Restaurants/Bars/Hotels: Always Often Rarely Never

8. In the past month when you sold birds, how much money did you sell them for per kg?

Lowest Most common Highest Tray size _____ Eggs _____

PART B. Production information

9. What breed are your birds?

Indigenous breed Mixed breed Exotic breed

Name of breed _____

10. How many birds do you currently have on your premises?

	Number of bird	Age (weeks)	Size of unit (L x W in cm)
Unit 1			
Unit 2			
Unit 3			
Unit 4			
Unit 5			

11. With the current facilities, what is the highest number of broilers you have had on your farm? _____

12. Does the level of production on your farm have seasonal changes?

Yes No

If yes, during which months do you typically have a higher level of production?

Jan Feb Mar Apr May Jun
 Jul Aug Sep Oct Nov Dec

PART C. FARM EXPENSES

13. How much do you spend on running costs for broiler production?

Staff	<input type="text"/>	per month	Water	<input type="text"/>	per batch
Rent	<input type="text"/>	per month	Electricity	<input type="text"/>	per batch
Litter/bedding	<input type="text"/>	per batch	Transport*	<input type="text"/>	per batch
Maintenance	<input type="text"/>	per year	Tax or fees	<input type="text"/>	per batch
Disinfectants	<input type="text"/>	per batch	Other	<input type="text"/>	per batch

* Transport for buying new stock, buying feed, medical supplies, litter, etc

14. What do you feed your birds?

1. Branded commercial poultry feed Brand
2. Unbranded poultry feed
3. Crop by-products, bought in
4. Crop by-products, self-produced
5. Other Specify

Type of feed	Starter	Grower	Finisher
Week number	0-6	7-18	19-
Measurement unit			
Unit size			
Price per unit			
Number of units used in total for the batch			

This information refers to a batch size _____ birds

PART D. Production parameters**15. Typical estimated slaughter weight, or weight at which birds sold?**

Kg _____

16. Age at slaughter weight/when birds are sold?

Days _____

17. How many birds have you sold in the past 12 months? _____**18. From the previous batch, how many died and at what age?**

Age group	Starter	Finisher	Total
Number at start			
Number died			

PART E. Veterinary interventions

19. Do you use pharmaceutical products and feed additives on a routine basis?

Product type				
Product name				
Frequency administered				
Cost per unit (packet/vital)				
Number of birds treated per unit				
Number of does wasted per unit				

20. For an average batch, how much can you expect to spend on treating sick birds? _____

21. What is the most important disease challenge for rearing poultry in this area? _____

22. Please list symptoms or disease encountered in your flock in the past 12 months

- A _____
- B _____
- C _____
- D _____

23. How do you access veterinary care for your birds?

Private vet Government vet Self treatment Other

If other, give details _____

PART F. Biosecurity and stocking density

24. Are buyers allowed to enter the poultry units?

Yes No

25. Do you use footbaths with disinfectants for people entering and leaving poultry units?

Always Often Rarely Never

26. Do you use separate shoes for entering the poultry units?

Always Often Rarely Never

27. When returning from a market or another family's farm do you carry out any shoe, cloths or hand cleaning procedures?

Yes No

If yes, please specify what type of cleaning takes place _____

28. What method do you use for carcass disposal?Buried on the premises Fed to dogs Other (*specify*) _____**29. Do you use chicken manure as fertilizer?**Yes No **30. How often do you use disinfectants to clean the farm?**Routine use Between batches After an outbreak Never

Name of disinfectant _____

30. How are your chickens housed?A Housed with roofing, mesh wire walls B Housed with roofing, solid walls C Other (*specify*) _____**31. How are your chickens housed?**Housed with roofing, mesh wire walls Housed with roofing, solid walls Other (*specify*) _____**32. How far is the nearest household with backyard poultry?**This house Next door < 100 m < 500 m >500m **33. How far is the nearest commercial poultry unit?**Next door <100 m < 500 m >500m **34. If birds are taken to the market and they are not sold, are they returned to the flock at your farm?**Yes No Not applicable **PART I. Farm records****35. What is the current value of your poultry units?**

Housing	<input type="text"/>	Total	
Feeders	<input type="text"/>	Unit price	<input type="text"/> Number
Drinkers	<input type="text"/>	Unit price	<input type="text"/> Number
Other	<input type="text"/>	Unit price	<input type="text"/> Number

36. When you first started your business, how did you raise the money for the investment?Own resources Family loan Commodity loan Moneylender Bank Other

37. When beginning each batch of birds do you need to borrow money?

Yes No

If yes, who lends the money and what rate of interest do they charge?

Family loan	<input type="text"/>	Rate	<input type="text"/>
Community loan	<input type="text"/>	Rate	<input type="text"/>
Feed supplier	<input type="text"/>	Rate	<input type="text"/>
Moneylender	<input type="text"/>	Rate	<input type="text"/>
Bank	<input type="text"/>	Rate	<input type="text"/>
Other	<input type="text"/>	Rate	<input type="text"/>

PART H. Cost and return

38. Information on poultry inventory (for one year)

Type(s)	Beginning/ Opening stock		Bought		Died		Sold		Consumed/ Gifted		Closing stock	
	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)
Poultry												

39. Cost of rearing poultry (month-wise)

Cost items	Unit	Quantity	Price/unit(Tk.)	Cost
Human labor	man-days			
Family				
Hired				
Feed				
Prepared feed				
Rice grain/bran				
Wheat grain/ bran				
Other(s)				
Veterinary				
Treatment				
Medicine				
Insecticide				
Water and electricity				
Housing				
Transport				
Others (<i>specify, if any</i>)				

40. Return from poultry rearing (month-wise)

Poultry product	Sold		Family purpose use		Gift		Others	
	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)	No.	Price (Tk.)
Egg								
Manure								
Other(s)								

41. Employment generation in poultry rearing

Scope of employment	Required time	
	Family labour (Minute/day)	Hired labour (Minute/day)
Taking poultry in and out		
Poultry shed cleaning		
Feeding/ Scavenging		
Veterinary care		
Chick growing purpose		
Egg production purpose		
Others (specify, if any)		

PART I. Farm records

42. Do you keep any farm records?

Yes No

43. Is your farm registered with a poultry association, or other authority?

Yes No

44. Are you registered with a veterinary clinic?

Yes No

45. What changes have you made in your production in the last two years?

Housing Feeding Disease control Input supply Marketing

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