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Economics of Small-scale Broiler Farming during Covid-19 Pandemic at Southern Part of Bangladesh

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Abstract
COVID-19 pandemic affected almost all the production activities not only in Bangladesh but also all over the world. The present effort was directed towards quantification of economic return from small-scale broiler farming in Southern part of Bangladesh. For this purpose 100 smallholder farms along with their respective feed and chick dealers from ten southern districts of Bangladesh were interviewed. Collected data were subjected to analysis in appropriate statistical programs. Findings revealed that owners of 20-55 years old were engaged in this sort of farming activities having on an average 845 birds farm^{-1}. However, nearly three-fourths of them started the business with no technical knowhow. The farmers used commercial broiler feeds from different manufacturers, and they were mostly dependent on their respective dealers for procuring various inputs on credit basis. During Covid-19 pandemic all manufactures lost their market share. This was due to drop in demand of poultry products in market and rise in feed price. Hence a huge number of small farmers were compelled to stop their business. Results indicated that farmers disposed the live broilers weighing 2.09kg bird^{-1} with 94.25% livability and BDT 100.50 kg^{-1} market price. Feed solely accounted for 74.35% of total production cost bird^{-1} followed by chick cost (11.32%), total fixed cost (7.45%) and medication cost (3.58%). It was found that average production cost bird^{-1} of 2.09kg amounted to BDT 195.99. Farmers gained a gross margin of BDT -33.58 to BDT +68.12 bird^{-1} with an average of BDT 13.60. The losses in broiler production events were due to unusual lower market demand attributed to rumors, increased feed price, disease outbreak, etc. The stallholder farmers may be saved from this vulnerable situation by reforming the existing marketing channels, monitoring market regularly, providingtechnological training,creating awareness, providing government incentives, and so on.

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I. Introduction

Poultry farming, especially small and medium one, has been playing a significant role in the development of rural communities in almost every aspect of life over few decades. This contributes as the main source of family income for many farm households as well as immensely helps to create employment, improve food security, livelihood and nutrition of people in Bangladesh (Saleque and Ansarey 2020). Among the poultry enterprises, broiler production is popular as it requires less investment and quick return. More than 75 percent of the broiler farms belong to smallholders in this country. Due to affordable price and availability, chicken meat and eggs are the cheapest sources of protein in Bangladesh compared to other sources like beef, mutton, and fish etc. (Saleque and Ansarey 2020, Light Castle Analytics Wing 2020). Thus, low-income people of the country mostly depend on eggs and broiler/sonali meat. Per annum egg consumption per person is now almost close to the recommended targeted in Bangladesh; and the demand for poultry products has been expanding dramatically withpopulation growth, urbanization, dietary changes, etc. (Saleque and Ansarey 2020). These smallholder producers, specially broiler rearers are dealer-based, i.e. they depends commonly on feed and chicks dealers of their locality as they are of poor economic base. As a result of weak access to institutional support service for finance, health, inputs and outputs, and the market (Rahman*et al*. 2021), the smallholder poultry producers are constrained by the lack of capital, skills, knowledge, and modern technologies (Islam *et al*. 2014, Rahman*et al*. 2014). Multiple adverse impacts of Covid-19 pandemic were noted on the poultry sub-sector and number of poultry products decreased to a large extent, going down by 52.84 percent and all the farmers suffered a lot (Haque and Habib 2021). The pandemic has terribly disrupted the production systems that mismatched demand-

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supply chain of inputs and poultry products. Saleque (2020) mentioned that poultry production significantly dropped (about 45 % in DOC, 28% in eggs, 45% in chicken meat and 40% in feed) from the inception of Covid-19. Small-scale farmers are facing difficulties in accessing markets to sell their products or to buy essential inputs. Marketing of fruits, vegetables, poultry, and dairy products, etc. has been impeded by lockdowns and road blockages which harmfully affected fresh produce supply chains, possibly causing increased food loss and waste (Shoaib and Arafat 2020). In addition to these, raw material price in international market attributing to gradual increase in commercial poultry feed and essential medicines has become a rising threat for the growth and productivity of poultry sector. Small holder farmers are able to harvest the benefit of farming and compelled to stop the business. Bangladesh government and private organizations, service providers and the stakeholders alone or in concert have taken necessary steps to ensure timely availability of inputs, extension support, transportation, and value addition. In such a situation, the present study was undertaken to explore the cost-benefit scenario of small-scale broiler farming in the southern part of Bangladesh.

II. Methodology

Study area and period

Primary data were collected during the period from August to mid October 2021 from different locations of Barishal and Khulna divisions in Bangladesh. Ten southern districts namely Barishal, Bhola, Pirojpur, Bagherhat, Khulna, Satkhira, Jessore, Gopalganj, Magura and Faridpur of these divisions were included in this study.

Farmer selection and data collection

Primary data were collected from 100 smallholder broiler farmers of aforesaid regions of southern Bangladesh. A variable opinion prevails on the definition of smallholder farms among the researchers and development personnel and they define it according to their purpose. However, in general, flock size up to 2500 birds at a time farm^{-1} premises may be termed as small-scale farm (Rahman*et al*. 2021, Saddullah 2000, Sheel and Sen 2013). Firstly, farmers were purposely selected based on their farm sizes as informed by their feed and chick dealers in the locality. Company representatives in the respective areas assisted to select the respondent farmers. Then information was collected through structured questionnaire and information provided was crosschecked from their respective dealers in the locality. Relevant information from dealers and practitioners was also documented. Besides, few industry personnel at field level were interviewed to collect supplementary information. Some recent relevant literatures were also reviewed for illustrations in the article.

Data sorting and analysis

Data were properly sorted and misleading information was discarded. Thereafter, necessary calculations were done using MS Excel. All collected and calculated data were analyzed in IBM SPSS Statistics 25. Analyzed data were tabulated and presented as per requirement.

III. Findings and Discussion

Demographic and business profile of broiler farms

The results of the present study indicate that average age of respondent farmers was 32.69 years ranging from 20-55 years (Table 1). Among them majority (62.5%) was dependent on farming for their livelihood which is supported by Alam*et al*. (2014). More than one-third of the participating farmers were involved (some of them are still engaged in) in various occupations before starting farming business. Almost all of them started the farming with no institutional or informal training on poultry farming in the region. A large proportion (72.5 %) of the farmers without training on poultry farming was reported by some earlier studies (Sultana *et al*. 2012, Alam*et al*. 2014). Majority of the farmers owned single shed with a below 1000-bird capacity (Table 1). Survey data indicate that 22% respondent farmers used commercial feed manufactured and marketed by Nourish Poultry and Hatchery followed by KaziFrams (17%), Aman Feed (14%), Provita Group (13%), Paragon Group (10%) and so on. No farmers use hand-made feed because of questionable qualities of individual feed ingredients, hassle in grinding and mixing of various ingredients, little or no technical knowledge on feed formulation, etc. Three-fourth of the farmers procures the farm inputs like chick, feed, medicine and neutralceuticals from the feed and chicks dealers on credit. That is why farmers also receive most of the veterinary advice from their dealers as it required monetary involvement. Feed and/or chick dealers in Bangladesh make link between small-scale farmers and large integrators like input manufacturers, retail bird outlets and/or *paikar* (Rashid *et al*. 2004, Mandal and Khan 2017). Dealers in the locality also played a major role in disposing the live birds, and therefore majority farmers did not face any problem regarding marketing. Rahman*et al*. (2021) reported that dealers provide DOC, medicine and feedto small producers and buyback goods (live birds and eggs) to sustain the production cycle but not to withstand the small-scale farmers. Findings also revealed that increasing trend in feed price, frequent disease outbreak even after vaccination, lower

consumers' demand of broilers as a result of rumor and declining trend in price of live birds are the major problems hindering broiler farming business during Covid-19 pandemic.

Table 1 Descriptive statistics of the farmers

Parameters	**Category**	**Respondent (%)**
Age (Mean ± SD)	32.69±2.1	-
Primary income source	Poultry farming	62.5
	Others	37.5
Profession before farming	Small business	25.0
	Job	25.0
	Others (overseas job, agriculture, daily labour, electrician, workshop labour, etc.)	31.2
	None	18.8
Training on poultry farming	Yes	6.3
	No	93.7
Duration of business	≤ 2 years	43.8
	>2 years	56.3
Number of sheds	1	68.8
	2	31.3
Capacity of sheds	<=1000	75.0
	>1000	25.0
Feed used (manufacturer)	Nourish Poultry and Hatchery	22.0
	Kazi Farms	17.0
	Aman Feed	14.0
	Provita group	13.0
	Paragon Poultry	10.0
	CP Bangladesh	7.0
	Others	17.0
Mode of input procurement	Cash	12.5
	Credit	75.0
	Mixed	12.5
Veterinary technical advice	Own	31.3
	Dealer	68.8
	Doctor	18.8
	Other farmer	12.5
	Company representatives	6.3
Mode of bird disposal	Through dealer	56.3
	Others	44.7
Facing of market problem	Yes	75.0
	No	25.0
Type of problem faced	Increased feed price	93.8
	Diseases outbreak	75.0
	Low demand of broiler in market	62.5
	Increased chick price	56.3
	High transport and other cost	12.5

Market share and growth in feed market

Table 2 reveals that Nourish Poultry and Hatchery holds the highest (14.94%) share in feed market followed by Aman Feed (14.0%), Kazi Farms (8.4%), AftabBahumukhi Farms (6.25%) and so on. All feed manufactures in the southern parts experienced a downward trend in growth. This drop in feed sale was due to sudden decline in consumers' demand in poultry meat and eggs from the inception of Covid-19 pandemic. Drop in demand of poultry products was probably arisen from the rumors in social media that farms chicken and eggs transmit Coronavirus. Rahman*et al*. (2021) also reported similar observations. Even some activists sporadically damaged a few live bird transport vans in the zone. This scenario was aggravated by increasing trend in feed price attributed to amplified raw materials price in the world market. During the last one and a half years, price of commercial feed jumped in 3-4 steps. Trend in commercial feed price is presented in Figure 1.

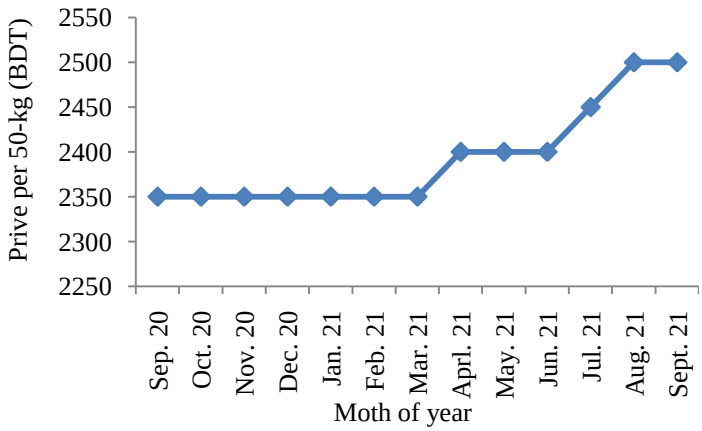

Figure 1 Price of commercial broiler feed over time

Table 2 Market share and annual growth of feed manufactures during Covid-19 pandemic

Name of feed manufacurer	**Market Zone**													
	Barishal		**Patuakhali**		**Pirojpur**		**Faridpur**		**Khulna**		**Jessore**		**Average**	
	Share (%)	**Growth (%)**	**Share (%)**	**Growth (%)**	**Share (%)**	**Growth (%)**	**Share (%)**	**Growth (%)**	**Share (%)**	**Growth (%)**	**Share (%)**	**Growth (%)**	**Share (%)**	**Growth (%)**
Kazi Farms	13.42	-2.00	2.30	-0.50	9.13	-2.00	6.99	-2.25	10.08	-2.50	8.50	-2.50	8.40	-1.96
Nourish Poultry and Hatchery	10.84	-2.50	3.83	-1.00	12.01	-3.00	18.59	-2.50	20.70	-4.00	23.68	-3.00	14.94	-2.67
Aftab Bahumukhi Farms	6.60	-1.50	5.36	-1.00	8.47	-2.00	6.99	-1.50	7.31	-1.00	2.79	-0.50	6.25	-1.25
Paragon Poultry	3.10	-0.50	3.83	-0.50	4.24	-1.00	1.95	-0.50	5.71	-1.00	2.09	-0.50	3.49	-0.67
ACI-Godrej Agrovet	5.26	-1.00	1.91	-0.50	6.36	-1.00	6.55	-1.50	1.61	-0.50	2.79	-0.50	4.08	-0.83
C.P. Bangladesh	4.95	-1.00	0.57	-0.25	2.35	-0.50	4.78	-1.00	2.77	-0.50	4.32	-0.75	3.29	-0.67
Provita Group	6.71	-1.00	2.60	-0.40	5.18	-1.00	8.59	-2.00	3.30	-0.50	2.51	-0.25	4.82	-0.86
Aman Feed	21.67	-4.40	22.39	-4.00	14.60	-2.00	11.16	-2.00	9.99	-1.00	4.18	-0.50	14.00	-2.32
Quality Feeds	5.68	-0.50	3.25	-0.25	3.30	-0.25	7.83	-1.00	2.68	-0.25	2.79	-0.25	4.26	-0.42
New Hope Feed	3.20	-0.25	0.38	0.00	3.77	-0.25	0.00	0.00	3.75	-0.40	4.60	-0.40	2.62	-0.22
Others	18.58	-3.00	53.58	-8.50	30.60	-5.00	26.56	-3.50	32.11	-5.00	41.78	-7.50	33.87	-5.42
Toatl	**100.0**	-	**100.0**	-	**100.0**	-	**100.0**	-	**100.0**	-	**100.0**	-	**100.0**	-

Source: Oaiduzzaman, 2021.

Farm inventory and economics of broiler enterprise

Number of birds farm^{-1} ranged from 250-2000 with an average size of 845, which were disposed step by step from 30-41 days of age (Table 3). Survivability of birds averaged 94.25% with a range of 86.11 to 97.11%. Farmers informed that somestimes lowered survivability resulted from improper brodding management, sudden disease outbreak, ascities, etc. Individual bird weighed 1.70-2.80kg with an average of 2.09kg at marketing.

Table 3 Inventory of participating farms

Parameter	**Mean ± SD**	**Range**
Number of birds farm^{-1}	845.0 ± 430.27	250.0 to 2000.0
Harvesting age (day)	35.5 ± 7.78	30 to 41
Survivability (%)	94.25 ± 2.88	86.11 to 97.11
Live weight bird^{-1} (kg)	2.09 ± 0.29	1.70 to 2.80

Gross fixed cost bird^{-1} (2.09kg live weight) amounted to BDT 14.61 which incurred 7.45% of total production cost (Table 4). Among variable cost items, chick, feed, litter and medication costs accounted for 11.32, 74.35, 1.14 and 3.58%, respectively of gross production. However, total variable cost involved in producing a 2.09kg-weight bird amounted to BDT 181.38 that was 92.55% of gross production cost. Alam*et al.* (2014) reported that chick, feed and medication cost accounted for 31.7, 57.0 and 5.6% of total cost bird^{-1} in a batch. These differences were due to the variations in chick and feed cost, feed conversion ratio, etc. Trend of chick and feed prices throughout a year are presented in Figures 2 and 3.

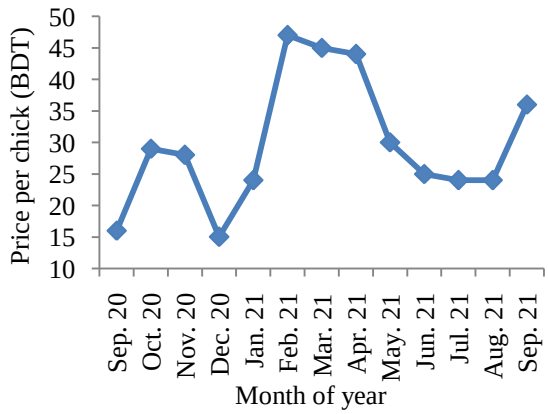

Figure 2 Chick prices over time

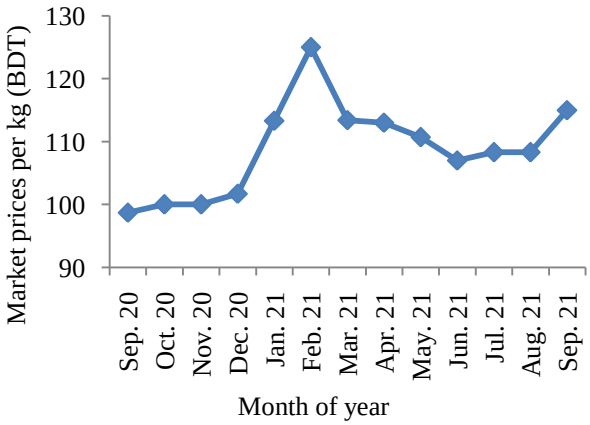

Figure 3 Live bird prices over time

Table 4 Estimated cost involvement in broiler farming

Economic indicator	**Mean ± SD**	**Range**	**Percent of total**
A. Fixed cost (Taka bird^{-1})			
Depreciation of land	0.42 ± 0.07	0.31 to 0.52	0.21
Depreciation of shed and equipment	3.31 ± 0.42	2.50 to 4.17	1.69
Interest on operating capital	10.88 ± 0.50	9.92 to 11.83	5.55
Sub-total	**14.61± 0.87**	**13.45 to 16.44**	**7.45**
B. Variable cost (Taka bird^{-1}) *			
Chick	22.19 ± 6.96	10.0 to 36.0	11.32
Feed	145.72 ± 6.87	133.57 to 157.64	74.35
Litter	2.23 ±0.78	0.70 to 3.33	1.14
Medication	7.01 ± 2.95	1.51 to 12.27	3.58
Vaccination	1.85 ± 0.44	1.11 to 2.67	0.94
Electricity	2.38 ± 0.80	1.00 to 3.85	1.21
Sub-total	**181.38± 8.37**	**165.28 to 197.09**	**92.55**

*Family labour was used for rearing and therefore, labour cost was not included in total production cost.

Gross production cost was calculated by adding fixed and variable cost items. To achieve 2.09kg live weight bird^{-1}, gross cost involvement was BDT 195.99 (Table 5) whereas gross return from the same was BDT 209.59. Therefore, gross margin from each bird amounted to BDT 13.60 considering the live bird market price of BDT 100.50. Per bird gross margin ranged from BDT -33.58 to BDT +68.12. Market price of input and prices are the majorfactors affecting profit margin. During Covid-19 situation, farmers were compelled to dispose the live birds with a minimum of BDT 40.00 resulting in huge losses and that is why the farmers became temporarily dropped out from business. Most of the dealers in the locality are still suffering from cash crisis required to meet the price of chick and feed manufacturing companies. Some other researchers (Al-Khalaifah*et al*. 2020, Saleque 2020) reported that poultry farmers specially smallholder ones experienced severe economic loss for the COVID-19 outbreak in Bangladesh. Damage and hurdle in marketing and distribution networks due to the lockdown measures most of the farmers failed to receive necessary supplies such as DOCs, feed, vaccines, medicines, etc. (Rahman*et al*. 2021). A large portion (about 25-30%) of farmers has lost their working capital and thus capital-constraint small farmers were not able to start their business further (Mahmud 2020, Saleque 2020). Some earlier researchers (Jabbar*et al*. 2011, Islam *et al*. 2014) also reported similar dropping-out of resource-poor farms and the highlighted reasons were unstable market, high input prices and low product prices, disease outbreaks or natural calamities like flood and others.

Table 5 Economic performance of smallholder broiler farming

Economic indicator	**Mean ± SD**	**Range**
Per bird live weight at slaughter (kg)	2.09 ± 0.29	1.70-2.80
Gross production cost (Taka bird^{-1})	195.99 ± 9.05	179.27 to 213.53
Price of live bird (Taka kg^{-1})	100.50 ± 9.38	90.00 to 120.00
Gross return (Taka bird^{-1})	209.59 ± 33.09	161.50 to 275.00
Gross margin (Taka bird^{-1})	13.60 ± 31.05	-33.58 to 68.12

Organized marketing channels, strict monitoring of all market actors and pricing of products, caveating farmers about necessity of biosecurity practices and technological training, controlling rumors by extensive advertisement may be helpful for the smallholders to get higher profit margin essential for their livelihood and sustenance. Contract farming can be an alternative way in this regard.

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