Agribusiness of Poultry and Poultry Products in Bangladesh

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1. INTRODUCTION

Agribusiness encompasses all activities from the "paddock to the consumer" that are relevant to the eventual transformation/value adding, distribution and retailing of food, fibre and associated products. Agribusiness is a name given to the farm inputs, farm and associated consumer products business and their study as an economic and business system.

Poultry, an important agribusiness sector, witnessed spectacular expansion in the recent past. A large number of commercial poultry farms have been established. For supplying day old chicks to these farms a substantial number of poultry hatcheries have also been established in the private sector. Additionally, a number of mills have started producing poultry feeds and more entrepreneurs are coming forward to establish poultry processing plants.

Since the industry has an enormous potential for expansion, great deal of investments have been rushed in this sector during the last few years. But many farms could not tolerate the temporary shock arising from market failure, which caused low price of egg and poultry meat in the market. The scenario in the poultry farming is that almost every day there are new farms coming up and some of the old ones closing down.

Sometimes egg and broiler prices go so down (which is lower than the production cost) in the wholesale market that many small and medium farms have no other alternative but to close down temporarily (Prothom Alo, 30/03/02). Moreover, there is high fluctuation of egg and broiler prices. It is blamed that the Aratdars have been earning more profit although the farm owners have to sell eggs and broiler at low price. Consequently, the consumers are not getting the benefit of low prices.

The farm owners complain that the Aratdars compel them to sell egg and broiler at low price despite prevalence of higher demand in the market. It is reported that although four eggs are sold at Tk. 11 to Tk.12 at retail market, they are sold at Tk. 6 to 7.50 at wholesale market. Farm owners say that they never witnessed such large difference between wholesale and retail prices of eggs. According to farm owners the Aratdars were mainly responsible for this crisis. Eighty-two Aratdars in Tejgaon area control the whole poultry business in Dhaka. The government has no control over them. They fix price according to their will. The Aratdars, however, refute the farm owners' complain. They say that they earn only Tk. 5 as profit from selling 100 eggs. A study showed that the large wholesalers' (Aratdars) profit ranged from Tk. 6 to Tk. 7 per 100 eggs (Ahmed, 2001). The farm owner association reported that there is no appropriate government policy for the poultry industry. The present study was undertaken to address some of the problems mentioned above.

This study is expected to be useful both at micro and macro levels. It will identify some basic problems that are faced by the owners of broiler and layer farms and wouldalso suggest measures for probable solutions. The research may be of use to the officials of the relevant government and non-government agencies and extension workers in making an appropriate decision regarding further expansion of poultry farming. The unemployed people and potential entrepreneurs will have an avenue for earning income through poultry farming if it is revealed to be a profitable business. Hence the present research was undertaken to study the agribusiness of poultry farming with the following objectives:

(i)   to study the market structure and distribution system of important inputs used in poultry farms,

(ii)   to estimate the cost, return and profitability of broiler and layer farms;

(iii) to examine the existing marketing system and estimate the cost, margin and profit of traders involved in the marketing chain; and

(iv)   to suggest some policy measures for increasing the price at wholesale level and lowering the production cost of farm owners.

2. METHODOLOGY

The study used data both from secondary and primary sources. Secondary sources included previously done theses, reports and researches. In order to substantiate the findings from the secondary sources, empirical data were collected from broiler and layer farmers. Field visits were made in Kishoregonj, Savar, Gazipur, and Kaliakoir areas during July 2002. To know about the marketing margins, costs and net margins, the Dhaka city market was surveyed at the same time. Data

obtained from empirical sources, were compared with those from the previously accomplished researches to arrive at meaningful conclusion. The findings were also subjected to sensitivity analysis to confirm the stability of the results.

Both tabular and statistical methods were used in this study. For collecting empirical data the farmers were divided into three classes: small, medium, and large. Costs, returns and profits of layer and broiler farms were estimated. A field survey was conducted in 2002 to look into the profitability of layer birds. Eighteen small, 12 medium and 10 large layer farms were selected.

For marketing study, Gazipur district and Dhaka city were selected as producing and consuming areas respectively for poultry products. From each type of trade (egg and broiler) 15 farm owners, 10 Aratdars, 6 wholesalers and 15 retailers totalling 46 traders and farm owners were interviewed for this study. That means the total sample size was 92 (46+46). To know the spatial price integration of eggs, Dhaka, Chittagong, Gazipur, Rajshahi, Sylhet and Bogra districts were chosen. Apart from the primary data, the average weekly wholesale prices of eggs of the selected markets during 1991 to 2001 were collected from the Directorate of Agricultural Marketing (DAM).

Ratio to moving average method was used for estimating seasonal price variation of egg and chicken for Dhaka market during 1991 to 2001. A commonly employed method for measuring the integration between agricultural markets is that of correlating time series price data for different market places and product. Simple correlation coefficient using nominal price as a measure of market integration has been criticized by many authors. (Blyn, 1973; Harriss, 1979; Lundahl and Petersson, 1982). Therefore, in this study, the correlation coefficient using first difference in nominal prices was calculated for weekly and monthly egg prices.

3.   MARKET STRUCTURE AND DISTRIBUTION SYSTEM OF IMPORTANT INPUTS USED IN POULTRY FARM

The main inputs used by poultry farms are: day old chicks, feed and medicine. The market structure and distribution system of these inputs are discussed below:

Day old chicks

There are over one hundred poultry hatcheries firms in Bangladesh. The market structure of hatchery is oligopolistic in nature. One study (Hossain, 2003) showed that the largest four hatcheries controlled 45% and 65% of production in the case of broiler and layer respectively. They have associations and price of chicks differ a little among the farms (Appendix table 1). In this market structure the big farms

fix the price and the small ones follow them. The individual hatchery sets price unilaterally considering the probable reaction of other farms. This type of price setting may be termed as interdependent action without agreement. The other characteristics of this industry are: atomistic buying condition, evidence of product differentiation in the form of strain and existence of barrier to entry in the form of huge capital requirement.

In order to get chicks the poultry farms have to place order through agent well ahead. For ensuring timely delivery of day old chicks (DOC) the farms require advance deposit of a portion of contract value. One study (Islam et. al., 2002) showed that 84% of farms paid about 30% of full amount in advance for getting DOC. The farms have to wait 3 to 8 weeks for delivery of DOC after advance payment. After receiving chicks, the agent sells them to farm owner and receive commission fixed by the hatchery. Generally the price of chick remains the same throughout the year. Sometimes price changes due to change in demand.

The farm owners mentioned various problems in the case of buying chicks. Sometimes they failed to purchase the necessary number of chick due to shortage of supply. As it is very difficult for them to identify good chicks, sometimes they have to accept bad quality (C grade) chicks. Generally they cannot purchase chicks directly from the hatchery and have to book earlier through agent. They have no scope to bargain and have to purchase at prices fixed by the hatcheries. The price, according to them, was much higher and the hatchery earns abnormal profit. Hossain (2003) showed that although economic profit existed in the hatchery industry, one-third of capacity remained unutilised during 2002.

Feed

The broiler farms purchase ready made feed for their birds. On the other hand, the layer farms prepare own feed after purchasing ingredients from the market. Like hatchery, the feed mills supply feed through their agents/dealers via their sales centres at a price fixed by them. The price of feed does not vary much throughout the year. However, at times of high demand the agents raise price by creating artificial scarcity.

The structure of feed mill industry in Bangladesh is moderate concentrated oligopoly. It was found that the largest four firms produced one-third of total industry's production (Roy, 2001). A degree of interdependency in determining price was found among the firms. They were always conscious about the probable reaction of the rivals in the case of setting/changing price. As a result, the price variation across firms was not significant. The price per kg of feed ranged from Tk. 14 to Tk. 16 (Appendix Table 2). Atomistic buying condition, product differentiation in the form of quality and entry barrier in terms of less access to

liquid fund were the major characteristics of this industry. The capacity utilization of this industry was satisfactory, which was 94% during 1999 and the profit margin was found positive (Roy, 2001).

The layer farms purchased ingredients like maize, bran, soybean and oyster shell from wholesaler, protein, laycin, enzyme plus, mithionin and layer premix from agents/dealers and salt from retailers. The price of ingredients such as protein, enzyme, premix etc. supplied by different companies was more or less the same in the study area (Appendix Table 2).

The farm owners faced problems of selecting good quality of feed. As a result, sometimes they incurred loss by purchasing adulterated feed. Sometimes necessary feed was not available in the market. The layer farm complained on the non-availability of ready feed in the market.

Medicine

The farms purchased medicine from agents at price fixed by the company. At the time of large-scale disease attack the agents raised price of necessary medicine by creating artificial scarcity. The price of the same medicine varied markedly across different companies. For example, the retail price of Arif's Allvit was Tk 182 per 100gm, whereas the same medicine/ vitamin of Square named Megavit was sold at Tk.400 per 100 gm. Due to ignorance, the farm owners faced problem of selecting appropriate good medicine at the time of need. Sometimes, it is complained that the necessary medicine either was not available or available at a higher price.

4. PROFITABILITY OF BROILER AND LAYER PRODUCTION

A study (Karim, 2000) was conducted on broiler farms that were contact growers under Aftab Bahumukhi Farm Ltd. (ABFL) in Kishoregonj (Tables 1). The Aftab farm provided some support services and guaranteed price. The net return per 100 birds amounted to Tk 1078, Tk. 1089, Tk. 1239 and Tk. 1056 for small, medium, large and all farms respectively. As ABFL supplied necessary inputs on credit as well as provided technical services to contact growers, it offered lower than market price to the growers. As a result, their net return was found lower. These returns appeared to be the lower bound return of broiler farming. Another study (Begum, 2000), which covered wider range of flock size in Trishal and Mymensingh Kotwali thanas, revealed that the small, medium, large and all farms received respectively Tk. 1752, Tk. 2636, Tk. 2497 and Tk. 2401 as net return per 100 birds. (Table 2). Thus it appears that broiler farming is certainly profitable. The findings of the study by Begum (2000) may be accepted as the upper limit

regarding profitability of broiler farming and for making some projections. The rate of return from broiler raising is substantially higher than the opportunity cost of capital. Thus it may be suggested that if a medium size broiler farm is started with 4500 birds/year, it is likely to generate an annual net return of Tk 1,18,620.00.

It was also found that net return per 100 birds of broiler increased with the increase of farm size. This indicates that the medium and large farms were capable of earning more profit per bird compared to small farms. Fokrul et. al. (2002) obtained similar results which showed that larger farms achieved higher efficiency not only due to better cost economy but also due to better technical performance of the flock.

Table 1: Cost and return of contact broiler growers by farm size

(Tk./100 birds)

Particulars	Small	Medium	Large	All farms	% of total cost
Variable Cost Items					
Feed cost	4066	4046	4066	4057	52.55
Day old chick	2200	2200	2200	2200	28.50
Hired labour	165	155	145	154	1.99
Veterinary cost	406	492	532	493	6.39
Cleaning	34	38	34	36	0.47
Transportation	120	119	113	117	1.52
Electricity	107	95	78	90	1.17
Litter cost	33	35	30	33	0.43
Total variable cost	7131	7180	7198	7180	93.01
Fixed Cost Items					
Family labour	110	73	54	73	0.95
Housing	126	119	106	115	1.49
Tools & Equipment	28	30	34	31	0.40
Interest on operating capital	303	305	305	304	3.94
Land use cost	18	29	28	17	0.22
Total Fixed Cost	585	556	528	540	6.99
Total cost	7716	7736	7726	7720	100.00
Total Gross Return	8921	8940	9071	8987	-
Net return	1205	1204	1345	1267	-
Benefit-Cost Ratio	1.16	1.16	1.17	1.16	-

Source: Karim, 2000

Table 2. Cost and return of broiler production by farm size

(Tk./100 birds)

Particulars	Small	Medium	Large	All	% of total cost
Variable cost items					
Feed cost	3613	3445	4027	3826	46.17
Day-old-chick	2342	2367	2300	2343	28.27
Hired labour	328	481	426	445	5.37
Veterinary cost	320	319	323	325	3.92
Electricity	95	117	75	94	1.14
Carrying cost	88	94	74	84	1.02
Total Variable cost	6787	6822	7226	7117	85.88
Fixed cost items					
Family labour	460	291	146	239	2.88
Housing cost	81	97	81	88	1.06
Tools and equipment	91	68	54	64	0.77
Interest on operating capital	576	579	853	744	8.98
Land use cost	45	40	27	35	0.43
Total Fixed cost	1252	1074	1160	1170	14.12
Total cost	8039	7896	8386	8287	100.00
Gross Return	9791	10532	10883	10688	-
Net Return	1752	2636	2497	2401	-
Benefit-cost Ratio	1.22	1.33	1.30	1.29	-

Source: Begum, 2000

To explore the profitability of layer farms, a very recent survey was conducted in Gazipur in 2002 (Tables 3). The findings of the study were substantiated by Khanum's study (Table 4). According to the recent survey, costs per 100 birds amounted to Tk 52581, Tk 50135, Tk 48398 and Tk 50070 for small, medium, large and all farms respectively. Annual net return per100 birds amounted to Tk 23310, Tk 20115, Tk 22236 and Tk 21946 for the small, medium, large and all farms, respectively. The net return per 100 birds obtained from Khanum's study (2002) amounted to Tk 19551, Tk 22416, Tk 23909 and Tk 19480 for the small, medium, large and all farms, respectively. The findings of the two studies varied slightly. Hence it appears that both broiler and layer farming are profitable enterprises. Layer farming, however, is more profitable than broiler farming. Assuming a flock size of 8000 layer birds, the annual net returns may range between Tk 16.00 lakh to Tk 17.00 lakh. Farmers, however, are still more interested in broiler rearing because of quicker returns.

Table 3: Cost and return of layer production by farm size

(Tk/100birds)

Particulars	Small	Medium	Large	All	% of cost
Variable cost items					
Feed cost	40536	39512	39213	39682	79.25
Hired labour	1825	1655	1473	1622	3.24
Veterinary cost	941	980	896	933	1.86
Electricity	594	485	354	458	0.91
Carrying cost	413	314	173	280	0.56
Litter cost	340	227	136	219	0.44
Day-old-chick	2420	2322	2200	2296	4.59
Total variable cost	**47069**	**45494**	**44446**	**45489**	
Fixed cost items					
Family labour	1507	984	654	984	1.97
Housing cost	679	605	514	586	1.17
Tools and equipment	722	540	484	566	1.13
Interest on operating cost	1586	1587	1546	1569	3.13
Land use cost	1018	925	754	876	1.75
Total fixed cost	**5512**	**4641**	**3952**	**4581**	9.15
Total cost	52581	50135	48398	50070	100.00
Gross return	75891	70250	70634	72016	
Net Return	**23310**	**20115**	**22236**	**21946**	
Benefit-cost Ratio	1.44	1.40	1.46	1.44	

Source: Field Survey, 2002

Feed comprises a larger share of total cost in broiler and layer rearing. For broiler rearing, feed cost roughly constituted around 50 per cent of the total cost. The corresponding cost for layer rearing constituted closer to 80 per cent. There is a scope to reduce feed cost by increasing management efficiency. Timely availability of feed and its quality very often cause higher feed cost to poultry farmers.

Table 4: Cost and return of layer production by farm size

(Tk./100birds)

Particulars	Small	Medium	Large	All	% of total cost
Variable cost items					
Feed cost	42931	42140	41889	43346	78.28
Hired labour	1809	2015	1796	2025	3.66
Veterinary cost	999	1002	1004	1002	1.80
Electricity	668	495	404	535	0.97
Carrying cost	446	301	146	298	0.54
Litter cost	354	231	142	242	0.44
Day-old-chick	2410	2154	1992	2185	3.95
Total Variable cost	**49617**	**48338**	**47374**	**49632**	**89.64**
Fixed cost items					
Family labour	1659	1038	711	1063	1.92
Housing cost	778	604	518	633	1.14
Tools and equipment	787	601	504	631	1.14
Interest on operating cost	2481	2497	2369	2482	4.48
Land use cost	1278	982	635	929	1.68
Total Fixed cost	**6983**	**5722**	**4737**	**5737**	**10.36**
Total cost	56600	54060	52110	55369	100
Gross return	76151	76476	76019	74849	-
Net Return	**19551**	**22416**	**23909**	**19480**	-
Benefit-cost Ratio	1.35	1.41	1.46	1.35	-

Source: Khanum, 2002
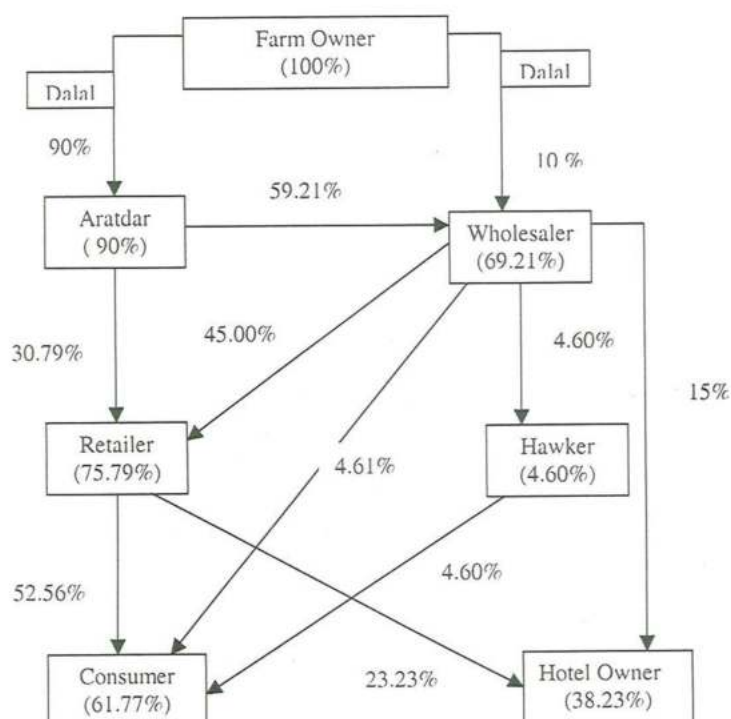
5.   MARKETING CHAINS OF BROILER AND EGGS

Egg

The market participants involved in marketing of egg are farm owner, Dalal, Aratdar (large wholesaler), Wholesaler, Hawker and retailer. The farm owners sold 90% of their eggs at their farm gate to the Aratdar and 10% to wholesaler through Dalal. Dalals are the local people who arrange contacting farm owners with Aratdar or wholesaler for transaction. They received Tk. 4 to Tk. 5 for selling 100 eggs from the farm owner for their service. Sometimes they did not disclose the actual selling price to the farm owner.

After purchasing eggs from farm owner, the Aratdars sell two third of their eggs to wholesaler and one thirds to retailer (Fig. 1). The wholesalers purchase most of their product from Aratdars (large wholesaler) and sell two-third to retailers and one fourth to hotel owners. They dispose of some amounts to Hawker and directly

to consumers. Retailers purchase 60% eggs from wholesalers and 40% from Aratdars and sell 70% to consumers and 30% to hotel owners.

*Figure 1: Marketing chain of egg in the Dhaka city*

Broiler

Like egg marketing chain, the intermediaries involved in broiler marketing are farm owner, Dalal, Aratdar (large wholesaler). Wholesaler, Hawker and retailer. The broiler farms sell 80% of their produce to the Aratdars and 20% to wholesalers at their farm gate through Dalals who help the owner to sell product. Dalals generally obtained Tk. 50 for selling per 100 kg of broiler. The Aratdars, on the other hand, sell 73% of their product to

wholesalers, 15% to hotel owners and 12% to retailers (Fig. 2). The wholesalers vend one half to retailers and one fourth directly to consumers. They also dispose of over 20% to hotel owners and a little quantity to Hawkers. Retailers purchase 80% eggs from wholesalers and 20% from Aratdars and sell 86% to consumers and 12% to hotel owners.

Figure 2: Marketing chain of broiler in the Dhaka city
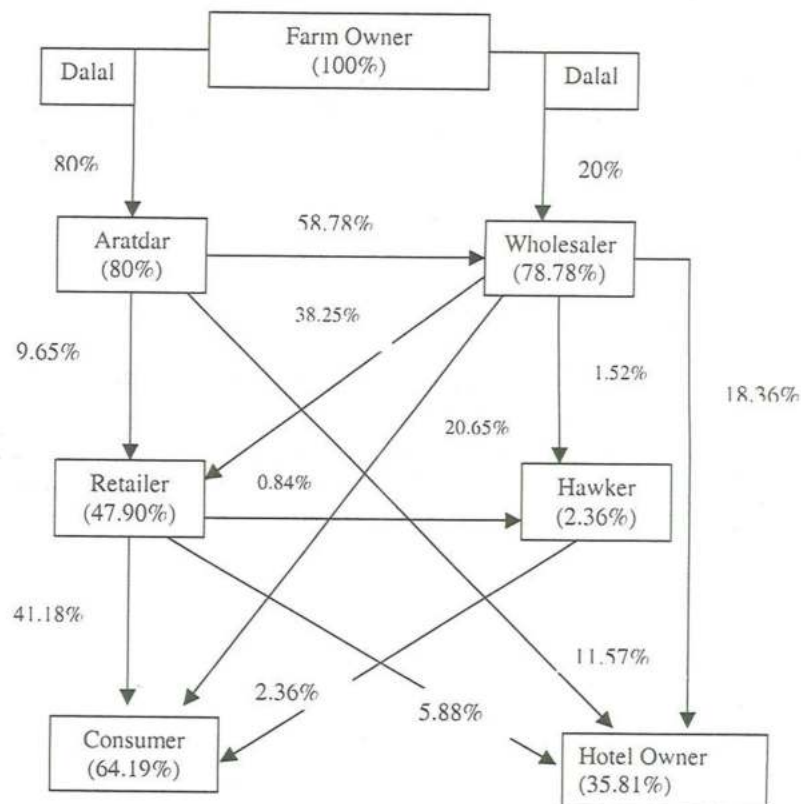
6.   MARKETING COST, MARGIN AND PRICE FIXATION PROCEDURE

Marketing cost and margin

Egg: The total marketing cost incurred by different intermediaries for one hundred eggs was calculated at Tk. 12.67, of which more than three fourth (78%) was shared by Aratdar (Table 5). Transportation was the highest cost item comprising about one half of total marketing cost. Wastage, the second highest cost item, accounted for about one-fourth of total cost. As Aratdars used to bring eggs directly from farms, which were located far away from Dhaka city, they incurred higher transportation and wastage cost compared to other traders.

Among the traders, retailers' net margin or profit was over three times higher than that of wholesalers (Table 6) because of the fact that they assumed more risk compared to other traders. Retailers generally have to wait for a long time to sell a fixed quantity of eggs compared with other traders. Although Aratdars' per unit profit was lower (4%of sale price), their total profit per unit of time was higher because of selling large quantity of eggs in a day.

Table 5: Marketing cost of egg intermediaries

(Tk/100 eggs)

Cost item	Aratdar	Wholesaler	Retailer	Total	Percentage
Transportation	5.32	0.38	0.55	6.25	49.33
Storage	0.63	0.10	0.00	0.73	5.76
Market toll	0.28	0.15	0.12	0.55	4.34
Labour	0.31	0.05	0.08	0.44	3.47
Wastage	2.21	0.33	0.50	3.04	24.00
Rent	0.57	0.25	0.19	1.01	7.97
Miscellaneous	0.52	0.09	0.04	0.65	5.13
Total	9.84	1.35	1.48	12.67	100.00

Table 6: Marketing margin of egg traders

(Tk./100 eggs)

Intermediaries	Purchase price	Sale price	Marketing margin	Marketing cost	Net margin
Aratdar	229.76	249.15	19.39	9.84	9.55
Wholesaler	272.13	279.50	7.37	1.35	6.02
Retailer	281.86	303.33	21.47	1.48	19.99

Broiler: Among the traders, Aratdars' marketing cost was the highest comprising about 60 per cent of total marketing cost of all traders because of the fact that they moved product from long distance (Table 7). Transportation, the highest cost item, accounted for about 40 per cent of total cost, followed by wastage of 20 per cent and storage of 15 per cent. Unlike egg traders, profit of wholesalers was found higher than that of other traders, although retailers bear more risk (Table 8). This has happened due to the fact that contrary to egg wholesalers, broiler wholesalers sell more than one half of their product either directly to the consumers or to the hotel owners. They may better be called as wholesaler cum retailer instead of simply wholesaler. As Aratdars trade more amount of product per unit of time, their total profit was higher than that of other traders.

Table 7: Marketing cost of broiler intermediaries

(Tk/Kg)

Cost item	Aratdar	Wholesaler	Retailer	Total	Percentage
Transportation	2.56	0.30	0.18	3.04	38.83
Storage	0.49	0.43	0.27	1.19	15.20
Market toll	0.08	0.12	0.17	0.37	4.73
Labour	0.45	0.12	0.13	0.70	8.94
Wastage	0.85	0.28	0.43	1.56	19.92
Rent	0.19	0.23	0.22	0.64	8.17
Miscellaneous	0.03	0.15	0.15	0.33	4.21
Total	4.65	1.63	1.55	7.83	100.00

Table 8: Marketing margin of broiler traders

(Tk/Kg)

Intermediaries	Purchase price	Sale price	Marketing margin	Marketing cost	Net margin
Aratdar	53.20	60.16	6.96	4.65	2.31
Wholesaler	58.00	63.70	5.70	1.63	4.07
Retailer	59.41	64.58	5.17	1.55	3.62

Price fixation procedure

Aratdars and farm owners jointly determine the farm level broiler and egg prices. At Arat level, price is settled by open bargaining mainly based on competition among the Aratdars. Wholesale price is fixed on the basis of competition among the sellers. Finally, retailers follow mark-up method to fix up selling price.

Marketing problems

Illegal payment, hooliganism, terrorism, fluctuation of prices and death of birds are the major problems mentioned by all broiler traders. Additionally, the wholesalers and retailers pointed out weight loss and increase in feed cost due to delayed sale as problem. Like broiler traders, egg traders mentioned illegal payments, terrorism, price fluctuation, wastage of eggs are the major problems. Besides, Aratdars cited poor communication system, presence of Dalal, Hartal, blockade etc. as the main problems.

7.   PRICE VARIATION
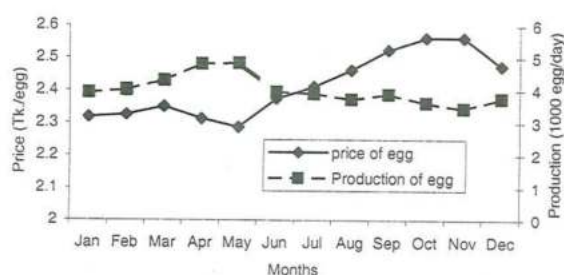
Seasonal Price Variation

Egg: It is evident from Fig. 3 that the seasonal price index of egg was the highest in October and the lowest in April. After initial peak in February, the price began to fall and reached the lowest level in April. After April, the price began to rise and reached the highest level in October with a small decrease in September. The seasonal price indices showed three peaks in the months of April, July and October. The prices remained higher than average in February, July to November and they were lower than average in the remaining months. The difference between the highest and the lowest indices and the coefficient of variation on indices were 20.06 and 6.75 respectively (Appendix table 3). The causes of such price variation might be as follows:

i)   In winter season, production of eggs increase because of congenial climate. Conversely, the production remains lower in summer season. Average production of egg per day and price received in different months by the sample farms as depicted in fig. 4 show that there is a strong negative relation between production and price. The correlation coefficient between production and price was estimated at –0.792.

ii)   Due to more availability of indigenous poultry eggs (chicken and duck) in April, the price of eggs remain at the lowest level. Another reason for lower price during April to June is that in those months, the demand for egg is lower due to hot weather.

iii)   Because of lower production, the price of egg is generally the highest in October. Moreover, higher demand due to cold weather cause the price to rise in October-November.

Figure 3: Seasonal price variation of egg & broiler during 1991 to 2001
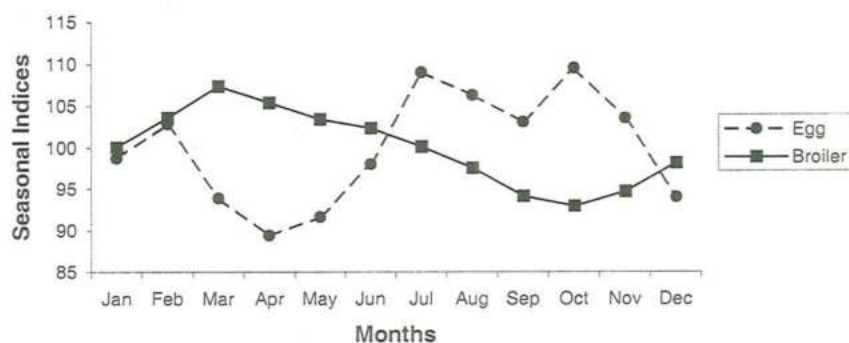
Broiler: The seasonal price variation of chicken/broiler in Dhaka market during 1991 to 2001 is also presented in Fig. 3. The broiler price started to rise from November, reached peak in March, decreased thereafter and finally reached the lowest level in October. Unlike egg price, the broiler price was the highest in March–April and the lowest in September-October. The price remained above average (100) during January to July and below average during August to December. Compared with egg, the seasonal price fluctuation of broiler was found lower. Another interesting result is that negative relation existed between the seasonal price variation of egg and broiler. That means when the egg price was higher, the broiler price was lower. Lower production due to unfavourable weather condition causes higher broiler price in March-April. Moreover, in this period the availability of fish is lower. On the other hand, the price remain lower during autumn season (September-October) because of higher production arising from favourable weather condition and because of availability of more fish in the market. Instead of winter, broiler production is the highest during autumn because during winter the mortality of smaller chicks is higher due to cold weather. Besides, during winter season the demand remains slightly higher due to occurrence of more social ceremonies like marriage, picnics etc. Price is mainly determined on the basis of demand and supply of broiler in the market. However, influence of supply was higher than that of demand because supply was more fluctuating.

Figure 4: Average production per day in thousand &
price of egg received by farm

Spatial Price Variation

The estimated correlation coefficients between different markets for weekly and monthly prices are presented in Tables 9 and 10 respectively. In the case of weekly prices, all the coefficients were below 0.30 and only 8 out of 15 coefficients were significant. This indicates that all the selected egg markets were either not integrated or integrated poorly in the short run.

Table 9: Correlation coefficient matrix of weekly egg prices in selected markets

Markets	Dhaka	Chittagong	Rajshahi	Gazipur	Bogra	Sylhet
Dhaka	1.00	0.28*	0.13*	0.18*	0.04	0.13*
Chittagong	0.28*	1.00	0.13*	0.06	-0.007	0.19*
Rajshahi	0.13*	0.13*	1.00	0.19*	0.06	0.09
Gazipur	0.18*	0.06	0.19*	1.00	0.07	0.07
Bogra	0.04	-0.007	0.06	0.07	1.00	0.12*
Sylhet	0.13*	0.19*	0.09	0.07	0.12*	1.00

* Significant at 1% level

For monthly price data, all the coefficients are low but significant. Except thecoefficient between Dhaka and Chittagong, all the coefficients were below 0.6. The correlation coefficient between Dhaka and Chittagong markets was highly related in the long run. This has happened due to the good communication (road and telephone) between these two markets. All other markets were moderately integrated in the long run.

***Table 10: Correlation coefficient matrix of monthly
egg prices in selected markets***

Markets	Dhaka	Chlttagong	Rajshahi	Gazipur	Bogra	Sylhet
Dhaka	1.00	0.75*	0.49*	0.53*	0.23*	0.39*
Chittagong	0.75*	1.00	0.49*	0.52*	0.26*	0.49*
Rajshahi	0.49*	0.49*	1.00	0.45*	0.34*	0.30*
Gazipur	0.53*	0.52*	0.45*	1.00	0.44*	0.32*
Bogra	0.23*	0.26*	0.34*	0.44*	1.00	0.22*
Sylhet	0.39*	0.49*	0.30*	0.32*	0.22*	1.00

* Significant at 1% level

8.   CONCLUSIONS AND RECOMMENDATIONS

8.1   Conclusions

Input sector: Poultry inputs like chick, feed and medicine markets are oligopolistic in nature, in which prices are determined individually considering probable reaction of others. Invisible collusion in determining prices exists among the firms and the possibility of earning abnormal profit cannot be ruled out. For that reason the prices of inputs of different firms were noted to be high and by and large equal. Except in the case of medicine, prices vary a little across the firms. The prices do not vary significantly throughout the year. However, at times of high demand the agents raise price by creating artificial scarcity. The farm owners have little knowledge to select the good quality inputs and incur loss by using poor quality inputs. They have no choice but to accept inputs at a price fixed by the company.

Production Sector: It has been observed that both broiler and layer farming are profitable enterprises. Farmers, however, are more inclined to broiler production because of quicker returns. These enterprises, at present, are confronted with a number of technical, biological, marketing and management constraints. In order to make the broiler and layer enterprises sustainable the management skills, among others, of the owners of the enterprises must be improved.

Marketing Sector: Although farm owners and Aratdars jointly determine the farm level prices of eggs, the demand and supply forces are very important in determining prices in the market. However, because of weak bargaining power of producers compared to the Aratdars, especially at the time of excess supply, Aratdars have an upper hand in fixing prices. Farm owners sometimes reportedly incur loss by selling eggs and broiler at a price lower than their production cost whereas such situation never arises in the case of Aratdars. That means Aratdars'

profit is certain and constant while producers' profit remains very uncertain and fluctuating. In majority cases, the transaction between Aratdar and farm owner has taken place through local Dalal. For that reason both the parties incur loss to the amount paid to the Dalal as commission. Although Aratdars' profit (4% of sale price) is lower, their total profit per unit of time must be higher as they handle larger volume of product. High wastage cost (about one-fourth of total marketing cost) implies lack of physical facilities, especially storage, in the market.

Egg and broiler prices show a distinct and regular seasonality in a year. The pattern of price is a reflection of number of factors including, among other things, availability of eggs and broiler (both commercial and indigenous) and change in demand arising from change in weather condition. For a perishable commodity, this high fluctuation of prices makes poultry industry very much uncertain. The study also shows that egg markets are poorly integrated despite development in communication facilities over the recent past years.

8.2   Recommendations

(i)   Government should take appropriate policy measures for ensuring steady supply of quality feed and day old chick to the farm owners.

(ii)   Farmers should be given short-term training to improve their technical know-how and management skill.

(iii) Appropriate housing design, especially to reduce summer stress is essential for reducing production loss due to heat stress.

(iv)   Extension services need to be strengthened for imparting knowledge on improved feeding, housing, nutrition, management and disease control measures.

(v)   Establishment of grandparent stockfarms is needed which could certainly reduce the price of day old chicks resulting in higher profit of farms.

(vi)   Introduction of processing (dressed) and further processing (cut up parts) of poultry and increased use of poultry egg and meat in value added products should help to reduce price fluctuation.

(vii) Farm owners may be organised into viable pressure groups so that they can sell their produce directly to the Aratdars instead of via Dalal. This would improve their bargaining power and thus help them to obtain a better price for their produce.

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APPENDIX

Appendix Table 1: Price of day-old chicks for different companies

Name of company	Broiler chicks		Layer Chicks	
	A grade	B grade	A grade	B grade
National	22.00	13.00	16.00	11.00
Naris	23.00	14.00	17.00	10.00
Dhaka	20.00	12.00	16.00	10.00
Kazi	20.50	12.00	15.00	10.00
Paragon	22.00	13.00	16.00	11.00
Finix	18.00	10.00	-	-
Royal	19.00	11.00	-	-
BRAC	19.00	14.00	-	-
Sylhet	-	-	15.50	9.00

**Appendix Table 2 Price of broiler feed and layer feed
ingredient for different companies**

Name of company	Broiler feed Price (Tk/Kg.)	Layer feed ingredient (Tk/Kg.)		
		Protein	Enzyme	Premix
Quality	14.25	-	-	-
BRAC	16.00	-	-	-
Pacha	14.20	32	315	120
Narish	14.00	35	320	125
ACI	-	35	300	120
Ranata	-	40	350	130
Arifs	-	36	335	125
Novertis	-	35	320	125

*Appendix Table 3: Seasonal price indices of egg and
broiler received by farm in 2001.*

Months	Seasonal Price Indices	
	Egg	Chicken
January	98.74	100.08
February	102.87	103.63
March	93.90	107.40
April	89.42	105.42
May	91.65	103.45
June	98.01	102.37
July	109.00	100.16
August	106.30	97.54
September	103.08	94.17
October	109.48	92.95
November	103.52	94.70
December	94.02	98.15
Range	20.06	14.45
C. V.	6.75	4.63