

POULTRY INDUSTRY IN BANGLADESH: WHICH WAY TO SUSTAINABLE DEVELOPMENT?

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1.0 Introduction

1.1 Poultry for Affordable Protein

Poultry industry plays a vital role in achieving food and nutrition security, creating direct and indirect employment and providing the affordable protein source at the cheapest and stable prices for the expanding population in Bangladesh (Table 1, Figure 1). The rising income push, which drives Bangladesh's to gain a lower middle-income country status with a raised per capita income of USD \$1466, has already contributed to increasing per capita consumption of meat, poultry and egg from 18.5 gm per day in 2000 to 26.2 gm per day in 2010, a rise of over 4% per annum (Table 2). This quantity is still far less than the desired intake of 70gm per capita per day, and also lowest amongst quite a number low income countries in recent years (Tables 2 & 3). The surge in overall gross national income by about 13% per annum (Table 4) is likely to further push consumption demand for protein rich foods including chicken meat.

In recent decades, poultry has come a long way in terms of increasing volume of business in the sub-sector, its contribution to GDP, and productive employment of family land and labor services side by

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side with the rapid growth of more organized commercial poultry sector. The industry however needs to be more structured/restructured to increase efficiency in terms of productivity and profitability as well to deliver safe food in affordable prices. The rapid urbanization and preference for more processed and conveniently packaged foods further induces such needs for commercializing the poultry industry. The high density of population with already growing scarcity of arable land imposes compulsion for finding alternate production systems i.e. soilless vertical farming, controlled live bird production systems, etc. The impending threat of poultry diseases draws policy attention to strengthening biosecurity management, improvement of poultry wet market and promoting well organized supply/ value chain for poultry products. These concerns are addressed in major policy documents i.e. Seventh Five Year Plan, and government's commitments to Sustainable Development Goals. The intended participation of private sector in accelerating the responsible food system, commensurate with the attainment of SDGs 1,2, and 12 in particular, further points to a paradigm shift in re/structuring poultry sector.

2.0 Context of Commercial Poultry

Poultry requires a long backward linkage from Grand Parent(GP) stock to commercialize Day Old Chick (DOC) and a streamlined forward integration channel to bridge producers with the consumers. In just 20 years, poultry has come a long way to meet our protein demand, although there remains a huge gap between intended intakes and actual of consumption of poultry products. Big investors started investing in large scale integration starting from Grand Parent (GP) stock to producing DOCs. Eight Grand Parent (GP) breeder farms are established and keep on business. The growing demand for parent stock led to the installation of more than 90 Parent Stock (PS) farms & hatcheries. As importing and maintaining Parent Stock (PS) involves high investment cost, large scale business integration often results in much higher commercial DOC price.

However, the supply of commercial DOCs became steady and affordable, although there are seasonal fluctuations in prices affecting the small poultry farmers. At the same time, broiler chicken started getting popular by the consumers at large, which is attributed to the hard work of government livestock extension service and NGOs for building awareness amongst the investors. This created an atmosphere

for the marginal farmers to step in and play their role as producer of live broilers. In other words, transformation of DOCs to saleable chicken followed the market signals in regards to demand and affordability.

The transformation of commercial DOCs needs very balanced nutrition through ready feed for achieving targeted growth and maintain commercially profitable meat and egg production. To cater to the demand, large integrators invested in vertical expansion and started producing ready feed for poultry, fish and cattle. This whole feed chain has a large number of companies to serve the farmers.

3.0 Size of Poultry Industry

The number of poultry farmers are approx. 150,000 producing 570 million MT of meat (after extraction), and 7347.45 million eggs per annum. Recent statistics shows that about 60 commercial feed production companies produce a total of about 300,000 metric tons of poultry, cattle and fish feeds of which 59% is produced by the top 10 companies. Similarly, 22 companies produce 1.1 million Day Old Chicks per week, of which 60% is produced by the top 10 companies (*Poultry Khamar Bichitra*, January 2017, p. 53).

This sub-sector of agriculture has drawn on commonly cited investment of over 30,000 crores (300 billions), created 8 to 10 million employment in primary, secondary and tertiary sectors, raised self-employment of otherwise unemployed family labor especially in the rural economy, and contributed to women empowerment through accumulation of some disposable income in the hands of rural women.

So far, broiler chicken meat is the cheapest source of protein with the slightest deviation in price over the last five years, which is 2%. During the same period beef & mutton prices went up and beyond the grip of middle income families by 44% & 33% respectively, and very recently we are observing the price of beef and mutton is spiraling out, Taka 650 – 700 perkg.

4.0 Poultry Stakeholders – their Functions and Challenges

Agricultural industries are dispersed and composed of numerous actors working in different clusters and socioeconomic classes. Their opportunities and constraints, and needs and priorities are also different.

4.1 Marginal Farmers

Conversion of Day Old Chick (DOC) to live broiler through proper rearing, farm management, managing bio-security, and controlling diseases to make profits is the key role of marginal farmer in the industry. They are bold small investors usually in dense locations and they bear high risks of losing it all if there is outbreak of diseases. They are dependent on local dealers for DOCs, feeds, medicines and other operational capital. They face numerous problems that put hindrances for their growth and expansion. The input costs of conversion i.e. DOC, feed & medicine has gone very high. On the contrary, the demand supply relationship for poultry products is very elastic, meaning that production in excess of prevailing market demand leaves them to dispose it at too low selling prices to bring any profit for them. Absence of stocking product aggravates this situation. As a result, they cannot expand, implement proper bio-security, gather more knowledge on animal husbandry so as to achieve economies of scale to minimize unit cost of production and make profits. Marginal farmers have limited access to credit from formal financial institutions.

4.2 Dealers

Dealers are the functional bridge between the input producers and the marginal farmers by sourcing the inputs from the large companies through their liaison and self-credibility. They take loan from the large companies and distributing it in forms i.e. DOC, medicines and feeds, and buy back product from the marginal farmers through the post harvesting channel (forward linkage channel) to generate the cash revenue, and thus keep the production cycle in motion. A challenge to the industry from this group is that some dealers may often play the role of "Mahajans", and also do not act responsibly to support the small and marginal poultry farmers.

4.3 Large Integrators

Large integrators are the producers of inputs and maintain complete forward and backward integration channel to establish brand, traceability and other safety standards. The old large integrators are the ones who took big risks and created successful awareness about poultry chicken, which opened up the frontier of business, self-employment by marginal farmers, and growth in protein consumption by making it affordable. Maintaining this complete integration channel imposes very high risk on the investors compared to very high financial stakes and not very high profits earned by them. The first

challenge for the large integrators is that, they do not have any kind of insurance, thus running a very risky live bird business. Second challenge is the risk for the new entrants, as the existing players have already made large and risky investments and established themselves. They are the sort of market oligopoly but generally lack competitive edges as the consumers do usually buy products from the wet market and are not that ready to pay premium price for quality products. Indeed, branding of products is likely to help raise demand for processed products.

4.4 Government

Government has its own stake in the development of the poultry industry, which is playing an essential role in achieving different long term goals i.e. MDG & SDG. The key roles of the government include reviewing the rules and regulation, implementing and enforcing law and order, providing physical and energy infrastructure, supporting the huge number of small and marginal poultry farmers with favorable credit and insurance policy, and encouraging the large commercial poultry sector to create reliable business database for wider dissemination and carry on sustainable production and consumption patterns.

5.0 Change in Dietary Pattern- Implications for Poultry Industry

Intake of carbohydrate, especially rice, has reduced from 458 gm/capita/day in 2000 to 416 gm/capita/day in 2010, resulting in decline of almost 2.5 million MT/annum. In contrast meat, poultry and egg intake has climbed from 18.5 gm/capita/day to 26.2 gm/capita/day, resulting in increase of almost 500 thousand MT of meat, poultry & eggs consumption over the same period (Table 2).

The desired intake/day/capita for meat, poultry & eggs is 70gm with a deficit of 43.8 gm/capita/day or 2.55 million MT deficits of meat, poultry and egg consumption. On a comparative basis, fish has a deficit of 11 gm/capita/day, which means 642,000 MT deficits. This clearly shows that more policy and investment attention needs to be focused on livestock development, especially poultry subsector. To achieve anywhere near this minimum desired amount of meat, poultry and egg intake we need to grow the industry by 167%. The consistent GNI per capita increase and maintaining a stable above 6% GDP growth together with the notable growth of technical expertise in animal husbandry and health science in recent years shows that the poultry has the potential to grow more rapidly in future.

Being the cheapest source of protein so far, a number of conjectures can be thought of. These include (i) keeping low affordable prices for poultry products to reduce dependency on carbohydrates; (ii)

growing number of urban consumers are willing to pay reasonable premium price for safe and hygienic products; (iii) truthful labelling, branding and packaging of poultry products is a precondition, (iv) poultry markets need to be more organized with more modern facilities; and (v) there is a need for stronger food safety authority.

6.0 Food Safety and Bio-Security

6.1 Food Safety defined

“Food safety is about handling, storing and preparing food to prevent infection and help to make sure that our food keeps enough nutrients for us to have a healthy diet. Unsafe food and water means that it has been exposed to dirt and germs, or may even be rotten, which can cause infections or diseases such as diarrhea, meningitis, etc.” (Source: FAO Corporate Document Repository, A Food and Nutrition Handbook, (<http://www.fao.org/docrep/003/x6557e/X6557Eo2.htm>)). The prime need for safe food production and safe handling of food is the compliance of bio- security measures at the farm level. But the compliance of this requires extra investment. Whether or not this is worth it is a question for individual small poultry farms.

6.2 Profitability of Bio-Security Measures: the case of small farms

When calculated for a 1000 bird capacity farm, the calculated cost of bio-security measures for producing per kg of live broiler is very high at the first glance. It may vary due to location of farms, density of farms in the area and many more factors. But, how much will it cost for small and average farmers to implement bio-security measures? The amount is Taka 3.64/kg of live broiler. This may seem very high, especially when one considers lack of knowledge in animal husbandry. The amount spent in bio-security is not a cost but an investment to secure the bigger investment and increase profitability. Bio-security is prescribed thoroughly for any farm to reduce risk and increase productivity, in the form of low Feed Conversion Ratio (FCR), low mortality, and lower medicine cost. These are actually invisible and turn back as profits.

Due to high FCR, DOC cost of live broiler can be decreased by Taka 3.64/kg. Lowering mortality from 5%- 2% will reduce the cost by taka 1.36/kg, manpower cost will reduce by Taka 0.50/ kg, overhead cost will be reduced by Taka 0.8/ kg, feed cost and medicine cost may reduce by Taka 4/kg and Taka 5.45/kg, respectively. With an additional cost of Taka 3.62/kg for bio-security measures, the equation sums up as reduction of Taka 12.13 for producing 1 kg of live broiler (Table 5).

At a glance, we can see that after implementing bio-security the cost goes down by Taka 12.13 per kg of live broiler. This implies that (i) bio-security cost is very modest considering the implications of loss; (ii) it is difficult for smaller farms with less operational cost to implement bio-security; (iii) there is a strong case for educating farmers to organize so as to gain from medium to moderate economies of scale. This last point is related to promoting farmers' organizations, a practice so far attempted in the case of crop farms only. It shows that the bio-security compliance can yield very positive results as follows: (i) increase in productivity; (ii) achieve potential economies of scale; (iii) gain bargaining power of farmers; (iv) achieve better control of the supply side issues to set justifiable price; and (v) facilitate investment in organized poultry slaughtering houses producing safe food for the consumers.

6.3 Cost of Bio-Security and Productivity Gains: the case of Parent Stock Farm

After analyzing comparative cost of an affected and non-affected LPAI parent stock farm of semi controlled type rearing a flock size of 64,000 birds, we saw the following implication and increase in cost.

With an expectation of producing 129 DOC/ Hen Housed (which is the average production of Bangladesh), proper bio-security measures can be taken with a total cost of Taka 1.7 million that creates an incremental cost of Taka 0.265/ commercial DOC in a semi controlled parent stock farm (Table 8). This incremental cost will help to produce better quality DOC which will perform far better in commercial broiler and layer farms in terms of productivity. Bio-security expenses occur as a result of maintaining strict procedural guidelines, medicine and other disinfectants, manpower, depreciation of installed bio-security related machineries.

All these will also have impact on high productivity. Considering the marginal cost is Taka 0.265 per Commercial DOC all the Breeder houses and Layer houses should implement bio-security as the cost implications are nothing.

7.0 Reducing production cost and loss to the industry

7.1 Day Old Chick (DOC)

After analyzing a semi-mechanized PS farm/ campus before and after LPAI out-break, the production has gone down from 129 to 92 Hen-Housed (HH) production. The following are the cost implications:

The data has been derived from few LPAI Affected and non-affected farm of same area, size, and production at same time of the same year. It was attributed as LPAI. No other individual disease was found to be the cause of loss of production of DOC's.

DOC production reduced by 29% with a cost increase of 59% (Table 6). This has a huge impact on the DOC price. At the same time, reduced 29% DOCs play a vital role in price determination given the supply-demand interactions. LPAI related production reduction in GP- PS level has resulted in fall of commercial DOC production having multiple impact on the price of the DOC. There is no other way but implementing precautions against LPAI through vaccination. There may be points of debate about its implementation, but this will reduce the cost of DOC charged from the farmers.

29% reduction of DOC has multifarious impact on poultry sector. It has not only increase in cost of production by 59% also it is creating serious disequilibrium in the supply and demand side of the economy of poultry market. In reality price is being determined at a much higher level than where it should be due to the increase of cost of production.

7.2 Ready Feed

Table 7 shows that the enforced tax and supplementary duty on imported raw materials has a significant toll on the feed price per kg calculated at Taka 1.91 per kg of Feed, which increases the cost of live broiler directly. Feed accounts for about 60% of the total rearing cost.

7.3 Medicines

In Bangladesh, there is a substantial cost of medicines amounting up to Taka 8.45 per kg of live broiler. With proper bio-security and awareness building, this cost can also be reduced to Taka 3 per kg of live broiler with a reduction of Taka 5.45 per Kg of live broiler (Table 5). This however requires increased awareness of farmers to administer medicine when required and as prescribed by certified Veterinary doctors.

According to recent studies, lack of farmers' composite knowledge about scientific rearing of poultry birds is also responsible for incurring high cost for medicines. Adequate technical and poultry husbandry knowledge of individual poultry farmers would have induced them to adopt more of preventive measures i.e. proper brooding, feeding, housing and vaccination, and spend less on curative measures such as medicines and antibiotics, some of which are alleged to be harmful too.

Summarizing all the cost reduction sources, production cost of live broiler can be reduced by Taka 30.24 per kg (Table 9), which will make this extremely important source of protein more affordable to a large population.

8.o Industry Loss Due to Less Production

Commercial farms incur losses due to less than potential production of DOCs, which is influenced by a number of factors including deviation from expected level, mortality, price per unit of DOC etc. At the feed level, actual feed conversion ratio is much less than the norm, resulting in lower production of live broiler than expected. Total loss to the industry for live broiler is estimated at Taka 24,239 million, which after deduction of loss due to DOC (Taka 6076 million) and Feed (Taka 12100 million) stands at a net loss of Taka 6063 million per year.

9.o Introduction to Safe Food

In this section, we will consider three interrelated dimensions of safe food concept- quality of food, standard of slaughtering provisions, and modern outlet for safe food delivery.

9.1 Safe Food and Quality Control

Safe food guarantees traceability throughout the value chain through implementing International Organization of Standardization (ISO), Hazard Analysis and Critical Control Point (HACCP), and Good Manufacturing Practice (GMP). It should further guarantee that the feed ingredients of the poultry birds are natural and without growth hormones or antibiotics administered. The quality of food can be maintained with enforcement of existing law 'National Residues & Contaminants control programs, which assess self-controls adopted by poultry industry. Quality also ensures protection of animal welfare, hygiene standards in the wet market and cold-chain management (static & mobile) of live broiler and dressed poultry products respectively.

Environmental responsibility figures out prominently in safe food system. The wet markets are the major source of contamination and the poor physical and hygienic conditions due to zero management and/or recycling of waste materials deteriorates the environment, which in turn threatens food safety.

9.2 Slaughtering and Slaughter Houses

Slaughtering and processing of live products i.e. animals and birds, is a grave stage of contamination. We have slaughtering law but that needs strict enforcement and review and updating. Slaughtering should be done only in approved slaughtering houses. Unplanned and localized slaughtering are not only contaminating the food but also threatening the environment. Exposing densely populated communities to viral and bacterial challenges because the wastes are dumped/ drained into public sewerage systems or open spaces creates massive health hazards in the country, especially in crowded urban areas.

10.0 Modern Trade Outlets

Modern Trade Outlets (MTOs) in the country are expanding/increasing rapidly with growing urbanization. Introducing customers with a hassle free, hygienic and comfortable shopping spaces needs expansion of customer reach to district and divisional level. Modern trade outlets are divided in two parts, some are chain shops like Agora, Shwapno & Meena Bazar, and area based or locational MOTs with single outlet providing same facility – Unimart, Dhali, Shop & Save, etc.

The spillover effect of these MTOs are further encouraging others to copy the concept of MTO and applying it to a smaller scale to cater to local and area wise consumers, i.e. daily shopping, which is a chain MTO in a smaller scale.

There is very little data available on the MTOs and their sales, but the MTOs will be the key element to deliver safe food to consumers, because people shopping from MTO's are likely to have better purchasing power and concern over safe food. This will be the perfect channel to introduce and push safe chicken to the customers.

An in-house research data shows that the overall retailing industry is growing at average 14% per annum due to both economic growth and urbanization. According to a World Bank report, the top 20% of the population in terms of income accounts for 41.4% of total consumption, implying modern retail has the potential to quintuple in turnover with time. (Source: Food Market and Consumer Behavior, World Bank-2012). Bangladesh Modern Trade Outlet is estimated to grow BDT 3027.25 billion (\$38.8 billion) by 2021. These outlets can be the mainstream to promote 'Safe Poultry Food' in the country to grow at double digit annually.

11.0 Piloting Safe Food Zone

This involves standardization of wet market hygiene and strict adherence to it for improvement of wet market. Identification and gradual phasing out of wet markets in metropolitan areas can be thought of on a pilot basis. Animal slaughtering anywhere needs to be restricted. Building awareness amongst the people about health, hygiene and safe food system is needed.

12.0 Conclusions and Recommendations

Poultry industry is growing steadily and has made tremendous contribution to economic growth, affordable protein supply, employment of land and labor, above all women empowerment. Now that commercialization of agriculture is taking place, more investment and policy support is needed for accelerating the growth of this subsector. Major areas of interventions include as follows:

- i. Strengthen the forward linkage aspects of the poultry industry i.e. product marketing, processing, storage, and waste disposal.
- ii. Extend policy, extension and credit support to the lower end of the industry i.e. small and marginal farmers; piloting of poultry insurance program can be tried.
- iii. Support bio-security measures at the local marginal poultry farm level
- iv. Make provisions for training, extension and credit support to market intermediaries i.e. input dealers, *Farias and Beparis* involved in poultry product supply chain.
- v. Encourage big DOC companies to create provisions for dedicated poultry information repository, and facilitate wider access to production related information so that the others stakeholders including smaller farmers can plan their production strategies based on reliable data. This will help rational price formation and hence improve profitability and sustainability of the industry.
- vi. Create provisions for early warning about weather, disease incidence, price forecast, etc.; DLS in collaboration with the reformed DAM should be the appropriate institutions to handle this.
- vii. Divert part of the subsidy to establishing slaughter houses as well as poultry product storage facilities at the local level; this will enhance the scope of delivering safe food to growing population.

- viii. Encourage business plan for branding of products so that the safe food conscious consumers become interested to pay higher price for assured quality; this can also help benefit of economies of scale (e.g. responsible contract growing system).
- ix. Create a Logo for Safe Food market places which sells certified Safe Food and promote the logo through branded packaged products.
- x. Improve poultry waste management, integrating it with overall waste management initiatives in the country.
- xi. Address reduction of feed cost through rationalization of taxes and duties for raw material import; exploit the possibilities of manufacturing critical raw materials domestically.
- xii. Review the possibility of LPAI vaccine at GP- PS level for controlling fall of DOC production from the expected level.
- xiii. Allocate modern trade outlets in municipal corporation markets and more of convenient stores & supermarkets in new neighborhood markets through the Dhaka and other greater metro city expansion programmes.
- xiv. Take initiatives for a comprehensive poultry sector review considering the rapidly changing food systems, urbanization, income push, deepening of private sector, and the increasing demand for safe food.

TABLE 1: Meat & Chicken Prices by Year (Tk./ Kg: 1 USD = Taka 80)

Year	Beef	Broiler	Chicken (Deshi)	Mutton
2012	285.6	143.5	300.0	425.0
2013	267.6	140.7	300.0	414.5
2014	281.0	137.4	304.5	423.9
2015	359.6	140.1	328.4	519.2
2016	410.4	146.8	358.2	566.0
Grand Total	327.6	141.6	320.6	477.8

Source: Latest Market Prices taken from Trading Corporation of Bangladesh, <http://www.tcb.gov.bd/> and average yearly prices calculated by Aftab Bahumukhi Farms Limited

TABLE 2: Per Capita Food Intake by Items (gm/ day)

Food items	2000	2005	2010	Desirable intake	
				Gram/day	% energy
Cereals	486.7	469.2	463.9	400	56
Rice	458.5	439.6	416	350	49
Potato	55	63.3	70.3	100	4
Vegetables	140.5	157	166.1	300	4
Fruits	28.4	32.5	44.7	100	3
Pulses	15.6	14.2	14.3	50	6.5
Milk/milk prod.	29.7	32.4	33.7	130	3.5
Meat, poultry, egg	18.5	20.8	26.2	70	4
Edible oil	12.8	16.5	20.5	30	11
Fish	38.5	42.1	49.5	60	3
Spices, candy	50	53.4	66.2	20	2
Sugar/gur	6.9	8.1	8.4	20	3
Miscellaneous	10	38.2	36.5	N/A	N/A
Total	893.1	947.7	1000	1280	

Source: Table 5.2, Seventh Five Year Plan Preparation – Background Paper on Food Security and Nutrition; HIES 2010. Desirable intake is from Desirable Dietary Pattern for Bangladesh. NFPCSP/FAO study, 2013.

TABLE 3: Per Capita Income and Meat Consumption by Country

Country	GNI / Capita - 2015 US \$	Per capita meat (lbs.) 2009	Lbs. to Kg
Cambodia	1070	16.66	7.56
Yemen, Rep.	1140	17.9	8.12
Myanmar	1160	32.1	14.56
Bangladesh	1190	4	1.81
Lesotho	1280	18.3	8.30
Tajikistan	1280	14.7	6.67
Cameroon	1320	12.7	5.76
Kenya	1340	16.7	7.57

Source: GNI per capita: <http://data.worldbank.org/indicator/NY.GNP.PCAP.CD?end=2015&locations=BD&start=2005>
Meat consumption/ capita: https://en.wikipedia.org/wiki/List_of_countries_by_meat_consumption

TABLE 4: Economic Indicators of Bangladesh by Year

Year	GNI per Capita	GDP Growth
2007	590	7.06
2008	650	6.01
2009	710	5.05
2010	780	5.57
2011	870	6.46
2012	950	6.52
2013	1010	6.01
2014	1080	6.06

2015	1190	6.55
Source: http://data.worldbank.org/indicator/NY.GNP.PCAP.CD?end=2015&locations=BD&start=2005		

TABLE 5: Estimated Cost Benefits of Bio-security Measures – Broiler Farm

Particulars	COGS Normal	COGS Bio- security Implemented	Deviation
DOC Cost TK/ KG	40.00	36.36	(3.64)
Feed Cost	66.00	62.00	(4.00)
Medicine Cost	8.45	3.00	(5.45)
Manpower Cost	3.00	2.50	(0.50)
Overhead	3.00	2.20	(0.80)
Mortality	2.11	0.74	(1.36)
Additional Cost for Bio	-	3.62	3.62
COGS/KG	122.56	110.42	(12.13)
Source: Aftab Bahumukhi Farms Limited, Costing Department			

TABLE 6: Impact of LPAI on Production and Cost of Semi-Mechanized PS Farm

Net Impact (total nos. of Com DOC reduced due to LPAI effect) based on 3,000 nos. of birds housing capacity per flock	110,347Pcs.
Net Impact (Cost Tk./DOC Increased due to LPAI effect) based on 3,000 nos. of birds Housing capacity per flock	Tk. 14.96
Commercial DOC Production Reduced % due to LPAI effects to Broiler PS farm	29%
Cost Increase % due to LPAI effects to Broiler PS farm	59%
Source: Aftab Bahumukhi Farms Limited, Costing Department	
Note 1: Bangladesh standard production is estimated as 129 DOC/ Hen housed	
Note 2: Net number of Commercial broiler DOC production reduced as affected by LPAI is 110,347 Pcs.	

TABLE 7: Cost of Feed Ingredients, Tax and Supplementary Duty

Ingredients	% of Cost/kg	Basic Cost/Kg	% of Excluding Other Landed Cost/kg	Tax Imposable amount/kg	Imposable Tax Rate			Tax Imposed(Tk./kg)
					CD	AIT	ATV	
1. Maize Cost	52%	15.57	15%	13.24	-	5%	-	0.66
2.Soyabean Cost	35%	10.48	15%	8.91	10%	-	4%	1.25
Total	87%	26.06	30%	22.15	10%	5%	4%	1.91

Source: Aftab Bahumukhi Farms Limited, Costing Department

TABLE 8: Incremental cost of Bio-security – PS Farm

Cost Head	Total cost (Tk.)	Cost Tk./ Hen Housed	Cost Tk./Commercial Broiler DOC
Medicine cost	1,361,743	21.28	0.16
Manpower cost	342,400	5.35	0.04
Depreciation charges for Machineries	500,000	7.81	0.06
Total	1,704,143	34.44	0.26

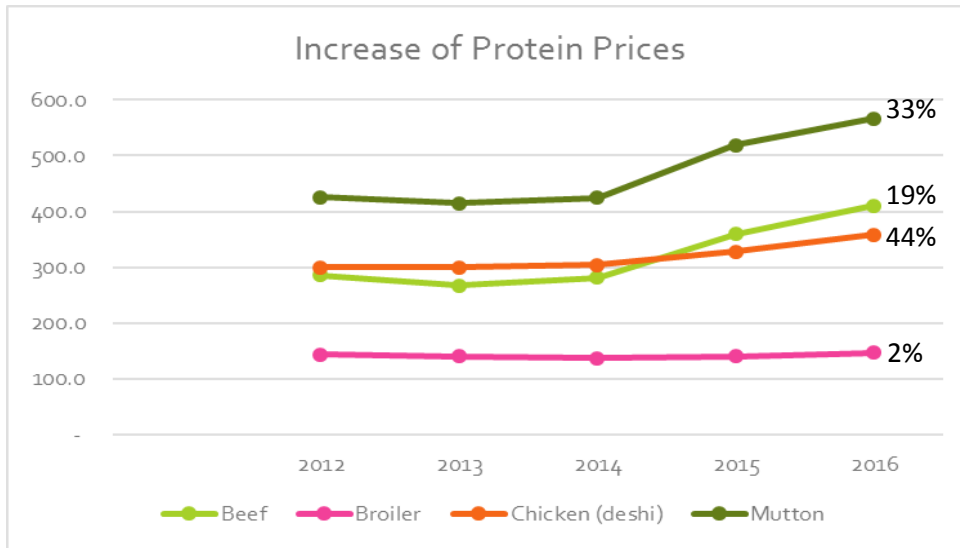
Source: Aftab Bahumukhi Farms Limited, Costing Department

TABLE 9: Tentative Total Cost Reduction in PS Farm

Particulars	Cost
PS to DOC - LPAI	14.96
Bio- Security Broiler Farm Level	12.13
Feed Cost Impact	3.15
Total Tentative Cost Reduction	30.24

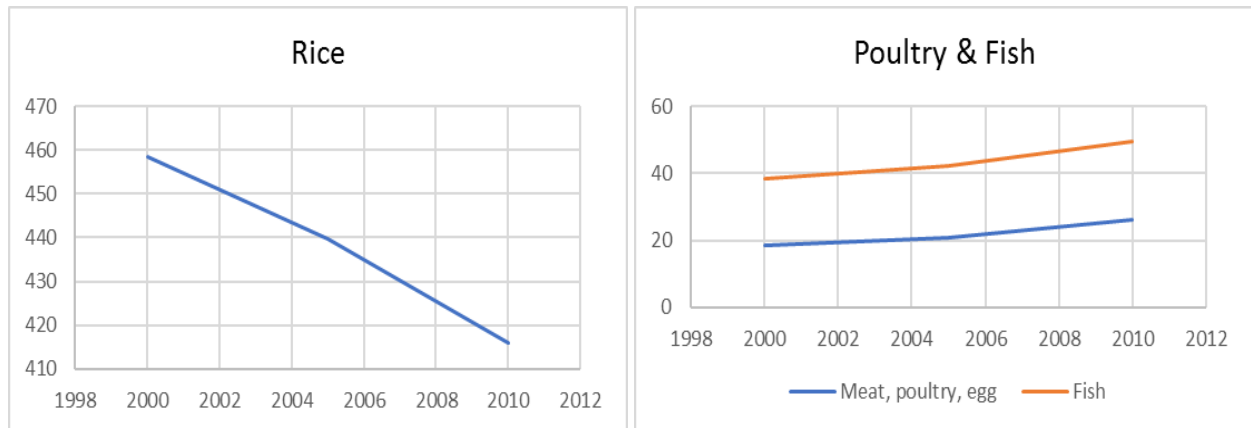
Source: Aftab Bahumukhi Farms Limited, Costing Department

FIGURE 1: Overtime Changes in Protein Products



Source: TABLE 1 Meat & Chicken Prices by Year (Tk./Kg: 1 USD = Taka 80);
 Source: Latest Market Prices taken from Trading Corporation of Bangladesh, <http://www.tcb.gov.bd/> and average yearly prices calculated by Aftab Bahumukhi Farms Limited

FIGURE 2: Overtime Changes in Consumption of Rice, Poultry & Fish



Source: TABLE 2 Per Capita Food Intake by Item (gm/ day)
 Source: Table 5.2, Seventh Five Year Plan Preparation – Background Paper on Food Security and Nutrition; HIES 2010. Desirable intake is obtained from Desirable Dietary Pattern for Bangladesh. NFPCSP/FAO study, 2013.